5. Alternatives Analysis & Development Plan

Introduction

Airfield and landside development alternatives are identified for COS in this Master Plan based on the analyses completed in Chapter Four, *Demand/Capacity & Facility Requirements*. This chapter examines alternative development concepts and uses evaluation criteria to select a preferred development scenario to meet identified facility requirements in each of the following Airport functional areas:

- Airfield
- Passenger Terminal
- Automobile Parking and Rental Car
- Westside Development Area
- Airport Traffic Control Tower (ATCT)
- Airport Surveillance Radar (ASR)/East Deicing Apron
- Consolidated Airfield Maintenance/East Hangar Development

The order with which the development alternatives are evaluated reflects the need to implement an integrated development plan for the Airport's various facilities. The development of the airfield may impact development of general aviation, air cargo, and aviation support facilities which, in turn, must synchronize with the Airport's access and parking infrastructure.

Evaluation of Alternative Development Scenarios

A set of evaluation criteria was established to facilitate the selection of preferred development scenarios. These criteria will be used to compare and contrast the potential benefits and impacts of the alternative development incorporated into the selection process. The evaluation criteria include the following selections:

Safety/Operational Factors – Each alternative is evaluated on its ability to safely accommodate future demand for aircraft, vehicles, and other relevant traffic (based on each specific facility). This criterion evaluates an alternative's anticipated improvements to operational safety, capacity, and delay; tenant and user convenience; and other relevant planning considerations.

Economic Factors – Economic factors—historic infrastructure investment, the remaining useful life of existing Airport facilities, anticipated "order of magnitude" project costs, and property acquisition requirements—are considered in this analysis. These factors provide a basis for comparing the cost-effectiveness and economic ramifications of various development scenarios.

Environmental Factors – Relevant environmental factors including, but not limited to, noise, wetland, and contamination impacts, contribute to this analysis. These factors illustrate a scenario's environmental impacts and identify those that may minimize environmental disruptions.

Implementation Feasibility – Qualitative and quantitative factors can impact an airport's ability to implement certain development schemes. Community and political acceptance are examples of implementation feasibility factors considered in this analysis.

Alternative development scenarios are evaluated based on these factors. The results highlight preferred development alternatives that satisfy the previously specified facility requirements. Recommendations for development will be illustrated on the Airport Layout Plan (ALP) as part of this Master Plan.

Airfield

The facility requirement analysis examined the potential need for airfield development projects to enhance the Airport's ability to safely and efficiently accommodate current and projected activity. Key considerations in that analysis included airfield capacity and congestion, design standards and other safety issues, and facilities and equipment providing navigational and visual aid.

Airfield facilities deemed sufficient in Chapter Four are only addressed in this chapter if future airfield development could impact their ability to accommodate activity through the planning period. The following sections examine specific requirements identified for each of these facilities, the findings and recommendations of related previous analyses, and potential new development options to identify a preferred airfield development scenario.

Runway and Taxiway System

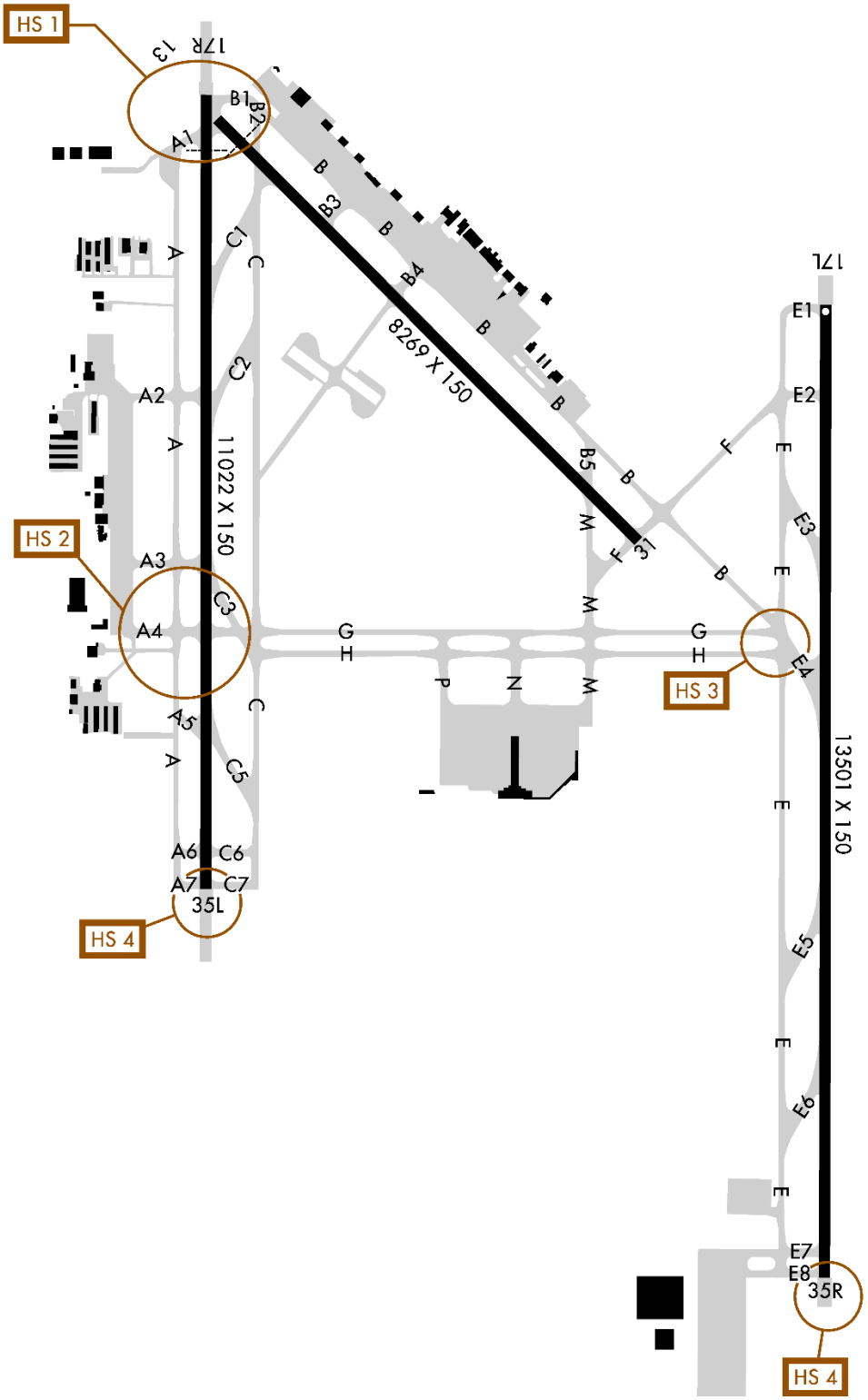
Chapter Four examined the ability of the Airport's existing runway and taxiway system to accommodate projected levels of activity through the 20-year planning period. The results indicated that the existing airfield configuration provides sufficient capacity to efficiently accommodate aircraft operational demand through the planning period. The Airport's estimated airfield demand/capacity ratio is not projected to reach the key benchmarks that would demand enhanced capacity.

As shown in Chapter Three, *Aviation Activity Forecast*, because the use of narrowbody and large jets will continue to grow at COS, the demand for the necessary facilities will also continue to grow. The runway and taxiway system at COS was designed to accommodate these aircraft while still servicing smaller aircraft. The popularity of regional and narrowbody jet aircraft among domestic air carriers may drive increased jet traffic at the Airport. Despite the projected increased traffic, the existing runway and taxiway system should be maintained to existing standards to serve air traffic.

The previous Master Plan, completed for COS in 2013, reached similar conclusions. The 2013 airfield development scenario included shifting and extending Runway 17R-35L to increase the overall length by 710 feet to efficiently accommodate projected activity while addressing Hot Spot #1 (Runway 17R-35L coupled with Runway 13-31). In addition, the 2013 plan called for the relocation and displacement of the Runway 13 threshold, effectively shortening the runway by 400 feet. The 2013 recommended airfield development scenario was re-evaluated in this Master Plan.

The findings and recommendations of the Airport's 2013 Master Plan, as it pertains to the runway and taxiway system, are summarized in the following section. On the following page, a simplified airport diagram is provided for referencing the airport layout as well as the runway and taxiway systems.

Figure 5-1: Simple Airport Diagram



2013 Master Plan

The Airport's 2013 Master Plan evaluated facility requirements and selected an airfield development concept that addressed demand and design issues. Some airfield facility requirements identified in the 2013 plan continue to be relevant considerations for future Airport development. Below is a summary of airfield recommendations from the 2013 Master Plan:

- Relocating the threshold and associated taxiways for Runway 17R 1,790 feet south and demolishing the remaining pavement before the threshold. Extending the Runway 35L end and associated taxiways 2,500 feet south.

- Constructing a parallel taxiway (shifting existing Taxiway A west 100 feet) for Runway 17R-35L with a runway/taxiway separation of 500 feet to serve large aircraft. Removal of segments of existing Taxiway A.

- Relocating high-speed exits off Runway 17R-35L connected to Taxiway C, positioned relative to the shifted runway. The High-speed exits require additional modifications:

    - Relocation of high-speed exit C1 approximately 3,300 feet south to provide an ideal aircraft exit location relative to the runway shift—effectively removing C1 and constructing a new exit south of C2.

    - Closure of high-speed exit C3 to address multiple converging taxiways associated with Hot Spot #2.

    - Development of a new high-speed exit near the existing Runway 35L threshold. This will provide an ideal aircraft exit location relative to the southern runway shift.

- Relocating high-speed exit E4 serving Runway 17L-35R and Taxiway E. The high-speed exit will be shifted 1,700 feet south of its current location to address multiple converging taxiways associated with Hot Spot #3 and to provide an ideal aircraft exit location.

- Constructing runway end entrance, exit, and bypass taxiway connectors on both ends of Runway 17R-35L associated with the runway shift as well as a new bypass connector serving Runway 17L. This change will provide runway end entrance, exit, and bypass taxiway connectors on the parallel runways.

- Demolishing and constructing various taxiway connectors to improve consistency with taxiway design principals and address Hot Spots related to taxiway congestion and confusion. This includes modification to the following taxiway connectors:

- Closure of A1 with Runway 17R threshold relocation
- Relocate A2 to avoid direct apron-to-runway access
- Modify A3 and A4 to avoid direct apron-to-runway access
- Given removal of some taxiway connectors and to enhance aircraft flow to the general aviation (GA) apron and Taxiway A, construct a high-speed exit for aircraft landing on Runway 17R near A3
- Realign the end of Taxiway B with its connection to Taxiway E to address multiple converging taxiways associated with Hot Spot #3

The findings and recommendations from the 2013 Master Plan for airfield enhancements related to Runway 17R-35L and 17L-35R have been reevaluated in this Master Plan. Recommended projects related to Runway 17L-35R and associated taxiways are carried forward in this and onto the Airport Layout Plan. Similarly, the recommended project to shift Taxiway A with a 500-foot separation from Runway 17L-35R is reasonable, follows FAA design guidelines and is carried forward in this Master Plan.

This Master Plan further studies requirements to shift Runway 17R-35L south and decouple it from Runway 13-31. An investigation of the geotechnical and subsurface factors associated with extending Runway 35R is a key element of the final design. Although a detailed investigation and survey is not included in this Master Plan, some research of the existing surface and subsurface conditions will inform future cost assessments. Cost estimates to extend the runway will be developed.

Airfield Safety Areas

The 2013 study examined various alternatives to address compliance issues with the Runway Protection Zone (RPZ) and Runway Safety Area (RSA) for Runway 13. The study noted that the RPZ for Runway 13 had a road passing through it and called for the road to be relocated or the runway end shifted. The study also called for a runway shift to rectify the non-standard condition of the RSA off the end of Runway 13. The resulting recommendation reduced the runway length by 400 feet and displaced the Runway 13 threshold by 510 feet.

The recommendation from the previous Master Plan was reevaluated. With the shift of Runway 17R-35L to the south, the RSA for Runway 13 follows FAA design standards and does not require a shift. It was also determined that the current RPZ issue does not require a runway shift or road relocation. The FAA's land use guidance related to RPZs calls for compliance if/when the location and/or size of the RPZ changes. The road within the current RPZ is effectively "grandfathered" with previous RPZ guidance and does not require a shift of the Runway 13 threshold. Given these factors, changes to the Runway 13-31 length and

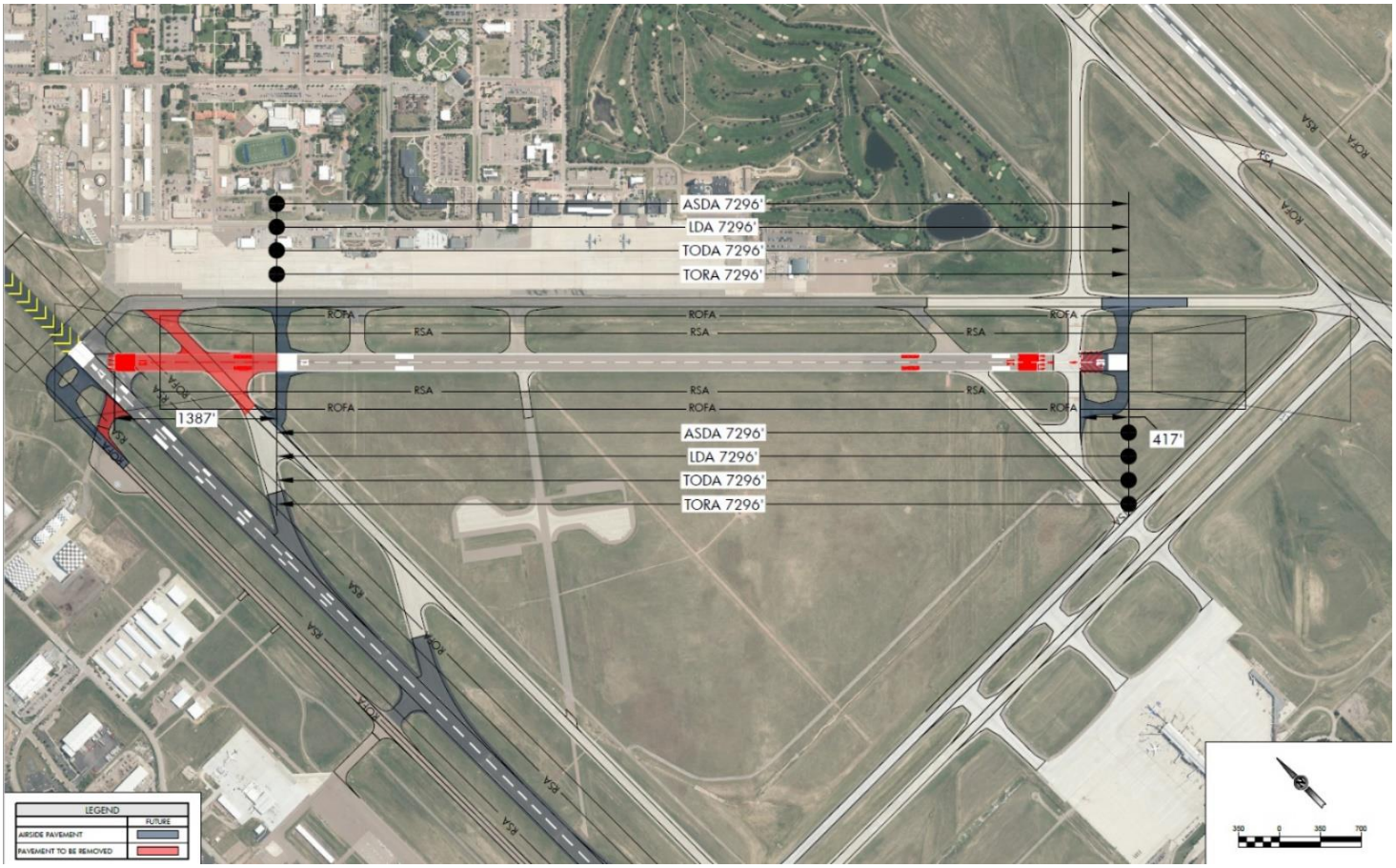
thresholds, as depicted in the 2013 Master Plan, are not required or recommended in this Master Plan.

This Master Plan provides the opportunity to reevaluate the recommendations made in the 2013 Master Plan and look for ways to meet design standards with potentially more cost-effective solutions. The option to address the Hot Spot #1 (HS 1) coupled runway issue by shifting Runway 13-31 and not shifting runway 17R-35L (as recommended in the 2013 Master Plan) was reexamined.

Runway 13-31 Alternative #1

The first Runway 13-31 option to address HS 1 was to shift the Runway 13 threshold 1,387 feet east to separate the RSA for Runway 13-31 from Runway 17R-35L while maintaining a 1,000-foot RSA. Runway 31 is extended 417 feet east to provide additional length while maintaining a 1,000-foot RSA. This effectively creates a standard runway configuration without the use of declared distances and produces a runway length of 7,296 feet. Runway 17R-35L is not shifted in this solution. **Figure 5-2** illustrates this alternative and includes associated taxiway improvements.

Figure 5-2: Runway 13-31 Alternative #1

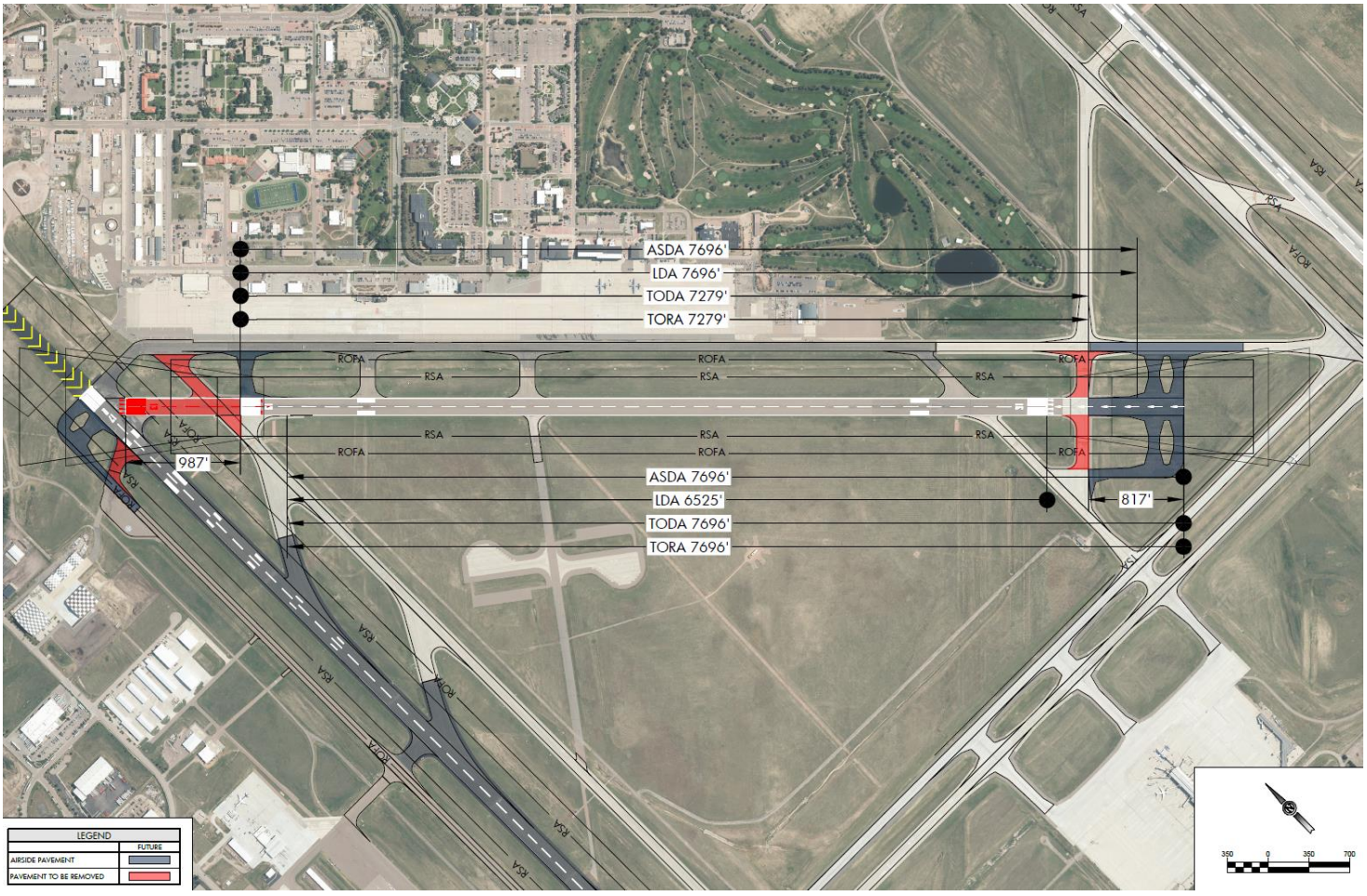


Source: Jviation

Runway 13-31 Alternative #2

The second Runway 13-31 option to address HS 1 was to shift the Runway 13 threshold 987 feet east and extend the Runway 31 end by 817 feet. This option employs the use of declared distances that require a 600-foot RSA prior to the landing threshold and 1,000-foot RSA beyond the runway departure end. Additionally, this alternative maintains the Runway 31 threshold in its current location and positions the takeoff point for departures on Runway 13 in a location that retains the existing approach and departure surface locations. This option creates various takeoff and landing lengths used in declared distances to meet design standards while extending usable runway length. Similar to Alternative #1, Runway 17R-35L is not shifted in this solution. **Figure 5-3** illustrates this alternative and includes associated taxiway improvements.

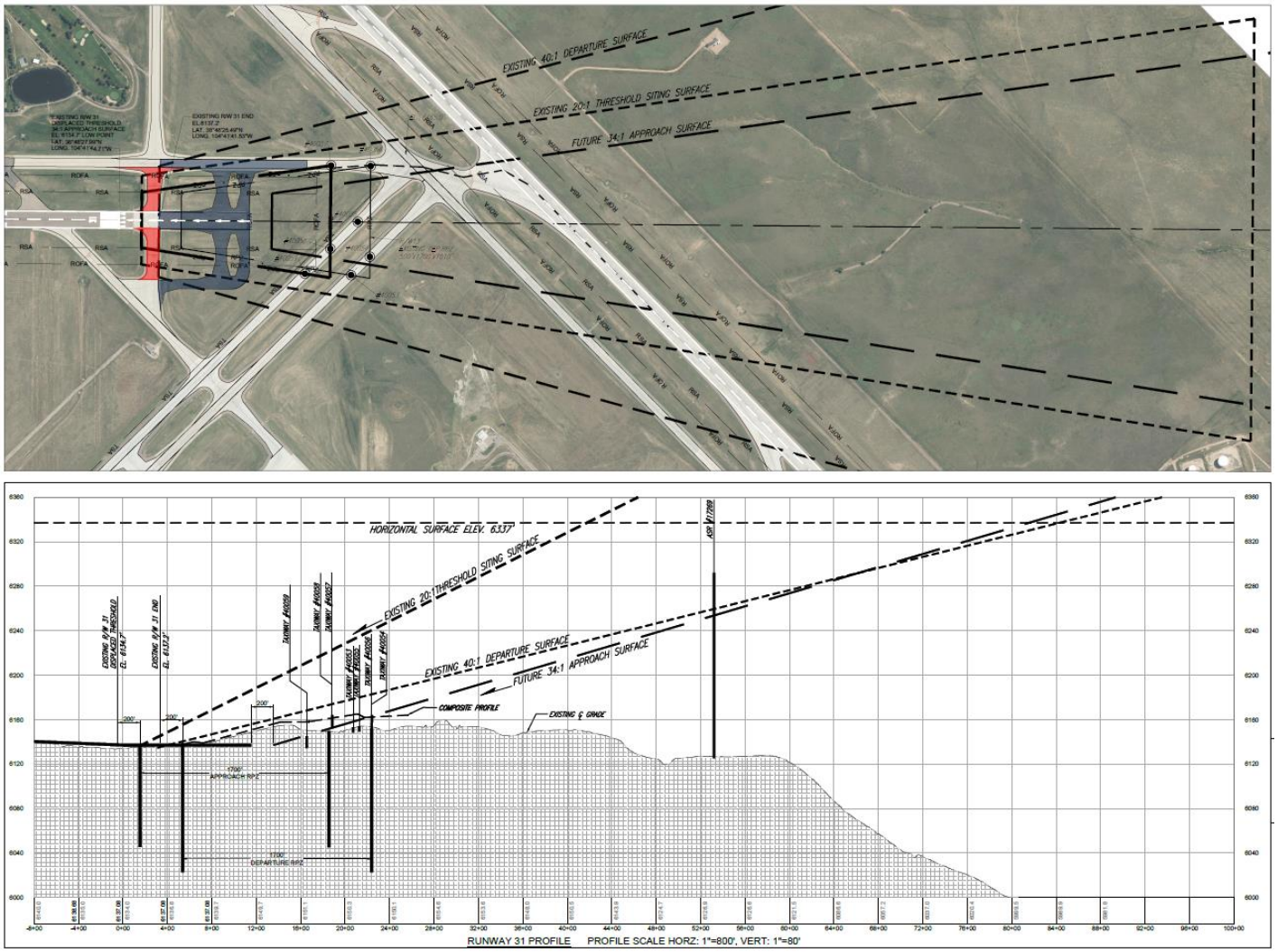
Figure 5-3: Runway 13-31 Alternative #2



Source: Jviation

Runway 13-31 Alternative #2, is the preferred option to address HS 1 because it does not require a shift in Runway 17R-35L (far more costly), provides greater takeoff length from Runway 31 than Runway 13-31 Alternative #1, and maintains existing approach and departure slopes on the Runway 31 end **(Figure 5-4**).

Figure 5-4: Runway 31 Alternative #2 Profile

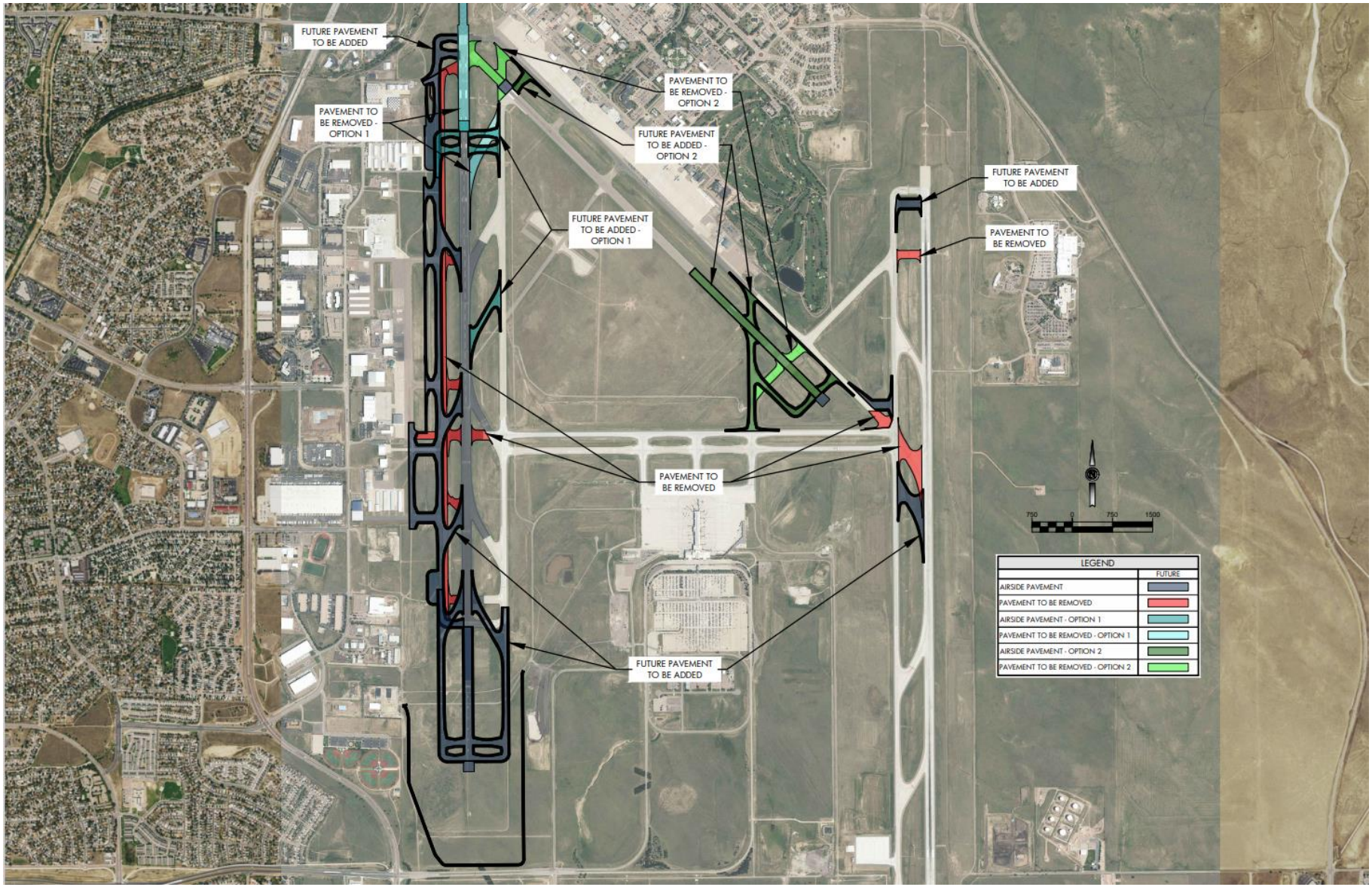


Source: Jviation

The decoupling of Runway 17R-35L from Runway 13-31 creates an opportunity to improve efficiency and aircraft flow by modifying the runway end entrance, exit, and bypass taxiway connectors serving the runways. On the Runway 13 end, pavement prior the Runway 13 threshold will be removed to simplify movement paths At Runway 31, existing connectors will be abandoned, and new connectors added to the extended runway end. These improvements will simplify the taxiway layout, reduce possible confusion, and enhance aircraft flow. The grade of the Runway 31 will be adjusted to meet design standards.

Figure 5-5 illustrates options to address HS 1, with Option 1 being to shift Runway 17R-35L as presented in the previous master plan and Option 2 being to shift Runway 13-31 as presented above. Both these options require additional study to determine a preferred solution. After discussion with COS and the FAA, the recommendation is to illustrate both of these options on the ALP and evaluate them further to include survey and design to lead to a preferred option.

Figure 5-5: Airfield Development Plan



Source: Jviation

Passenger Terminal

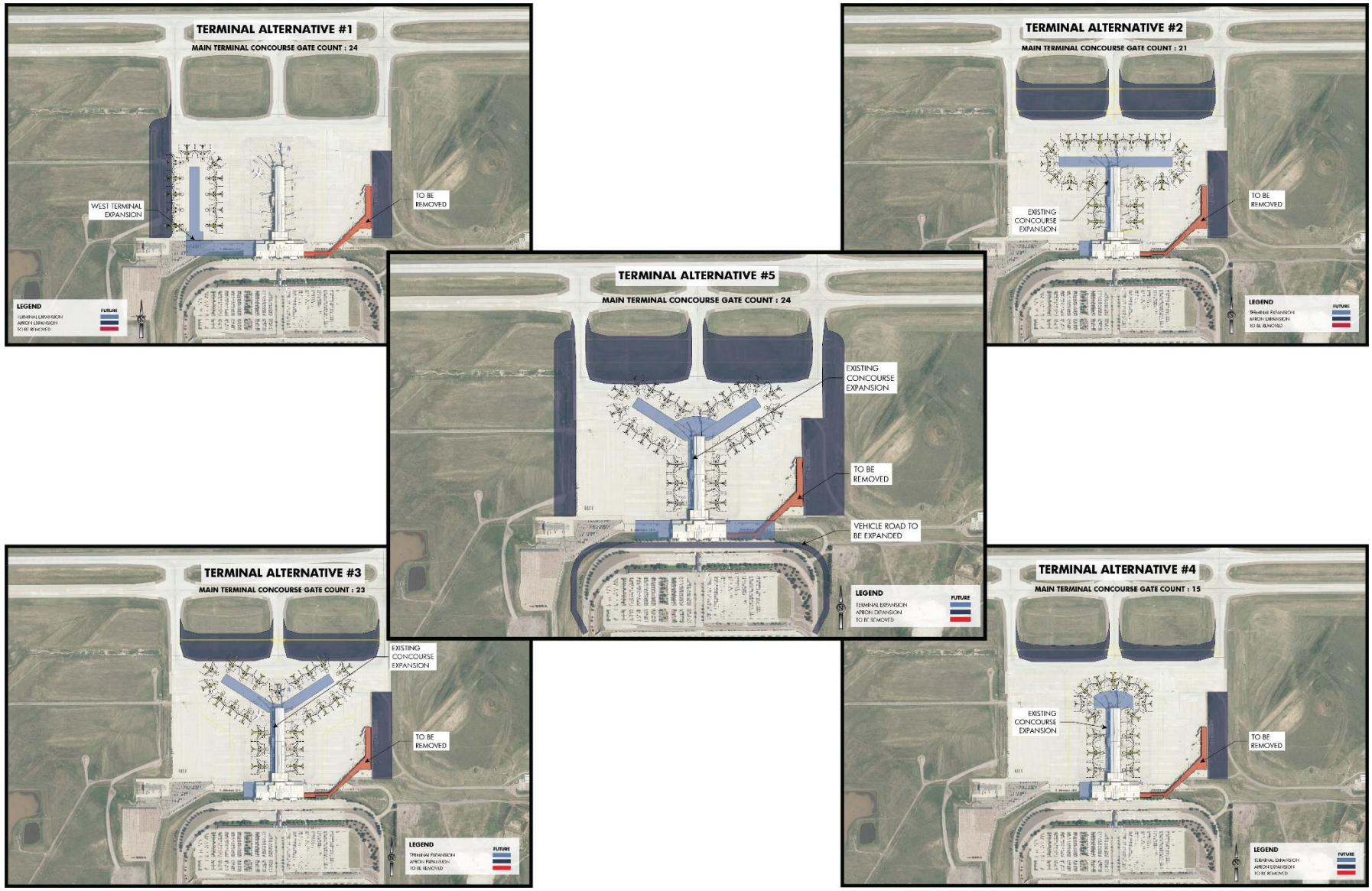
Chapter Four, *Demand/Capacity & Facility Requirements,* identified a long-term need to expand the overall terminal building to accommodate air carrier passenger levels once they begin to approach 1.6 million annual enplanements—identified as Passenger Activity Level (PAL) 4. The expansion of the terminal building would increase space for passenger circulation, security screening, concessions, gates, and other functional areas. Interim improvements before overall terminal expansion may be necessary to accommodate short-term demands. Baggage system, passenger screening and other areas of the terminal may be required before large scale capacity enhancements are made.

A series of terminal development options review possible modifications to the existing terminal that would accommodate long-term demands. The complete redevelopment of the terminal building, including demolition of the entire existing terminal, was not studied as many portions of the existing terminal are viable and well within their useful life.

It is important to note that these options are simple terminal layouts that provide a high-level perspective of overall building, gate, and apron space. As passenger volume increases and the Airport seeks ways to expand the terminal, a more thorough terminal capacity and design effort should be undertaken to determine the best plan for COS. The preferred option shown within this Master Plan is intended to preserve the Airport's ability and interest to carry out such a future evaluation. **Figure 5-6** illustrates four terminal building expansion alternatives to accommodate a greater level of passenger activity than today.

Following the graphic, each alternative is summarized and evaluated, followed by a recommendation.

Figure 5-6: Terminal Development Alternatives



Source: Jviation

Passenger Terminal Alternative Descriptions

Terminal Alternative 1 – This alternative effectively doubles the size of the existing terminal by adding and connecting another full-length concourse. This produces a total count of 24 narrowbody main terminal gates (not including the East Terminal Unit). Additional apron space is added to the western edge of the existing apron to provide adequate aircraft pushback and movement area. This alternative would require an additional TSA checkpoint at the beginning of the new concourse.

Terminal Alternative 2 – This alternative extends the concourse to create a T-shaped design to utilize existing apron space and terminal infrastructure. The existing terminal and concourse are widened to provide more circulation, concession, and holdroom space leading to the additional gates. This alternative produces a total of 21 narrowbody aircraft gates within the main terminal concourse. This alternative removes the East Terminal Unit and expands the apron area east to allow for more aircraft and ground service equipment movement, staging, and parking. The apron is also expanded to the north with two taxilanes running east/west, providing air carrier aircraft with multiple taxi routes to access gates.

Terminal Alternative 3 – This alternative extends the concourse to create a Y-shaped configuration intended to utilize the depth of the existing apron space. In this alternative, the existing terminal and concourse are also widened to provide more circulation, concession, and holdroom space leading to the additional gates. The Y-shaped design promotes a centralized concession area where the three legs converge. This alternative produces a total of 23 narrowbody aircraft gates within the main terminal concourse and removes the East Terminal Unit to expand the apron area east to allow for more aircraft and ground service equipment movement, staging, and parking. In addition, the apron is expanded to the north with one taxilane running east/west to allow for adequate aircraft pushback and circulation.

Terminal Alternative 4 – This alternative creates a rounded-end at the end of the existing concourse, creating additional gates, a centralized holdroom, and a concession area. The existing terminal and concourse are widened to provide more circulation, concession, and holdroom space leading to the additional gates. This alternative produces a total of 15 narrowbody aircraft gates within the main terminal concourse. This alternative removes the East Unit Terminal as additional apron area used for aircraft and equipment movement, staging and parking. The apron is expanded to the north, with one taxilane running east/west, to allow for adequate room aircraft pushback and circulation off the end of the concourse. This alternative could be viewed as a preliminary phase of expanding the concourse further in the T or Y configuration, as noted in the previous two alternatives.

Terminal Alternative 5 – This alternative is created by combining Alternatives 3 and 4 noted above. The configuration could be completed into two stages with the rounded-end completed first, then the Y-shaped added as demand increases, or completed all at once. This alternative creates a rounded-end at the end of

the existing concourse, creating additional gates, a centralized holdroom, and a concession area as well as a Y-shaped configuration intended to utilize the depth of the existing apron space and provide a total of 24 gates. The East Unit Terminal is removed, and the apron is expanded on both the east and west to provide double width taxilanes to all gates as well as additional apron space for aircraft and equipment movement, staging and parking. The apron is also expanded to the north with two taxilanes running east/west, providing aircraft with multiple taxi routes to access gates.

Passenger Terminal Alternative Evaluation

The matrix presented in **Table 5-1** compares each alternative with respect to the evaluation criteria. To measure and rank the quantitative and qualitative impacts associated with each alternative, a value range of 1 to 5 was assigned to each evaluation criterion. A value of 1 represents the least benefit, and a value of 5 represents the most positive impact or provides greater benefit. It must be noted that this evaluation is non-scientific and is based on an understanding of the Airport, community, and industry standards.

Table 5-1: Passenger Terminal Alternatives Evaluation Matrix

Alternatives	Safety/Operations	Economic	Environmental	Implementation	TOTAL
Alternative 1	1	2	3	4	10
Pros	Doubles main terminal gate count, minimal disruption to existing operation during construction.				
Cons	Requires extensive existing apron space, congested taxilanes to concourses, requires two screening stations, costly.				
Alternative 2	3	3	3	2	11
Pros	Significant gate capacity, consolidated screening, promotes centralized concessions at center of T, provides additional apron space.				
Cons	Taxilane congestion off ends of T, major disruption to existing operation during construction, costly.				
Alternative 3	4	3	3	2	12
Pros	High gate capacity, consolidated screening, promotes centralized concessions at center of Y, produces additional apron space.				
Cons	Taxilane congestion off ends of Y, major disruption to existing operation during construction, costly.				
Alternative 4	5	4	3	3	15
Pros	Consolidated screening, promotes centralized concessions at end of concourse, utilizes existing apron with little expansion required, consistent with expected gate demand (cost effective), allows for additional long-term expansion in other areas.				
Cons	Adds fewest number of gates, moderate disruption to existing operation during construction.				
Alternative 5	5	5	3	5	18
Pros	Consolidated screening, promotes centralized concessions at end of concourse, utilizes existing apron, expanded apron for movement, staging and parking, consistent with expected gate demand (cost effective), allows for additional long-term expansion in other areas, promotes phasing development opportunities, no taxilane congestion, high gate count.				
Cons	Moderate disruption to existing operation during construction, costly				

Source: Jviation
Note: Criterion Scores Range: 1 = least benefit; 5 = Positive impact/most benefit

Pros and cons for each alternative are provided in the table above and explain the evaluation scores. Based on the evaluation, it is recommended that Alternative 5 be carried forward in the Master Plan and ALP set. As noted earlier, further study of the terminal capacity and design requirements should be undertaken when terminal expansion is initiated.

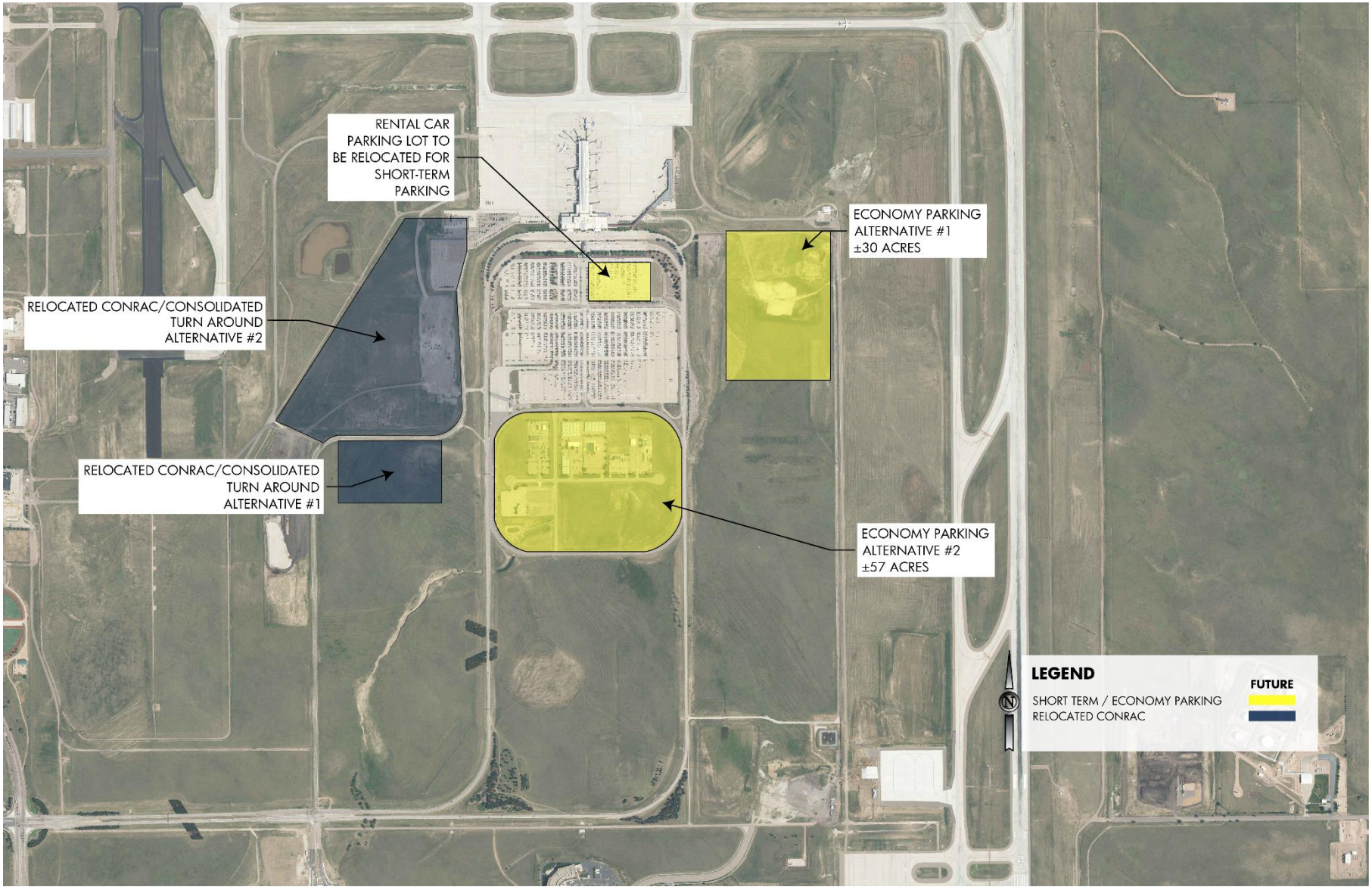
Automobile Parking and Rental Car

As noted in the previous chapter, automobile parking at COS is near capacity during peak periods of passenger activity. The short-term parking lot (7 acres) periodically reaches capacity, forcing visitors who would otherwise use short-term parking to park in the long-term lot. Consequently, long-term parking (34 acres) may reach capacity when short-term parking overflows or during holiday travel periods. The need for additional automobile parking will only increase as the number of passengers rise and commercial flights increase, further exacerbating the problem. Additional short and long-term parking areas will provide much needed capacity.

One remedy to address the need for short-term parking is to develop a consolidated rental car (CONRAC) facility. Locating the CONRAC facility away from current rental car parking and freeing the space for parking will effectively double short-term parking spaces and align the short-term parking lot closer to its intended purpose. Alternatives for CONRAC facilities are shown within the terminal area to promote passenger convenience and shorter travel distances. Many airports develop CONRAC facilities far from the terminal area to avoid congestion. At COS, however, there is abundant land near the terminal area for a CONRAC and other facilities that would benefit from a close connection to passenger activity.

A series of parking and rental car development alternatives were created to address existing and future parking capacity issues. These areas were studied together as they influence one another and could be partially consolidated. **Figure 5-7** shows a combined series of alternative options for multiple parking and CONRAC locations. A description of each alternative, an evaluation, and a recommendation follows.

Figure 5-7: Parking and CONRAC Alternatives



Source: Jviation

Parking Alternative Descriptions

The parking lots in the alternatives are further from the terminal than the long-term lot and may require shuttle service. Due to this distance, these lots could be considered "economy," a designation that would represent a third tier of parking at COS (short-term, long-term, and economy). This potential parking tier should be evaluated further to determine services, amenities, and costs associated with the lots.

Economy Parking Alternative 1 – This alternative adds parking east of the existing parking lots and is easily accessed by passengers as they approach the terminal. At 30 acres, this lot would almost double long-term parking capacity.

Economy Parking Alternative 2 – This alternative transforms the existing rental car turnaround facilities into a parking lot that measures approximately 57 acres. This lot could be accessed via current roadways and integrated with the existing parking pay stations.

CONRAC Alternative Descriptions

Alternatives for CONRAC development include the consolidation of all rental car functions at COS, including a ready/return lot; a building with rental agency counters, offices, and other facilities; and vehicle turnaround facilities. As mentioned earlier, the development of the CONRAC is recommended to realign the existing rental car ready/return lot to much needed short-term parking.

CONRAC Alternative 1 – In this alternative, the CONRAC is placed in between Milton Proby Parkway and Peak Innovation Parkway, directly west of the existing turnaround facilities. This lot would be accessed via Peak Innovation Parkway, keeping all rental car traffic off Milton Proby Parkway. An option to lower the size and costs for this alternative could be keep rental car turnaround facilities where they are currently located. This option would not allow for the existing rental car turnaround facilities to be converted to a parking lot.

CONRAC Alternative 2 – This alternative shows the CONRAC located west of, and relatively close to, the terminal building. A moving walkway would likely be utilized by passengers going to/from the terminal. In this alternative, the CONRAC would be accessed via Peak Innovation Parkway, keeping all rental car traffic separated from Milton Proby Parkway. The area shown in this alternative could accommodate rental car turnaround facilities, allowing for the conversion of the existing turnaround facilities to a parking lot.

Parking and CONRAC Alternative Evaluation

An evaluation of parking and CONRAC alternatives is presented in **Table 5-2.** This matrix compares and contrasts each alternative with respect to the evaluation criterion and evaluates the interrelationship between the two facilities to produce a recommendation that works best for both.

Table 5-2: Parking and CONRAC Alternatives Evaluation Matrix

Alternatives	Safety/Operations	Economic	Environmental	Implementation	TOTAL
Parking Alternative 1	3	4	3	4	14
Pros	Convenient location near terminal building, room for expansion, possible walkway option.				
Cons	Requires use of Milton Proby Parkway, users must pass terminal building after exiting the lot, disconnected from other lots, may require shuttle, may reduce long-term terminal area expansion (aeronautical uses).				
Parking Alternative 2	4	3	3	3	13
Pros	Can be connected to existing long-term lot for consolidated operation, possible walkway option.				
Cons	Requires reallocation of rental car turnaround facilities, may require shuttle option, requires use of Milton Proby Parkway.				
CONRAC Alternative 1	3	3	2	4	12
Pros	Reduced size configuration option with existing turnaround facilities in place, dedicated route on Peak Innovation Parkway.				
Cons	Further from terminal building than other alternative, requires shuttle ride and no opportunity walkway, cannot be used as flex space with parking.				
CONRAC Alternative 2	4	4	3	3	14
Pros	Convenient location near terminal building with passenger walkway, space for additional peak period parking demand (flex space), dedicated route on Peak Innovation Parkway.				
Cons	Requires reallocation of overflow lot, may reduce long-term terminal area expansion (aeronautical uses).				

Source: Jviation
Note: With respect to the criterion above, Range with 1 = least benefit; 5 = Positive impact/most benefit

Pros and cons for each alternative are included to explain evaluation scoring. Based on the evaluation, it is recommended that Parking Alternatives 1 and 2 and CONRAC Alternative 2 be carried forward in the Master Plan and ALP set. Both parking alternatives are recommended because they scored high and close to one other in the evaluation, are independent from one another, represent a valuable use for each area, and could each contribute to accommodating demand as the Airport grows. The phased development of Parking Alternative 2 is driven by the development of the CONRAC.

CONRAC Alternative 2 was chosen because of the convenient proximity to the terminal; employment of a passenger walkway (potentially in addition to shuttle); the use of Peak innovation Parkway for access; and the ability to share the flex space between parking and rental car needs. It is important to note that these options are simple high-level alternatives for parking and rental car components. The preferred options shown in the Master Plan are intended to preserve the ability to carry out future evaluation, which will also include consideration of public parking/rental car facilities.

Westside Development Area

The Westside Development Area, or General Aviation Area, of the Airport is home to many businesses, tenants, and users. This area has been redeveloped in the past and continues to expand to satisfy user needs. The previous chapter, the 2013 Master Plan, and the 2016 COS General Aviation Area Plan all define areas of expansion for the Westside Development Area. Key aspects of these studies have been incorporated into this plan:

- In-fill apron and hangar development intended to accommodate the growth in based aircraft as well as businesses using the Airport
- Apron expansion tied to the redevelopment of Taxiway A to better utilize space and accommodate more diverse aircraft
- Alternatives for a consolidated general aviation fuel farm to improve the efficiency and effectiveness of FBO fueling operations
- Westside aircraft apron parking, staging and deicing to accommodate the wide range of aircraft types using Runway 17R-35L

The areas to expand in the Westside Development Area, as well as alternative locations for the consolidated general aviation fuel fam, are illustrated **Figure 5-8**. Hangar, apron, and deicing locations were determined through a previous study and consultation with the Airport. The evaluation and recommendation of the consolidated general aviation fuel farm location is discussed below.

Figure 5-8: Westside Development Area

Source: Jviation

Three alternatives for a consolidated general aviation fuel farm were developed as part of this study. All alternatives are located on the Westside Development Area of the Airport with Alternative 1 located at the northernmost point, Alternative 2 located south of the World War II Aviation Museum, and Alternative 3 located central to the Westside Development Area and close to the Airport's FBOs. These alternatives were determined and evaluated with Airport operations and management staff.

Alternative 3 is the recommended location of the consolidated general aviation fuel farm. This recommendation is based on the central location on the Westside Development Area, proximity to the FBOs, and convenient landside and airside access. As the Airport works towards design and development of the facility, the FBOs should be engaged to determine overall capacity requirements and any special needs for the facility.

Airport Traffic Control Tower

Chapter Four noted the need to relocate the Airport's Airport Traffic Control Tower (ATCT). Relocation of the ATCT may be beneficial for several reasons:

- Improve line of sight to the existing airfield and address possible line of sight issues with the proposed shift of Runway 17R-35L.
- Address the two Hot Spots #4 which note that the approach ends of Runways 35L and 35R are very far from the ATCT and small aircraft near those locations may not be readily visible from the ATCT.
- Afford Peterson Space Force Base use of the existing ATCT facility or land for other purposes to carry out its mission.

Finally, the ATCT's new position should conform to airfield design standards. Ideally, a controller will look north for approaching/departing aircraft to avoid prolonged viewing into the sun so moving the ATCT from its current position will reduce southern exposure.

Figure 5-9 illustrates four alternative ATCT location sites. The graphic includes the recommended ATCT heights at each proposed location as well as the existing location, to maximize object discrimination and line of sight based on the FAA's Air Traffic Control Visibility Analysis Tool. A brief description, the benefits and challenges of each location, and a recommendation follow the illustration.

Figure 5-9: Airport Traffic Control Tower Alternatives

Source: Jviation

ATCT Alternative Descriptions and Evaluation

The application of ATCT siting principals generated four alternative locations. The planning effort used these principals as both guide and goalpost to determine ATCT location alternatives. The runways at COS are more than one mile apart, requiring a taller ATCT than airports with closely spaced runways.

ATCT Alternative 1 – This alternative places the ATCT at the corner of Peak Innovation Parkway as the road nears the terminal area. The height of the ATCT, estimated at 267 feet, provides an adequate view of all runway ends and approaches. This location conflicts with the recommended CONRAC Alternative location.

ATCT Alternative 2 – This alternative shows the ATCT located south of the existing rental car turnaround facilities. This southernmost ATCT location requires the greatest height, 315 feet, to overcome the Airport's lower southern topography.

ATCT Alternative 3 – This alternative locates the ATCT near the terminal area building. The departure roadway and surrounding land rises in this area, providing line of sight benefits and lower ATCT height requirements. The required height at this located is estimated at 227 feet. This location is central to the runway configuration at COS and provides convenient access to roadways and utilities. It is placed adjacent to one of the recommended economy parking lots.

ATCT Alternative 4 – This alternative places the ATCT on the eastern border of the Airport. Because the land slowly rises in this area, the height of the ATCT at this location is estimated at 205 feet, the lowest of all alternatives. This location has the greatest potential to conflict with future opportunities for aeronautical and non-aeronautical expansion. Additionally, the ATCT is positioned in the existing Airport Surveillance Radar (ASR) critical area. While that may restrict the ATCT development, a recommendation considered later in the is chapter relocates the ASR, which may allow ATCT development in this area.

This Master Plan only provides a high-level siting analysis for the ATCT. The FAA must be engaged in any further siting, designing, and studying of the ATCT. The recommended location is presented with this future comprehensive evaluation in mind in order to maintain options and funding eligibility.

Based on the evaluation above, the recommended location of the ATCT is Alternative 3. This site is central to the airfield, provides clear views of all runway ends, has the second lowest height requirement, and does not conflict with other future potential uses.

Airport Surveillance Radar / East Deicing Apron

ASR Location

The ASR sits on COS's eastern boundary. The land it occupies could be developed for greater aeronautical or non-aeronautical uses or the ASR could conflict with future off-airport development. It is recommended that the Airport and FAA collaborate to move the ASR to a location within the airfield, away from other potential uses, and ideally suited for air operations. With more than a mile

between the runways, COS has land within the center of the airfield that could easily accommodate the ASR. The ASR should be positioned at least 1,500 feet from structures, buildings, or holding/parked aircraft. The FAA is currently working to upgrade ASR-9 radar sites to a modernized digital version known as the ASR-11. This upgrade may coincide well with the recommended relocation.

Figure 5-10 shows a possible location for the ASR within the airfield that meets these requirements. Although the final location will require additional study by the FAA, including this possible location on the Airport Layout Plan allows for future consideration and funding eligibility.

East Deicing Apron

The development of an East Deicing Apron will facilitate deicing access to aircraft using Runway 17L-35R and free much needed space on the Airport's terminal apron. This apron will serve as the primary deicing apron for air carrier aircraft and will house all air carrier deicing equipment and supplies.

The recommended apron configuration, as shown in **Figure 5-10**, is intended to allow aircraft to taxi into position, deice, and continue onto Taxiway H for departure. This new apron area does not conflict with any of the terminal alternatives previously evaluated. This concept was developed in collaboration with Airport management and operations staff. Final design will be determined when the project is initiated.

Figure 5-10: Airport Surveillance Radar / East Deicing Apron

Source: Jviation

Consolidated Airfield Maintenance / East Hangar Development

Consolidated Airfield Maintenance

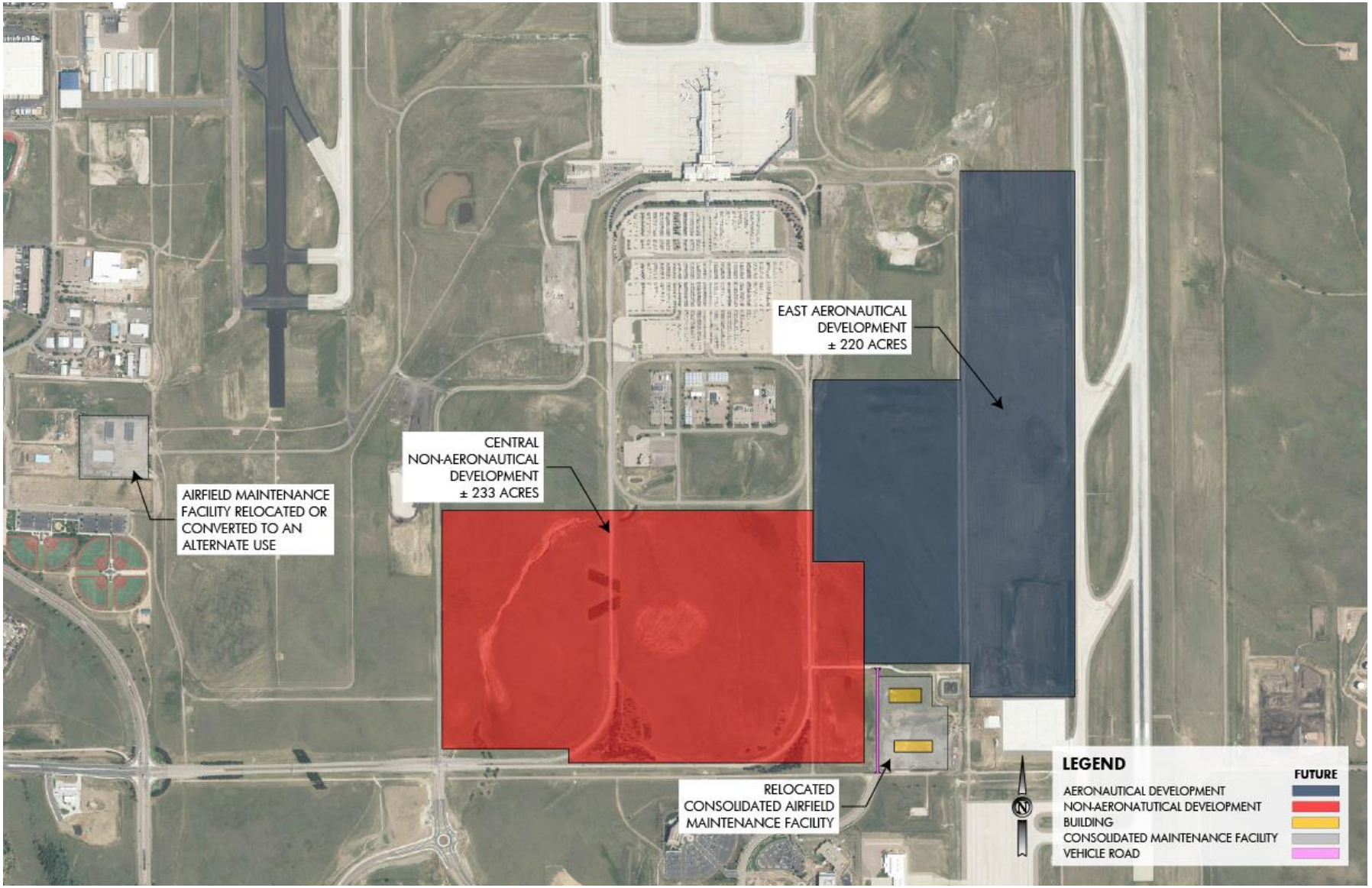
A preferred location for a consolidated airfield maintenance center was developed in consultation with Airport management and operations staff. This location on the east side of the airfield is shown in **Figure 5-11** and provides more convenient airfield access while freeing and maintaining land for aeronautical uses. This site provides more outdoor and indoor space for airfield and snow removal equipment storage and maintenance than the existing facility.

East Hangar Development

East hangar development is intended to accommodate large tenant aircraft, maintenance repair overhaul (MRO), and/or additional air cargo operators. The primary concern in this area is to preserve space for aeronautical use since it is conveniently located next to Runway 17L-35R. The hangars, apron, and taxiways illustrated in **Figure 5-11** are sized for large aircraft. Although the size and height of these hangars may change based on tenant needs, the large facilities shown illustrate the upper limits of hangar development in this area.

Based on discussions with Airport management, the alternatives shown represent preferred options for the consolidated airfield maintenance facility and east hangar development area, as these are deemed highly functional and appropriate uses for these areas. Although the final design of these facilities may change based on tenant specifications, these areas should be preserved for future aviation development to provide the greatest benefit to the Airport and its users.

Figure 5-11: Consolidated Airfield Maintenance / East Hangar Development



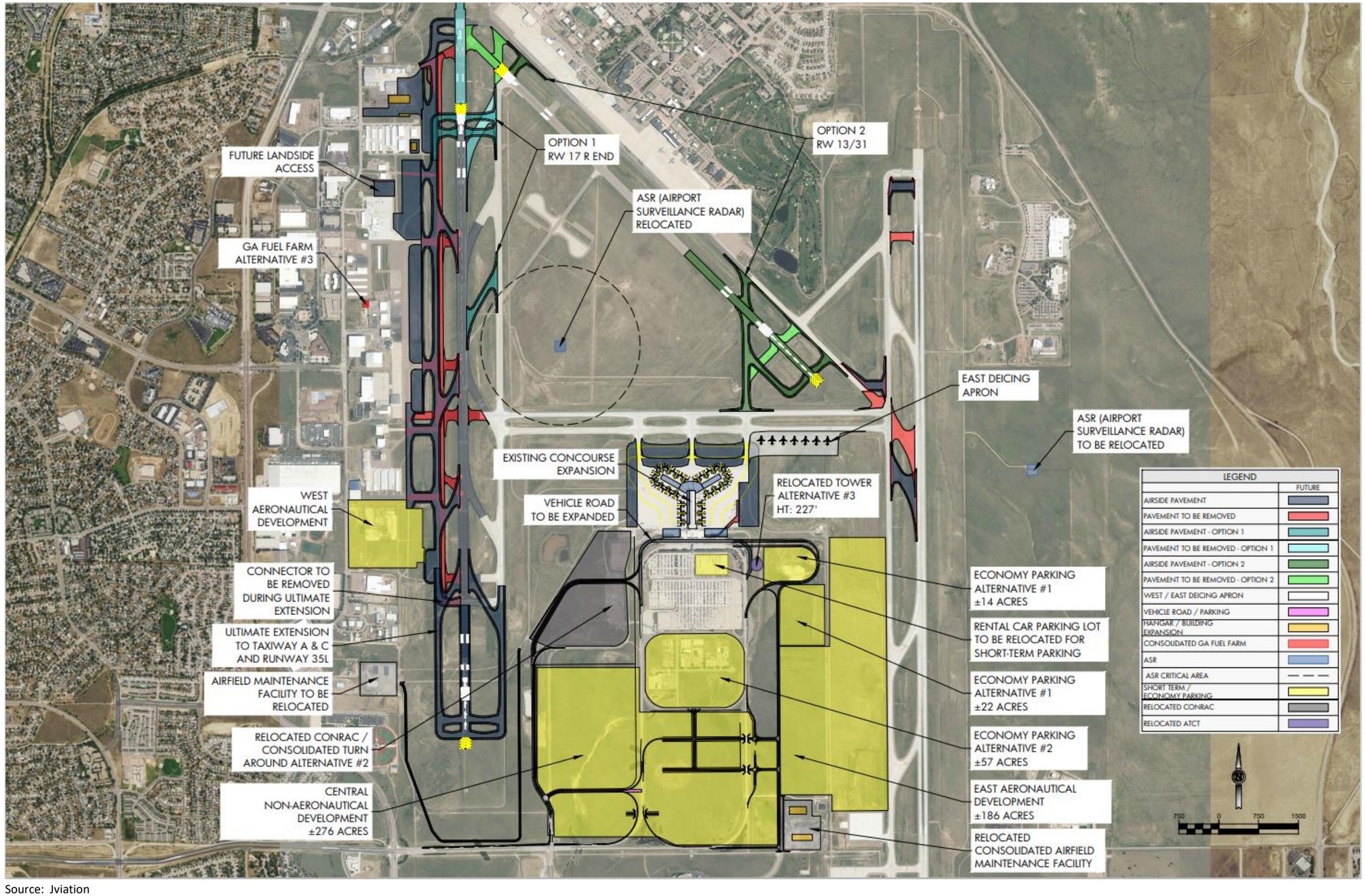
Source: Jviation

Development Plan Summary

Development plans may be modified over time as the needs of airport users change and new opportunities arise. As such, other alternatives may ultimately be developed and utilized, either individually or in conjunction, for different parts of the Airport depending on long-term needs. The recommended alternatives for the various elements discussed in this chapter, including the options for addressing HS 1, are combined in the overall Recommended Development Plan shown in **Figure 5-12**. This plan integrates existing roadway and land use plans for the Peak Innovation Park areas close to the terminal area as well as terminal curb front approach roadways designed to improve curb front access and capacity. The Plan does not include the recommendations for other area roadways for regional access to the Airport and the surrounding community (studied separately in the appendix).

This plan, along with recommended roadway improvements near the Airport, will be carried forward into the ALP set. Further study of the options shown to address HS 1 are recommended as a follow-on effort to the master plan. It is important to note that inclusion of the concept on the ALP does not commit nor obligate the City, Airport, State, or FAA to development or funding.

Figure 5-12: Recommended Development Plan



Source: Jviation