REDDING REGIONAL AIRPORT

Chapter Four

Development Alternatives

In the previous chapter, airfield and landside facilities required to satisfy the projected demand at Redding Regional Airport (RDD) through the long-range planning period were identified. The next step in the planning process is to identify and discuss alternatives for meeting the needs of airport users, as well as the mission and vision of the airport sponsor (City of Redding). There are a wide variety of potential development options, so this chapter provides an organized approach to identifying and discussing reasonable alternative development options. The alternatives should be considered unconstrained, meaning that reasonable options are first presented and discussed. Factors such as cost and environmental constraints are not weighted heavily at this point, as the goal of this chapter is to identify a viable set of alternatives. The alternatives will ultimately be evaluated using a variety of criteria to arrive at a recommended alternative, which will be presented in the next chapter.

The key elements of this planning process are:

1. Identification of alternative ways to address previously identified facility requirements;
2. Evaluation of the alternatives, individually and collectively, so that planners gain a thorough understanding of the strengths, weaknesses, and other implications of each; and
3. Selection of the recommended alternative.

Any development proposed for a master plan has evolved from an analysis of projected needs for a set period of time (i.e., the 20-year forecasts). Although the needs were determined by utilizing industry-accepted statistical methodologies, unforeseen future events could impact the timing of the identified needs. The master planning process attempts to develop a viable concept for meeting the needs resulting from projected demands for the next 20 years; however, no plan of action should be developed that may be inconsistent with the future goals and objectives of RDD. This chapter presents alternatives that could meet RDD's development needs in order to improve RDD as a system, while remaining responsive to environmental, fiscal, and other objectives.

The development alternatives for RDD can be categorized into two functional areas: the **airside** (runways, navigational aids, taxiways, etc.) and **landside** (hangars, apron, terminal area, support facilities, and vehicle access). Specific capabilities and facilities are required or desired within each functional area, which interrelates and affects the development potential of the others; therefore, all areas are examined individually and then coordinated as a whole to ensure that the final plan is functional, efficient, and cost-effective.

Not all airside or landside elements require a detailed alternatives discussion, which is intended to present solutions to specific issues. For those airside or landside elements for which only one solution is reasonable or where no alternative is necessary, an explanatory narrative is provided.

The information presented in this Alternatives chapter will be presented to the planning advisory committee and the public for comment and input. Based on these comments and input, the project team will evaluate the alternatives and incorporate any relevant information to develop a final recommended airport alternative, which will be presented in the next chapter.

NO-ACTION/ALTERNATIVES

The City of Redding is charged with managing RDD for the economic betterment of the community and region. In some cases, alternatives may include a no-action option; however, for RDD, this option would effectively reduce the quality of services being provided to the general public, affect the aviation facility's ability to meet Federal Aviation Administration (FAA) design standards, and potentially affect the region's ability to support commercial and general aviation needs.

The ramifications of a no-action alternative extend into impacts on the economic well-being of the region. If facilities are not maintained and improved so that RDD provides a pleasant experience for the visitor or business traveler, or if delays become unacceptable, affected individuals may consider doing business elsewhere. RDD also serves as a vital link in the overall National Airport System, which is important for both economic development and national security. The no-action alternative is also inconsistent with the long-term goals of the FAA and the California Department of Transportation - Aeronautics (Caltrans), which are to enhance local and interstate commerce; therefore, an overall no-action alternative is not considered further in this master plan. The no-action alternative will be considered in connection with individual elements of the master plan, to the extent reasonable and feasible.

Likewise, this study will not consider the relocation of services to another airport or development of a new airport site. The development of a new commercial service airport is a complex and expensive alternative. A new site would require greater land area, duplication of investment in airport facilities, installation of supporting infrastructure that is already available at the existing site, and greater potential for negative impacts to natural, biological, and cultural resources.

In this Alternatives chapter, various airport elements will be considered for improvement. As indicated above, one alternative for each element may be to take no action. The no-action alternative is compared to other alternatives; in some cases, the existing condition (no-action alternative) may be the best alternative available. Following review by the planning advisory committee, RDD staff, and the public, a recommended alternative will be developed; however, the final decision regarding pursuing a development plan or plans rests with the City of Redding and the FAA. The reasons for the selection of the recommended alternative will be clearly documented in Chapter Five – Recommended Master Plan Alternative.

REVIEW OF PREVIOUS PLANNING DOCUMENTS

RDD pursues a continuous planning process. The capital improvement program is updated and adjusted on an annual basis to address development needs for the next five years. Most capital improvement projects, especially those that need federal grant funding assistance, must be depicted on the airport layout plan (ALP). The current ALP for RDD was developed in conjunction with the previous master plan in 2018. It has been amended several times since 2018; the most recent amendment was approved by the FAA in September 2023, when a planned hangar was added.

Exhibit 4A presents the 2018 master plan concept. On the airside, the plan recommended the development of a full-length parallel taxiway on the east side of Runway 16-34, which would facilitate access to future aeronautical development. Several connecting taxiways were also planned to be reoriented to meet current design standards. Additional Runway 12-30 was planned to ultimately be closed and replaced with a parallel runway to the east of Runway 16-34. The planned parallel runway was 4,000 feet long and was intended to primarily accommodate general aviation operations.

The 2018 master plan and ALP included a 1,000-foot extension of Runway 16-34 to the north and the parallel runway. General notes on the ALP indicate that both of these projects were for City planning purposes and were anticipated to be implemented beyond the 20-year timeframe of the master plan. Additional justification, environmental review, and written FAA approval would be needed to implement either of these projects.

On the landside, the 2018 master plan recommended maintaining the current terminal building. At the time, enplanements were projected lower than this current plan, and the building was adequately sized. Record enplanement levels in recent years have changed that calculus, and this master plan indicates a need for a larger terminal building. The previous plan also reserved the space once occupied by the safety areas for the closed runway for additional hangar development.

The ALP will be updated because of this master plan process. Some elements depicted on the current ALP may be carried over to the new ALP and others may need to be adjusted or removed entirely; nevertheless, it is valuable to reference the current ALP while analyzing various alternative development scenarios.

PLANNING CONSIDERATIONS

Analysis conducted in the previous chapters indicated that various elements of RDD need consideration in this Alternatives chapter. The primary issues to be considered are summarized below:

The primary airfield elements considered include:

- Potential extension of Runway 16-34;
- Consideration of closing Runway 12-30;
- Consideration of keeping a parallel runway in the plan;
- Compatible land uses for the runway protection zones (RPZs); and
- Mitigation of taxiway geometry issues.

The primary terminal complex considerations include:

- Terminal building expansion options;
- Potential expansion of the terminal apron; and
- Consideration of expanding vehicle parking lots, including structured parking.

Other important elements to be considered in the alternatives discussion include:

- Continued separation of commercial service, general aviation, and air cargo activities;
- General aviation hangar expansion; and
- Presenting options for the highest and best use of airport-specific parcels.

AIRFIELD DEVELOPMENT CONSIDERATIONS

The purpose of this section is to identify and evaluate various airfield development considerations at RDD to meet the program requirements established in Chapter Three. Airfield facilities are, by nature, the focal point of an airport complex. Because of their primary role and the fact that they physically dominate airport land use, airfield facility needs are often the most critical factor in the determination of viable airport development alternatives. In particular, the runway system requires the greatest commitment of land area and defines minimum building setback distances from the runways and object clearance standards. Depending on the areas around the airport, these criteria must be defined first to ensure that the fundamental needs of the airport are met; therefore, airside requirements will be considered prior to detailing land use development alternatives.

RUNWAY CONFIGURATION

The runway configuration at RDD currently consists of primary Runway 16-34 and an additional runway, Runway 12-30. Runway 16-34 is 7,003 feet long and is in the optimal orientation because it provides for greater than 95 percent of crosswind coverage at 10.5 knots. This means that winds are favorable to use Runway 16-34 the vast majority of the time. The primary runway should be maintained in this orientation.

LEGEND

- Existing Airport Property Line
- Ultimate Airfield Pavement
- Ultimate Road/Parking
- Ultimate Building
- Existing Runway Protection Zone (RPZ)
- Ultimate RPZ
- Runway Safety Area (RSA)
- Object Free Area (OFA)
- To Be Removed
- VOR Critical Area (Height Restriction)

0 800 1600
SCALE IN FEET
DATE OF AERIAL: 7-13-2014
NORTH

Venture Parkway
Stillwater Creek
Old Oregon Trail
PHI Air Medical
Localizer
REIL
VASI
Runway 16L-34R (4,000' x 75')
Runway 16R-34L (7,003' x 150')
240'
400'
K1 K2 K3 K4 K5 K
J J1 J2 J3 J4 J5 J6
D D1 D2 D3 D4 D5 D6 D7
H M (F) C B A G E
Aviation Development Reserve
Non-Aviation Development Reserve
Aviation Development Reserve
1,000'
VOR
Glideslope
PAPI
MALSR
Upgrade perimeter service road
Upgrade perimeter service road
Solar Farm
ATCT
Woodrum Circle
Air Cargo Reserve
Fuel Farm
Airport Rd.
General Aviation Reserve
Commerical Aviation Reserve
Terminal Parking Reserve
Meadow View Dr.

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Runway 12-30 crosses the primary runway and is 5,067 feet long. Runway 12-30 is classified as an additional runway because the primary runway orientation captures more than 95 percent of crosswinds. As an additional runway, Runway 12-30 is not eligible for FAA maintenance and rehabilitation funding. Because maintenance and rehabilitation of a runway can be prohibitively expensive to fund locally, the previous master plan recommended ultimately closing this runway.

There are reasons other than cost to consider closure of Runway 12-30. The runway safety areas (RSAs) and the RPZs occupy an area along the primary runway flightline that would be ideal for additional hangar development. In fact, the RPZ for Runway 12 contains several structures, which is an incompatible land use for the RPZ. Taxiways M and C currently traverse the RPZ, as well, which is a non-standard condition. The intersection of the Runway 12 threshold and the access taxiways also has the potential to cause confusion among pilots.

There are many reasons to consider the closure of Runway 12-30 and it is also a recommendation of this master plan; however, closure of the runway does not have to happen immediately. The airport can maintain the runway, as long as it can be maintained to safety standards.

Future Parallel Runway

The current ALP and previous master plan include a parallel runway to the east of Runway 16-34. This runway is planned at a length of 4,000 feet and would be intended to accommodate general aviation aircraft, primarily training flights or touch-and-go operations. This configuration would enhance safety and airfield capacity by separating large aircraft and commercial operations from general aviation operations. This concept for the airport extends back to at least the 2005 master plan, which also included a planned parallel training runway.

Consideration is given again in this master plan to a future parallel runway to serve general aviation operations. This potential runway is not needed for capacity reasons, as the long-term operations projections do not exceed the capacity threshold, which is 60 percent of the annual service volume (outlined in Chapter Three); therefore, construction of a parallel runway would not be supported with FAA funding, so a case could be made for not maintaining the planned parallel runway in this master plan.

There are several reasons to maintain the plan for a parallel runway. It is a good practice to separate small aircraft operations from those by larger aircraft and is an added safety measure. Simply having the future parallel runway depicted on the ALP will protect the airspace from potential obstructions, as it will be in the official FAA airspace database.

On the current ALP, the future parallel runway is 2,500 feet from the primary runway, centerline to centerline. This separation distance permits simultaneous instrument flight rules (IFR) arrival operations when one of the approaches is offset (i.e., not straight-in). To accommodate simultaneous straight-in instrument approaches, the separation standard is 3,200 feet. For simultaneous visual approaches, the separation standard is 700 feet.

The parallel runway is planned for small aircraft (under 12,500 pounds) only and would be developed to the B-II(s) design standards. The runway would be 75 feet wide; the parallel taxiway is 35 feet wide. Instrument approaches to the parallel runway are not planned.

Exhibit 4B shows the configuration for a potential parallel runway at a separation distance of 2,500 feet and 700 feet. Locating the parallel runway 700 feet from the primary runway would require the on-airport Very High Frequency Omnidirectional Range Station (VOR) facility to be decommissioned and removed.

The status of Runway 12-30 and the future parallel runway will be discussed with the planning advisory committee, the FAA, airport staff, and the public. The next chapter of this master plan will present the resolution of those discussions.

RUNWAY DESIGN STANDARDS

This section considers the RSA, runway object free area (ROFA), runway obstacle free zone (ROFZ), and RPZ for each runway. Meeting the design standards to the greatest degree feasible is important to protecting the safety of aircraft operations. These elements were discussed at length in Chapter Three – Facility Requirements and identified on Exhibit 3D. In this chapter, these elements will be discussed as they relate to each runway.

Runway 16-34 Design Standards

The RSA, ROFA, and ROFZ fully meet the design standards. Any planned changes to the runway must include compliance with these standards. The RPZ serving Runway 16 also fully meets design standards.

A small corner (0.0026 acres) of the RPZ serving Runway 34 passes over Airport Road, as shown on **Figure 4.1**. Guidance on meeting RPZ land use compatibility is outlined in FAA Advisory Circular (AC) 150/5190-4B, *Airport Land Use Compatibility Planning*, which was published September 16, 2022. With the publication of this AC, the FAA indicates that it is the responsibility of the airport sponsor to take positive steps (when possible) to meet land use compatibility standards for the RPZ. The small corner of the Runway 34 RPZ that encompasses Airport Road is outside airport property; thus, the airport sponsor has limited influence. Available options could include the following:

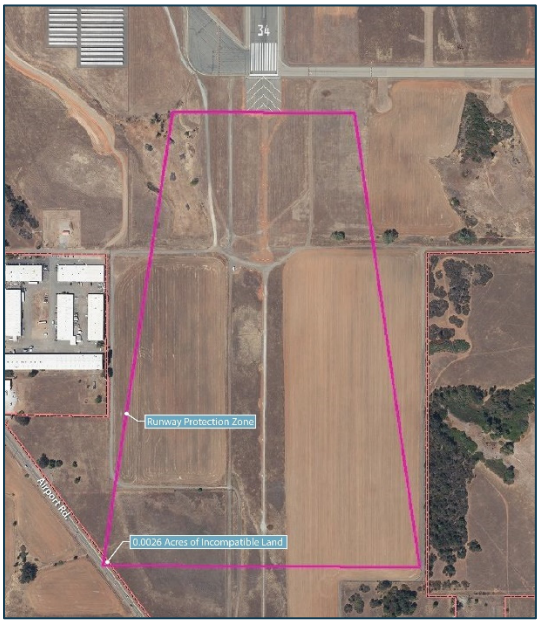

Figure 4.1 – Runway 34 Incompatible RPZ Land

1. **Shorten Runway 16-34**: The airport could plan to shorten the runway by 16 feet (or implement declared distances), which would bring the RPZ into full compliance. The FAA does not typically require an airport to shorten its runway to less than the recommended length for the critical aircraft, to meet RPZ standards; therefore, this is not a viable option.


Stillwater Creek
450′
250′
1,000′
75′
35′
240′
4,000′ x 75′
2,500′
H
E
Runway 16-34 (7,003′ x 150′)
16
34
D1
M
D2
B
N
0
600
SCALE IN FEET
Source: Martinez Geospatial
9/2/2022
LEGEND
Airport Property Line
Taxiway Designation
Ultimate Pavement
Runway Protection Zone (RPZ)
To Be Removed
Remove VOR
75′
35′
700′
300′
400′
4,000′ x 75′

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2. **Reroute Airport Road**: The airport could reroute Airport Road around the RPZ. The airport can monitor road improvement planning; if Airport Road is planned to be reconstructed, the airport can and should advocate for a slight adjustment to the alignment to avoid the RPZ.
3. **Do nothing**: Because it is the responsibility of airport sponsors to try to achieve RPZ land use compatibility guidelines, the airport can determine that the impact of this small incompatibility is inconsequential.

Runway 12-30 Design Standards

The RSA and ROFA behind the Runway 12 threshold (to the northwest) extend over Taxiways M and C. This is an unusual layout in which a taxiing aircraft could conceivably be in the RSA/ROFA while the runway is in use. To mitigate this possibility, there are hold-short markings on the taxiways. In addition, the ROFA extends over four hangar buildings. There have been no documented instances of a runway incursion in this location because of this geometry; nevertheless, the airport should seek opportunities to eliminate the possibility of a runway incursion. The following alternatives may be considered:

1. **Close Runway 12-30**: This is the preferred option, which is contained in the 2018 master plan and on the current ALP. Closing the runway would eliminate the presence of the RSA/ROFA.
2. **Change the runway design code**: The airport could consider downgrading the runway from C-III to B-II, which would shorten the RSA/ROFA as it extends beyond the runway ends from 1,000 feet to 300 feet. At 300 feet, the RSA would not extend over the taxiways. The ROFA would no longer extend over the hangars, but a corner of the ROFA would extend over Taxiway M; therefore, this change should be considered an incremental improvement for the ROFA.

The RPZs serving Runway 12-30 have several incompatible land uses, as documented on **Exhibit 4C** (and previously on Exhibit 3D). On the approach to Runway 12, these include the airport's maintenance buildings, Airport Road, Taxiways C and M, and two off-airport structures. The following alternatives may be considered:

1. **Close Runway 12-30**: This is the preferred option, which is contained in the 2018 master plan and on the current ALP. Closing the runway would eliminate the presence of the RPZ.
2. **Reroute Airport Road**: The road could be rerouted around the edge of the RPZ. The airport can monitor road improvement planning; if Airport Road is planned to be reconstructed, the airport can and should advocate for a slight adjustment to the alignment to avoid the RPZ.
3. **Change the runway design code**: The airport could consider downgrading the runway from C-III to B-II. This would change the dimensions of the RPZ so that the RPZ does not encompass any structures. The RPZ would still cross Taxiways C and M.
4. **Do nothing**: Because it is the responsibility of airport sponsors to try to achieve RPZ land use compatibility guidelines, the airport can determine that the impact of this small incompatibility is inconsequential.

Exhibit 4C shows the existing C-III design standards beyond the Runway 12 end. The potential B-II design standards are also shown for comparison. Changing the applicable design standards for Runway 12-30 will meet more of the design standards, but closing the runway will eliminate all non-standard conditions associated with the runway.


N
0
400
SCALE IN FEET
Source: Martinez Geospatial
9/2/2022
LEGEND
Airport Property Line
A
Taxiway Designation
Current C-III RSA/ROFA/RPZ
Potential B-II RSA/ROFA/RPZ
Runway 16-34 (7,003' x 150')
Runway 12-30
(5,067' x 150')
12
D
D
M
C
Taxilanes in
RSA/ROFA/RPZ
Buildings in RPZ
Buildings in ROFA
Public Road in RPZ
Airport Road
Buildings in RPZ

RUNWAY LENGTH

Previous analysis in Chapter Three – Facility Requirements addressed runway length needs at RDD. The length of the primary runway (7,003 feet) allows the critical aircraft (Boeing 737) to operate normally to all current destinations, as well as Denver, which is a planned destination. The runway is not long enough to accommodate cross-country flights. To better accommodate commercial flights to more distant destinations, a 1,000-foot extension of the runway is being considered.

The United States Forest Service (USFS) and the California Department of Forestry and Fire Protection (Cal Fire) have indicated that a 2,000-foot extension would allow them to utilize their full fleet of fire-fighting aircraft (including the DC-10) at RDD. They have also indicated that a 9,000-foot-long runway would enable them to expand their operations at RDD, including basing larger aircraft.

Exhibit 4D shows potential runway extension options. Both extension alternatives (1,000 feet and 2,000 feet) are considered on the Runway 16 end. Extending to the south is not considered feasible, as it would introduce new incompatible land uses to the RPZ and would necessitate a new instrument landing system (ILS) to Runway 34. It is also not necessary to extend south because there is undeveloped land to the north. North extensions will require the relocation of the localizer antenna which can be no closer than 1,000 feet from the end of the runway.

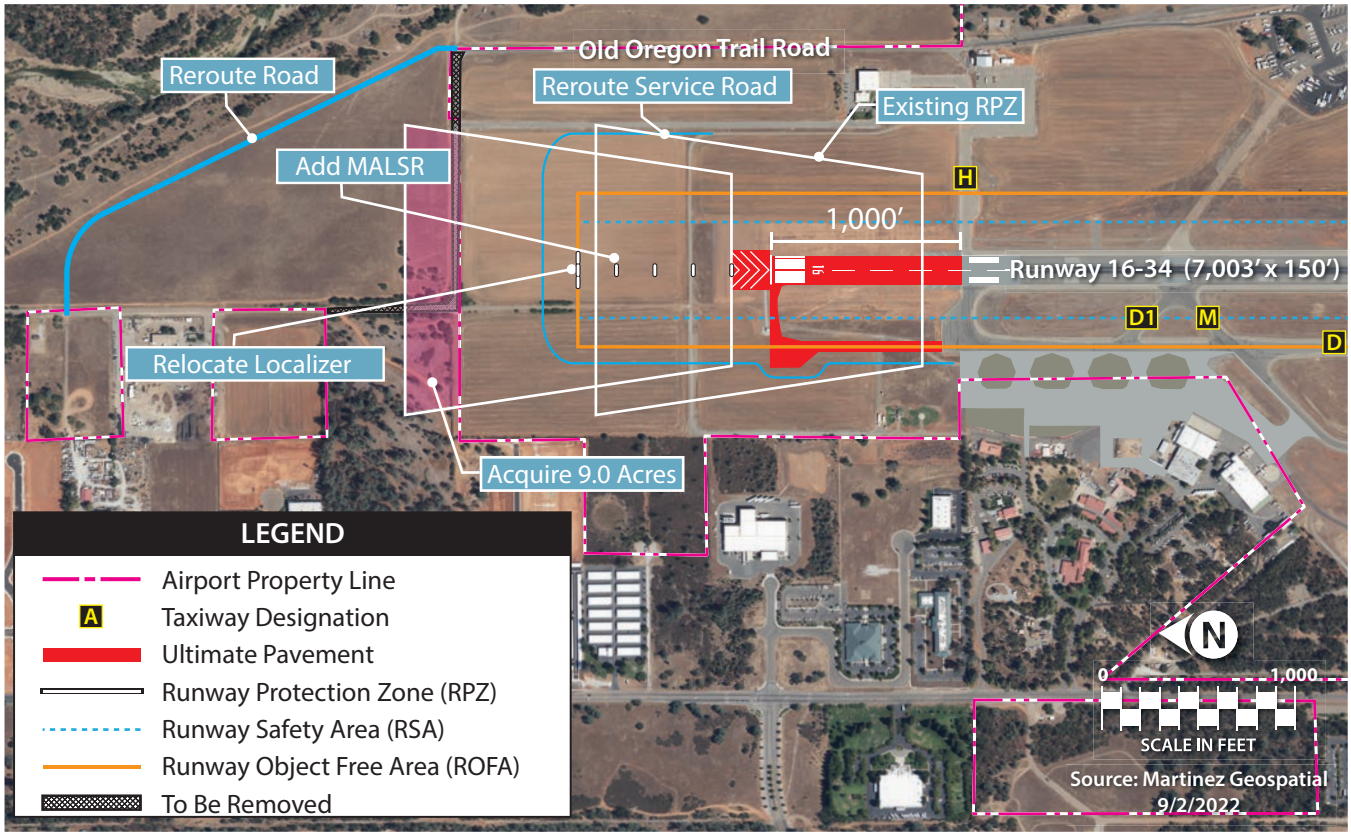
The top half of **Exhibit 4D** shows the 1,000-foot extension alternative. The new RPZ would cross a public roadway (Old Oregon Trail Road). This road provides access to the east side aeronautical users, as well as to the Redding Motorsports Park. When an airport project directly leads to a non-standard condition, like introducing a public roadway to the RPZ, the airport sponsor must explore all options to avoid introducing a non-standard condition; therefore, a portion of Old Oregon Trail Road is shown to be rerouted around the RPZ.

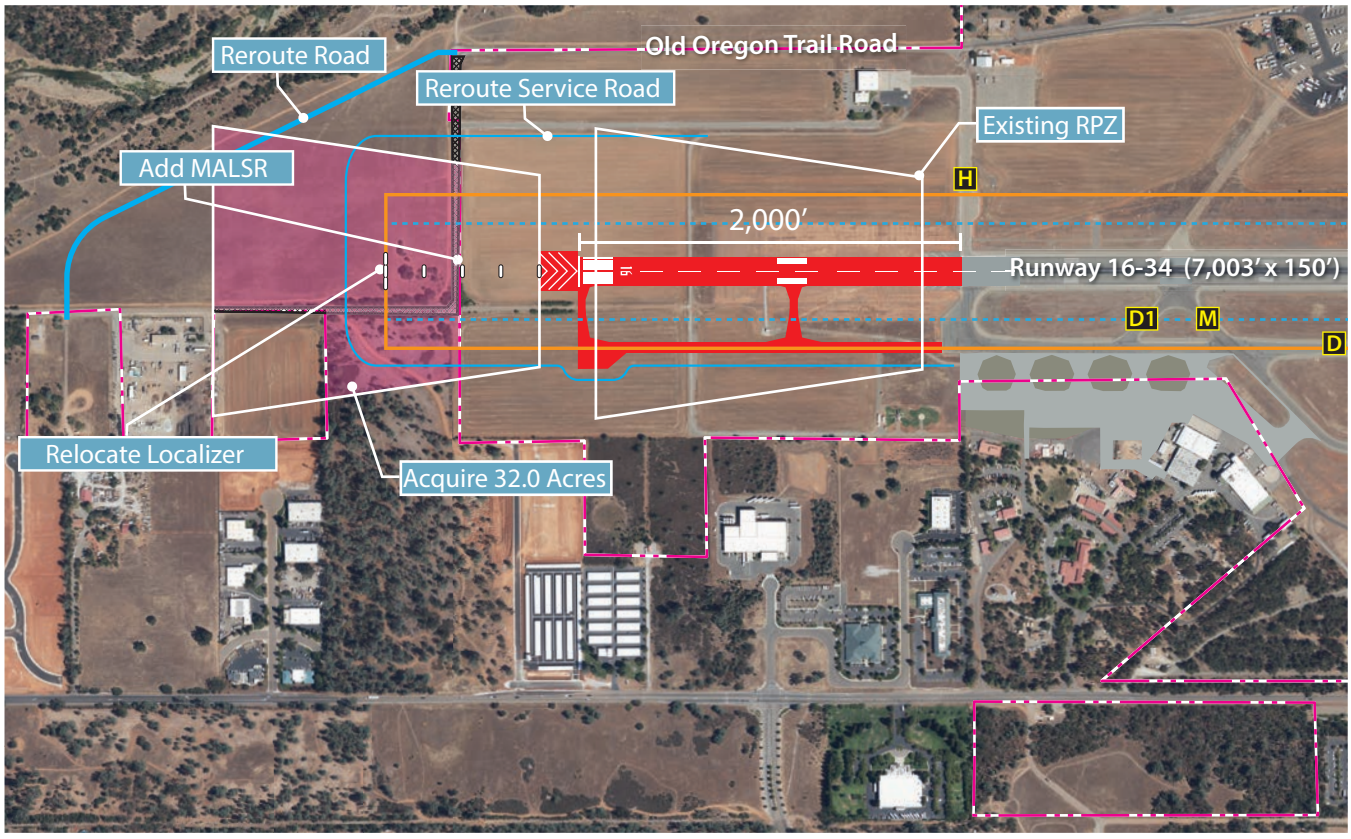
The RPZ serving the 1,000-foot extension will extend beyond airport property. While the airport would not be required to acquire the nine acres of RPZ land, doing so would be highly recommended. In addition, the airport service road would have to be rerouted around the RSA.

The bottom half of **Exhibit 4D** shows the potential impact of a 2,000-foot extension. Approximately 32 acres of RPZ land would fall outside of airport property and would be recommended for acquisition. Old Oregon Trail Road would need to be relocated; however, a corner of the road still falls within the ultimate RPZ. Additional analysis of this road alignment may be necessary.

RUNWAY WIDTH

Both runways are currently 150 feet wide, which meets the standard for the current and future critical aircraft (C-III and D-III, respectively). If Runway 12-30 were changed to a B-II runway, the runway width standard would be 75 feet.


Old Oregon Trail Road
Reroute Road
Reroute Service Road
Existing RPZ
Add MALSR
H
1,000'
Runway 16-34 (7,003' x 150')
D1
M
D
Relocate Localizer
Acquire 9.0 Acres
LEGEND
Airport Property Line
A
Taxiway Designation
Ultimate Pavement
Runway Protection Zone (RPZ)
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
To Be Removed
N
0
1,000
SCALE IN FEET
Source: Martinez Geospatial
9/2/2022


Old Oregon Trail Road
Reroute Road
Reroute Service Road
Existing RPZ
Add MALSR
H
2,000'
Runway 16-34 (7,003' x 150')
D1
M
D
Relocate Localizer
Acquire 32.0 Acres

TAXIWAYS

Design standards for taxiways have changed significantly in recent years. The latest design standards are intended to remove potentially confusing taxiway layouts by forcing pilots to make intentional turns prior to entering the runway environment. The standards are intended to increase pilot peripheral views through the use of intersection geometry at 90-degree angles, where feasible. Eliminating direct access from an aircraft apron to a runway is also a high priority.

Taxiways D1 and M, between Taxiways D and the primary runway, are arranged in a "V" shape, which is a geometry that is discouraged. A more desirable geometry would be achieved by replacing both of these connecting taxiways with a single taxiway connector that is perpendicular to the runway.

Taxiway B is an angled taxiway. While angled or high-speed exits are allowable for capacity improvement reasons, they should be at the standard 30-degree angle. Taxiway B does not meet this standard and the airport does not have a runway capacity deficiency; therefore, Taxiway B should be replaced with a 90-degree taxiway.

The threshold taxiway leading to Runway 34 is angled, which means that pilots holding before the runway do not have full peripheral views. This taxiway should be reoriented to a 90-degree angle. This would result in the existing hold apron being eliminated. A replacement hold apron west of Taxiway D at the Runway 34 threshold should be considered. This location is standard for hold aprons.

Runway 12-30 crosses the primary runway and Taxiway D. If this runway is closed in the future, the portion of the runway between Runway 16-34 and Taxiway D could be converted to an exit taxiway; however, it should be narrowed and designed to a 90-degree angle. The remaining portion of Runway 12-30 that is east of Runway 16-34 could be converted to a taxiway that would connect with a future parallel runway, but it would have to be narrowed to the 35-foot taxiway width standard. **Figure 4.2** shows a standard taxiway geometry layout with typical 90-degree intersections.

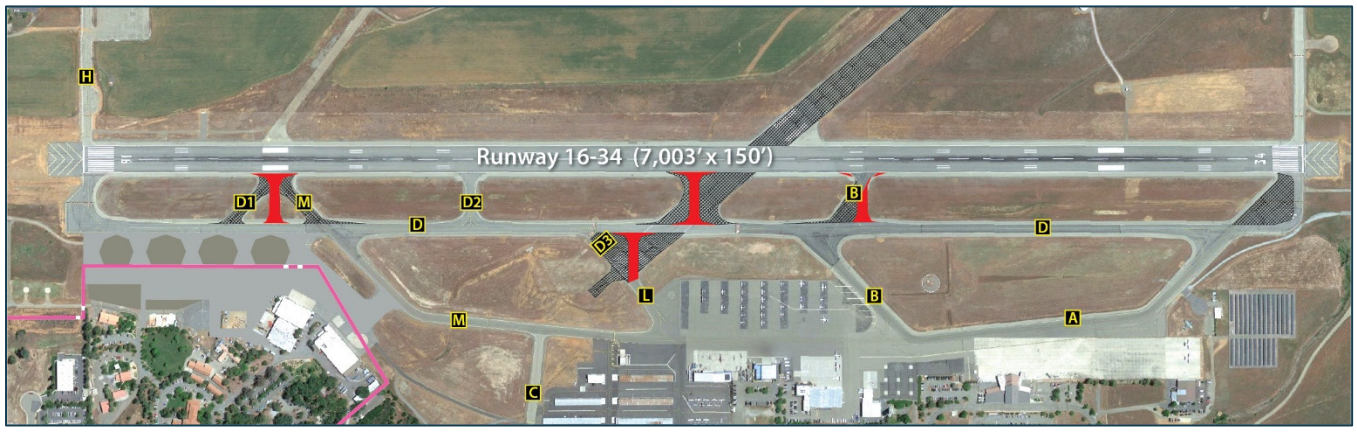


Figure 4.2 – Taxiway Geometry Options

INSTRUMENT APPROACHES AND APPROACH LIGHTING SYSTEMS

The existing instrument approach procedures are excellent and should be maintained. The ILS to Runway 34 provides visibility minimums not lower than ½-mile. The global positioning system/localizer performance with vertical guidance (GPS-LPV) approach to Runway 16 provides visibility minimums of ¾-mile. A required element of the ILS is the existing medium intensity approach lighting system with runway alignment indicator lights (MALSR); a MALSR is required when visibility minimums are ½-mile.

An approach lighting system is not required for Runway 16, but one is recommended when visibility minimums are below 1-mile; therefore, an approach lighting system is recommended for Runway 16. A variety of approach lighting systems could be installed, but only a MALSR would allow for the possibility of ½-mile visibility minimums; therefore, a MALSR is recommended.

HELICOPTER PARKING

The airport is heavily utilized by helicopters. Two air ambulance companies are based at the airport and the USFS/Cal Fire utilizes large Sikorsky helicopters for firefighting. The air ambulance operators are located on the east side of the airport, where there are large apron areas that are adequate to support these operations. The public helicopter apron immediately east of the control tower provides parking for up to nine helicopters. This helicopter parking apron is adequate and should be preserved.

The helicopter parking positions at the north end of the airfield that are utilized by the large Sikorsky helicopters are undersized. Planning will consider enlarging and expanding these parking positions. Their current location is ideal, as they are separated from other airport uses and are clear of any runway clearing surfaces.

REPLACEMENT CONTROL TOWER

The airport traffic control tower (ATCT) is old and in need of replacement. It is more than 50 years old and does not meet modern standards, such as compliance with the *Americans with Disabilities Act* (ADA). Potential sites for a replacement tower are considered; however, if a new tower is approved by the FAA, the FAA will determine the best site, which may be a preferred site from this master plan.

The FAA provides guidance on tower siting in FAA Order 6480.4A, *Airport Traffic Control Tower Siting Process*. The primary siting criteria are:

1. **Unobstructed view**: Visibility from the tower cab shall allow an unobstructed view of all controlled movement areas of the airport, including all runways, taxiways, and any other landing areas (such as heliports), and of air traffic in the vicinity of the airport. For any site considered, the FAA will utilize the Airport Facilities Terminal Integration Laboratory (AFTIL) simulation tool to conduct a dynamic visibility analysis, including evaluation of both moving and parked aircraft.

2. **Object discrimination**: Tower height and distance from critical airport locations shall support requirements for object visibility from the tower cab. The FAA will perform an object discrimination analysis to assess observers' probability of detection and recognition of an object on the airport surface.

3. **Line of sight (LOS) angle of incidence**: The FAA will perform this analysis to assess the angle at which the observers' view of a distant object intersects with the airport surface at an angle equal to or greater than 0.80 degrees.

4. **ATCT orientation**: The primary operational views shall face north or alternately east, or west, or finally south, in that order of preference.

The existing tower meets the above criteria; therefore, the existing site should be considered a viable site for a replacement tower. Because of the orientation of the runway, it is not feasible for the primary tower view to be to the north. East-facing towers are the second most desirable direction; therefore, only sites with east-facing towers are considered. Three potential tower sites are shown in **Figure 4.3**. Each potential site meets the basic criteria for a tower location.

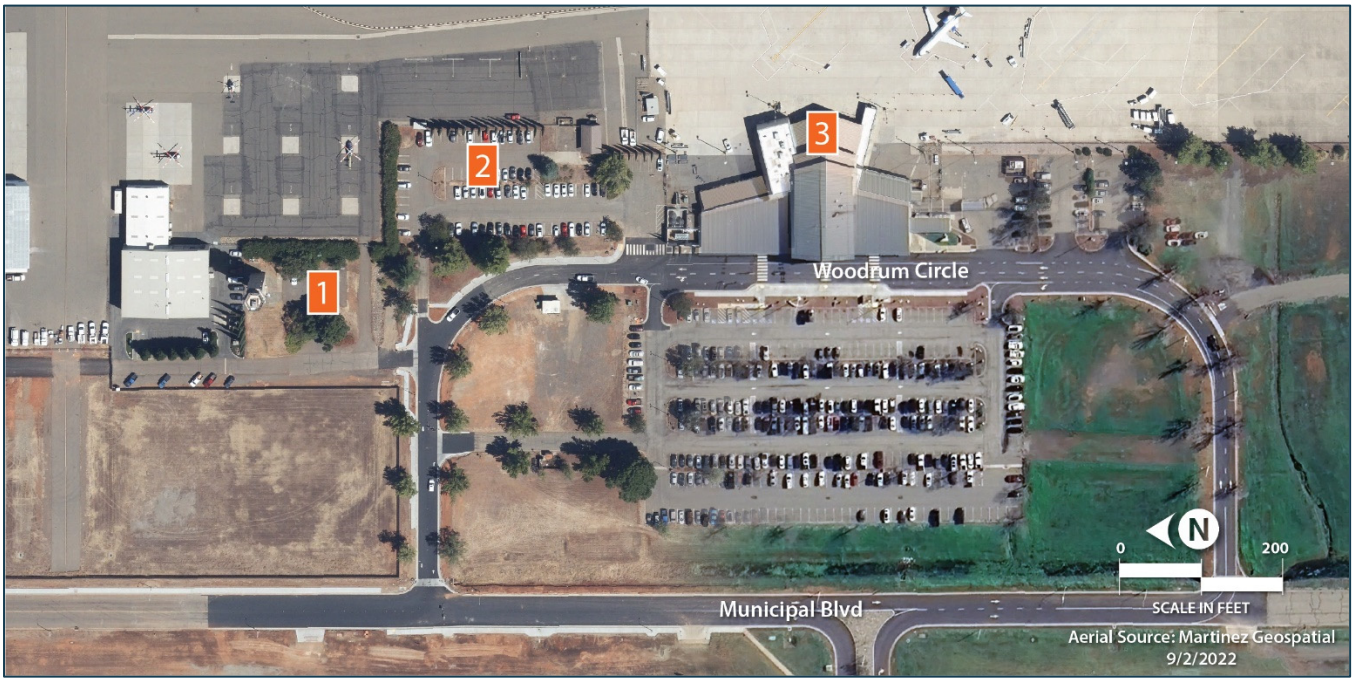


Figure 4.3 – Potential Control Tower Locations

- ATCT Site 1: This is the location of the current tower.
- ATCT Site 2: This location is slightly closer to the runway system, which may provide better views to the north.
- ATCT Site 3: This site is co-located with the terminal building.

TERMINAL COMPLEX ALTERNATIVES

In Chapter Three – Facility Requirements, terminal complex needs were defined, based on the projection of passenger enplanements. These needs include the terminal building, aircraft parking gates, terminal aircraft apron, vehicle parking, and circulation roads.

TERMINAL BUILDING ALTERNATIVES

The facility needs identified a long-term need for three aircraft gates. This analysis was based on historical trends in peak hour demand. Because airline flight schedules can and do change frequently, it is possible that at least one additional gate could be needed; therefore, four gates will be considered for the future condition.

The primary functional spaces that are currently undersized include the security queue area, passenger hold rooms, exterior baggage processing areas, public lobby space, airport administration space, restrooms, airline office space, and concessions.

Overall, the terminal building currently encompasses approximately 37,550 square feet of enclosed space. There is a current need for 53,742 square feet of space and a long-term need for 82,198 square feet of space. This equates to 16,192 additional square feet of space currently needed and 44,648 square feet of new space needed within the 20-year timeframe. Three terminal building expansion options are presented.

Terminal Expansion Alternative 1

Exhibit 4E shows the first terminal expansion alternative. A total of 49,500 square feet of new space is depicted in this alternative. Most of the expansion is to the south along the existing commercial apron. There are four aircraft gates, two of which accommodate a Boeing 737-size aircraft; the other two serve smaller regional aircraft. This alternative works within the confines of the existing apron area and would not impact existing Taxiway A.

Terminal Expansion Alternative 2

Exhibit 4F shows the second terminal expansion alternative. A total of 30,800 square feet of new space is depicted in this alternative. This terminal expansion option essentially creates a new secure hold room space with four gates. The new space extends the terminal to the east, which would necessitate adjustment to Taxiway A. This potential layout also provides for four total aircraft gates.

In this alternative, Taxiway A will need to be relocated and the commercial apron will need to be expanded.

Terminal Expansion Alternative 3

The third terminal expansion alternative is presented on **Exhibit 4G**. This alternative extends the terminal building to the east and includes four aircraft gates, which also expands the main terminal building. This addition encompasses approximately 52,000 square feet.

Exhibit 4E
TERMINAL EXPANSION ALTERNATIVE 1

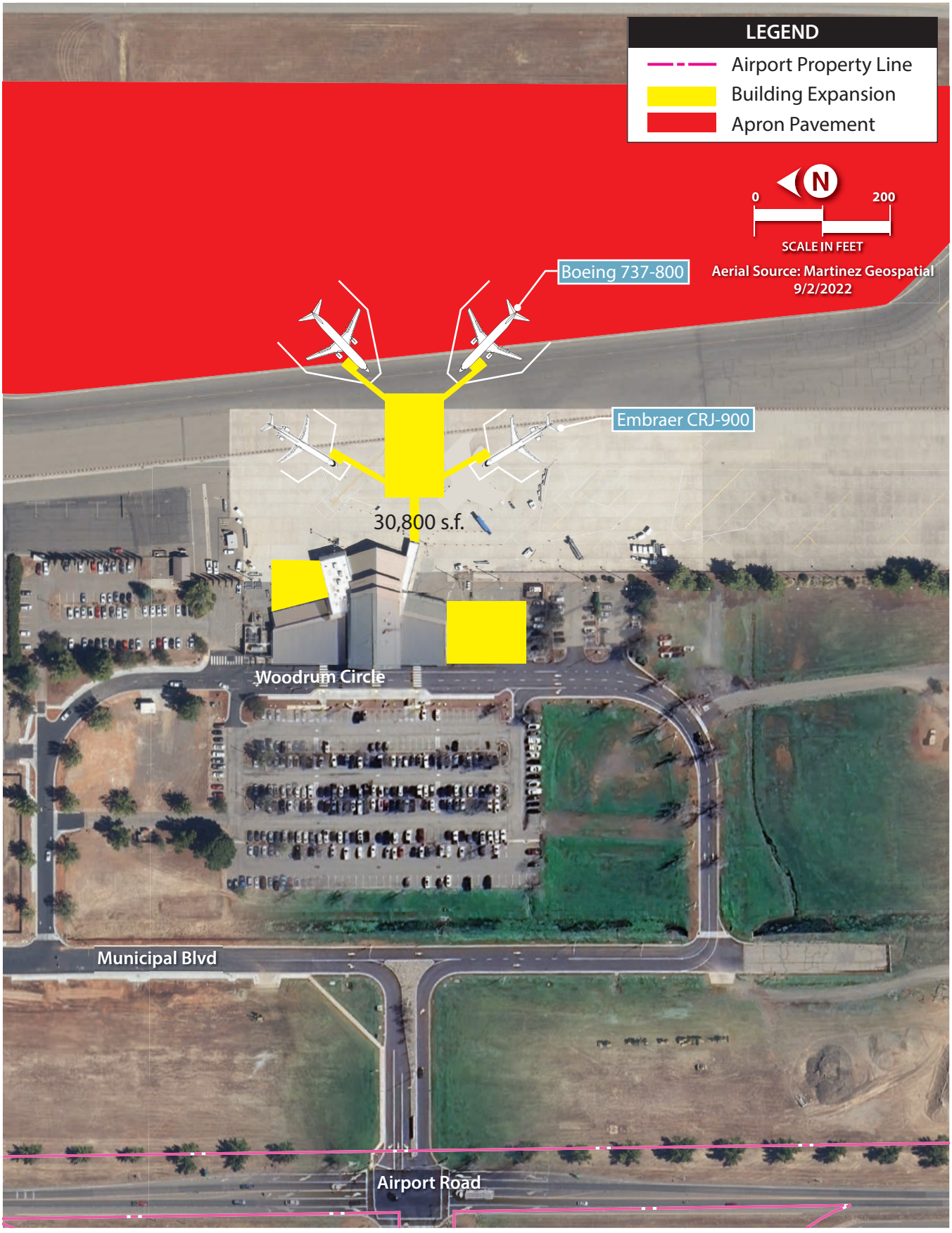


Exhibit 4F
TERMINAL EXPANSION ALTERNATIVE 2

Exhibit 4G
TERMINAL EXPANSION ALTERNATIVE 3

TERMINAL AIRCRAFT APRON ALTERNATIVES

The terminal apron is constrained at RDD because it is narrow, as the depth from the terminal building to the apron edge is only 150 feet at its narrowest. Because of this, only smaller regional aircraft can park in direct proximity to the terminal building, while larger aircraft (such as 737s) must park to the south, where additional apron depth is available. The current location of Taxiway A angles close to the terminal building, creating this constrained environment. Taxiway A is not a required element to access the terminal apron parking positions, but Taxiway A provides access to Taxiway D – and ultimately Runway 16-34 – for general aviation aircraft; therefore, several alternatives are presented on **Exhibit 4H** that include redesigning the terminal apron and continuing to allow general aviation aircraft to access the south end of the airfield.

Terminal Apron Alternative 1

This alternative considers relocating Taxiway A to be parallel to Taxiway D. The connections between the two are located at Taxiway B and where Taxiway A currently meets Taxiway D near the Runway 16-34 threshold. The entire area from the relocated Taxiway A to the terminal apron is then shown to be paved.

Terminal Apron Alternative 2

The second alternative eliminates Taxiway A altogether. The terminal apron is then expanded to the east and new connectors to the terminal apron are installed. This geometry would create a dedicated terminal apron and dedicated taxiway connectors so that general aviation aircraft would no longer need to intermix with commercial aircraft on the commercial apron.

Terminal Apron Alternative 3

The third alternative moves Taxiway A to the east about 200 feet. This creates more depth for the terminal apron and would be less expensive to build, while also achieving the separation of general aviation and commercial aircraft. Dedicated taxiway entrances from Taxiway D are also proposed.

TERMINAL CURB AND VEHICLE PARKING

The analysis in the facility requirements section of this master plan indicated that the terminal curb is currently adequate at 300 feet in length; however, additional deplaning curb will be needed by the short-term planning period (within 5-years). By the long term, an additional 70 feet of curb length will be needed. Planning for improvements to the terminal building should include additional curb length.

Vehicle parking is currently adequate to meet demand; however, based on the forecast enplanement levels, additional parking will be needed within the next five years. By the long-term planning period, approximately 60 additional spaces will be needed. Within the terminal loop roadway, there is undeveloped space that could more than double vehicle parking capacity with surface parking; past planning has depicted structured parking. **Figure 4.4** shows the available area within the terminal loop road for additional surface parking. A total of 440 additional spaces could be made available.

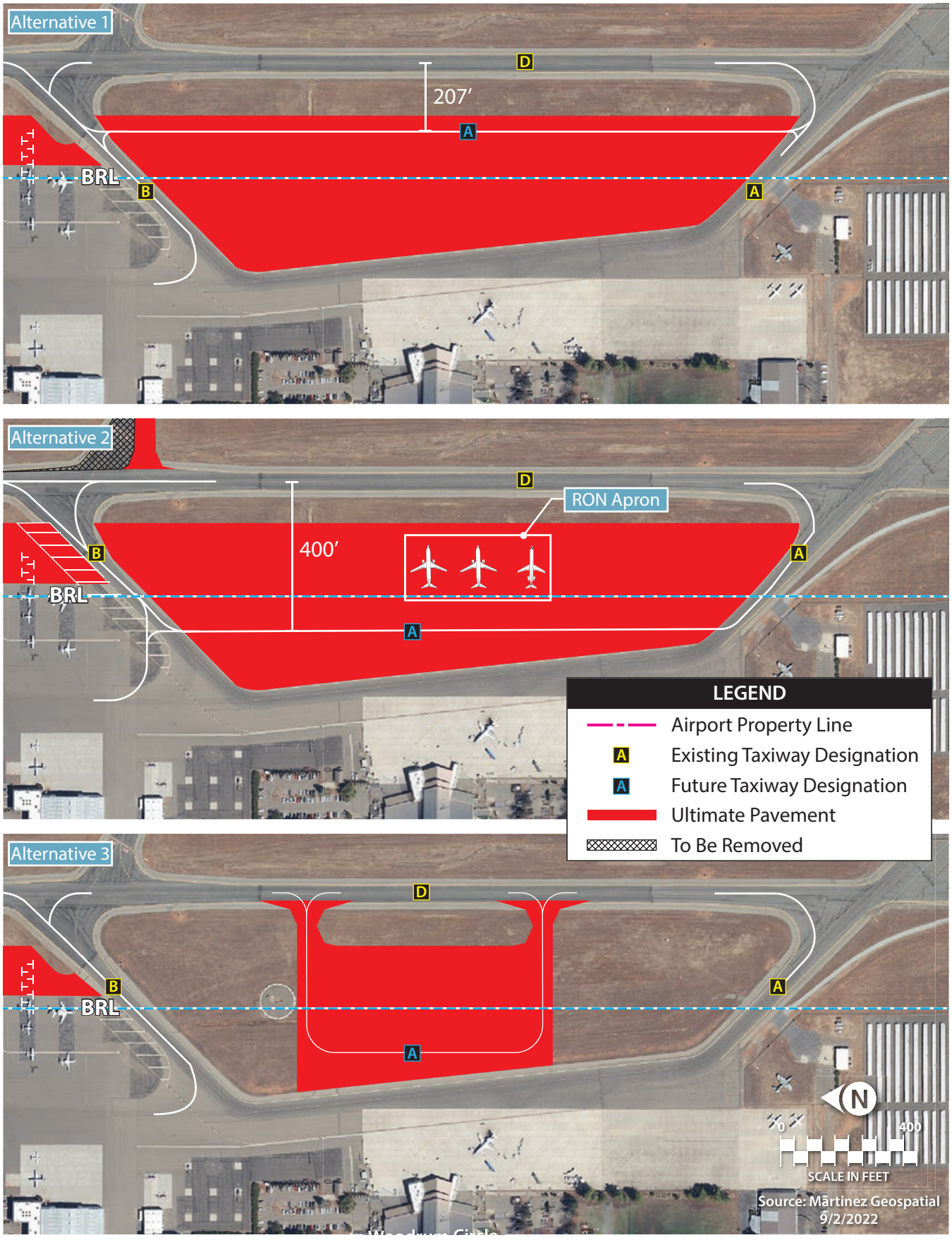

Alternative 1
D
207'
A
BRL
B
A
Alternative 2
D
RON Apron
400'
B
A
BRL
A
LEGEND
Airport Property Line
A Existing Taxiway Designation
A Future Taxiway Designation
Ultimate Pavement
To Be Removed
Alternative 3
D
B
A
BRL
A
N
0
400
SCALE IN FEET
Source: Martinez Geospatial
9/2/2022

Figure 4.4 – Surface Parking Options

LANDSIDE DEVELOPMENT ALTERNATIVES

Landside development alternatives include consideration of the general aviation services, air cargo facilities, apron areas, and other support facilities.

GENERAL AVIATION

Redding Regional Airport has a significant level of general aviation activity. Currently, there are approximately 240 based aircraft at RDD. The forecasts indicate that there could be an additional 50 based aircraft over the next 20 years; therefore, there will be a need for additional hangar space at the airport.

When planning new hangar facilities at an airport, it is important to maximize the available space. Land with access to a runway is a valuable commodity; therefore, planning for new hangars should only include the basic needs for taxilanes, apron area, and roadway access (where necessary). Facilities that are intended to be public-facing – such as a fixed base operator (FBO) – should have vehicle parking. Private hangars may have a small parking lot, but private owners will often simply park their cars in their hangars when utilizing their aircraft.

Airport Alternative 1

Exhibit 4J shows one potential concept for additional hangars. The area available for development would require the closure of Runway 12-30. If this runway is closed, approximately 35 acres would be available for development. Larger FBO-type hangars are depicted closest to the runway. This type of hangar is likely to experience a higher level of traffic than a smaller private hangar. A new access road is depicted extending from Airport Road to the FBO hangars and providing access to a series of eight smaller box hangars. These hangars are smaller than the FBO hangars, but they are intended for aviation service providers that may also need public road access. The exhibit shows a total of 400,100 square feet of new hangar space and capacity for 122 aircraft.

Airport Alternative 2

Exhibit 4K shows another potential layout for additional general aviation hangars. Unlike Airport Alternative 1, this layout includes several rows of T-hangars. This alternative provides for a total of 428,700 square feet of additional hangar space and storage capacity for 188 aircraft.

Both of these general aviation hangar layout alternatives would require the closure of Runway 12-30. If Runway 12-30 remains open, then all hangars would violate various protective surfaces surrounding the runway.

Both general aviation hangar layout alternatives also show expansion of the itinerant aircraft tiedown apron. The apron is shown to extend an additional 175 feet toward Runway 16-34. The edge of the new apron is 121.5 feet from the centerline of Taxiway D. This distance is recommended based on a taxiway object free (TOFA) area that is 243 wide (centered on the taxiway) and would meet the TOFA standard for aircraft with wingspans of up to 171 feet (airplane design group [ADG] IV).

AIR CARGO

The dedicated cargo apron is at the south end of the terminal apron. It encompasses approximately 5,200 square yards. This apron and the sort building are utilized by West Air, which contracts through FedEx and utilizes the Cessna Caravan 208B. The other air cargo operator, Redding Aero, is owned and operated by the Redding Jet Center and operates from its FBO apron. Redding Aero primarily uses the Cessna Caravan 208B, but also uses the Cessna 402 and 404 models.

The forecasts of aviation demand resulted in growth in the air cargo segment at the airport, with operations and tonnage increasing at 3.95 percent annually. It is not projected that either operator will up gauge to larger aircraft; however, the frequency of operations is projected to increase, and the airport may ultimately want to encourage the consolidation of air cargo activity to a single location. In this event, the airport cargo would need to be expanded and a second sort building may be needed.

The previous master plan reserved space to the immediate west of the existing air cargo apron for apron expansion. That planned apron expansion was approximately 7,800 square yards, which would bring the total apron size to 13,000 square yards and would accommodate all air cargo operations. This master plan will preserve this concept for future air cargo expansion. **Figure 4.5** shows the development concept for the air cargo area.

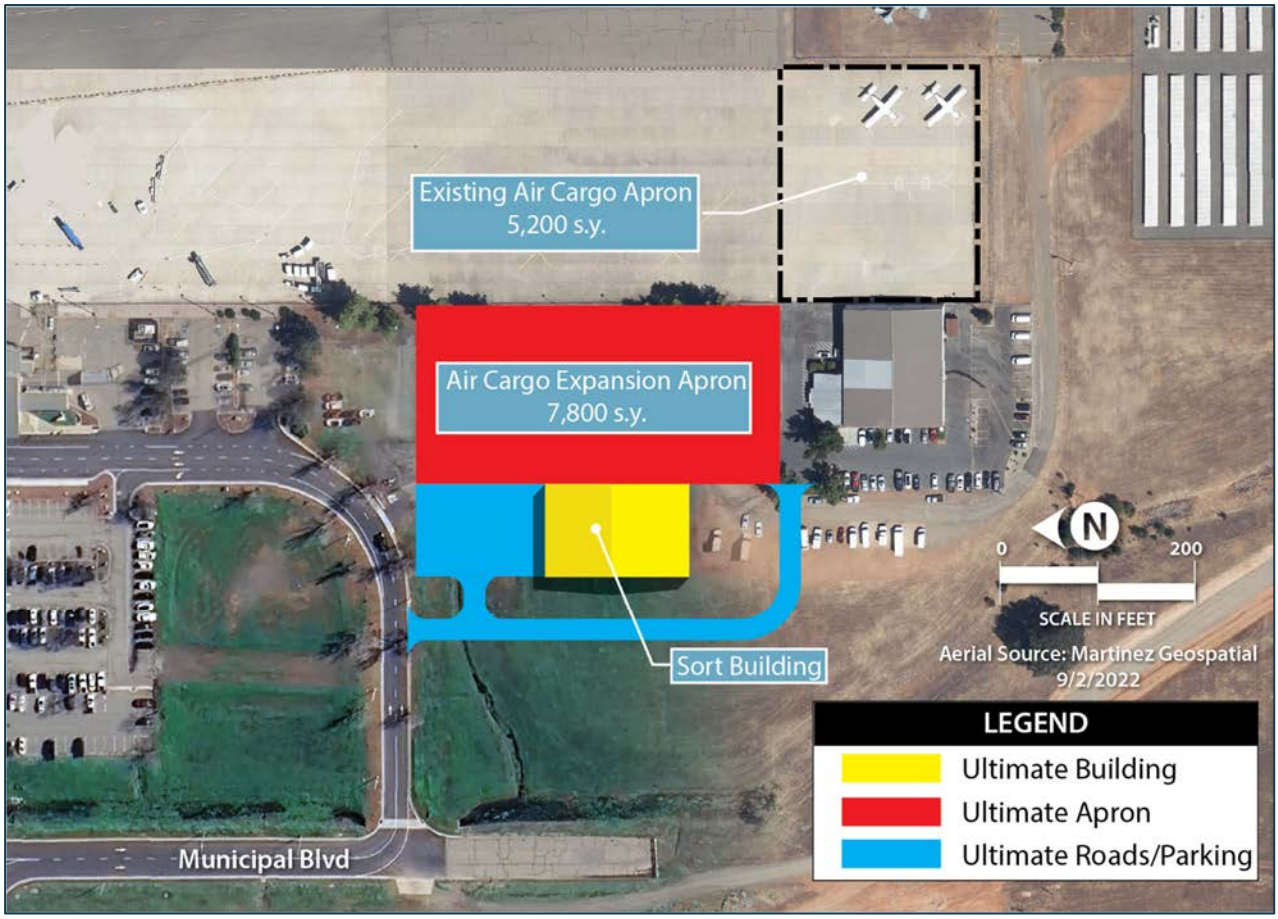


Figure 4.5 – Air Cargo Facilities

ALTERNATIVES SUMMARY

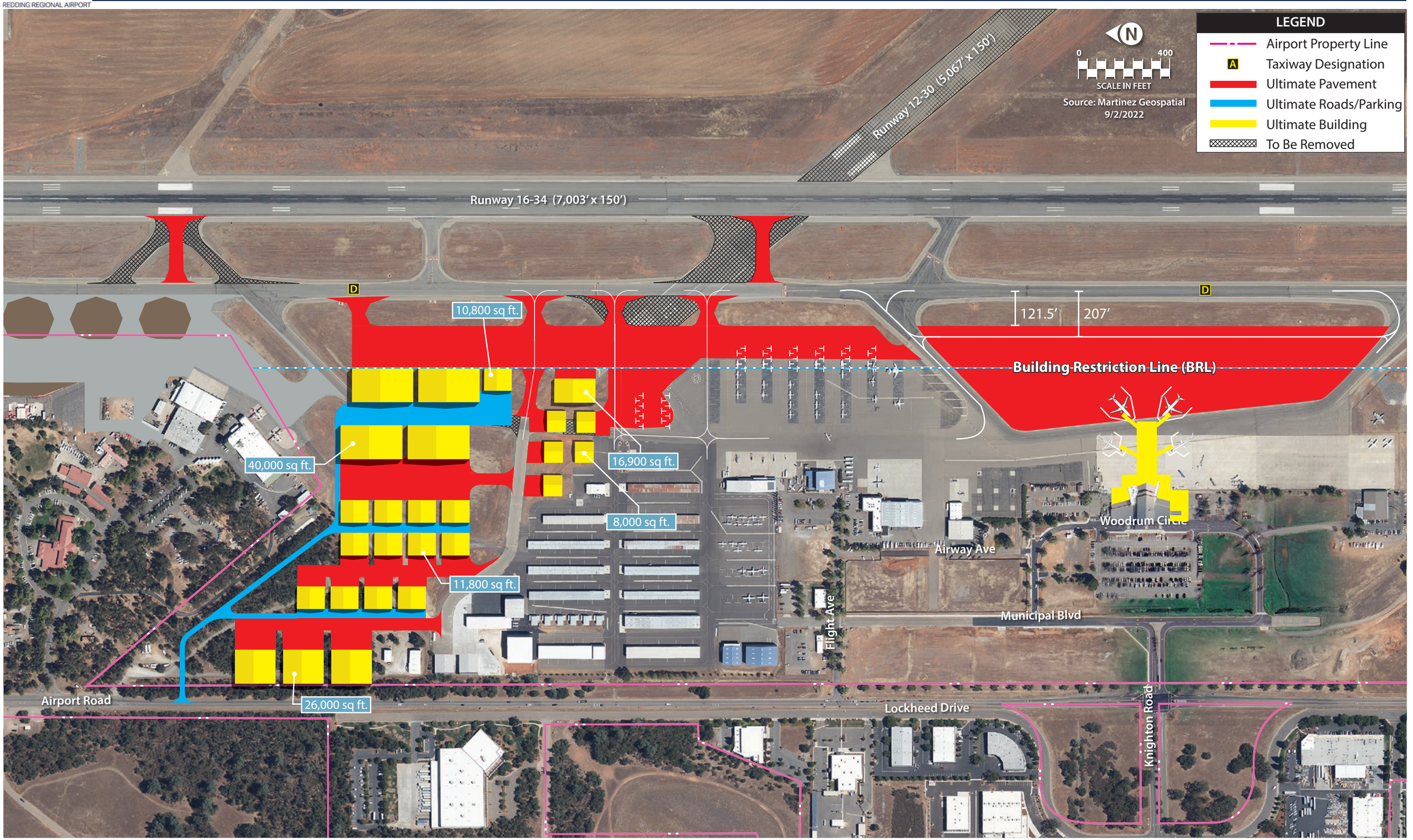
The process utilized in assessing airside, terminal, and landside development alternatives involved a detailed analysis of short- and long-term requirements, as well as future growth potential. Current airport design standards were considered at each stage of development.

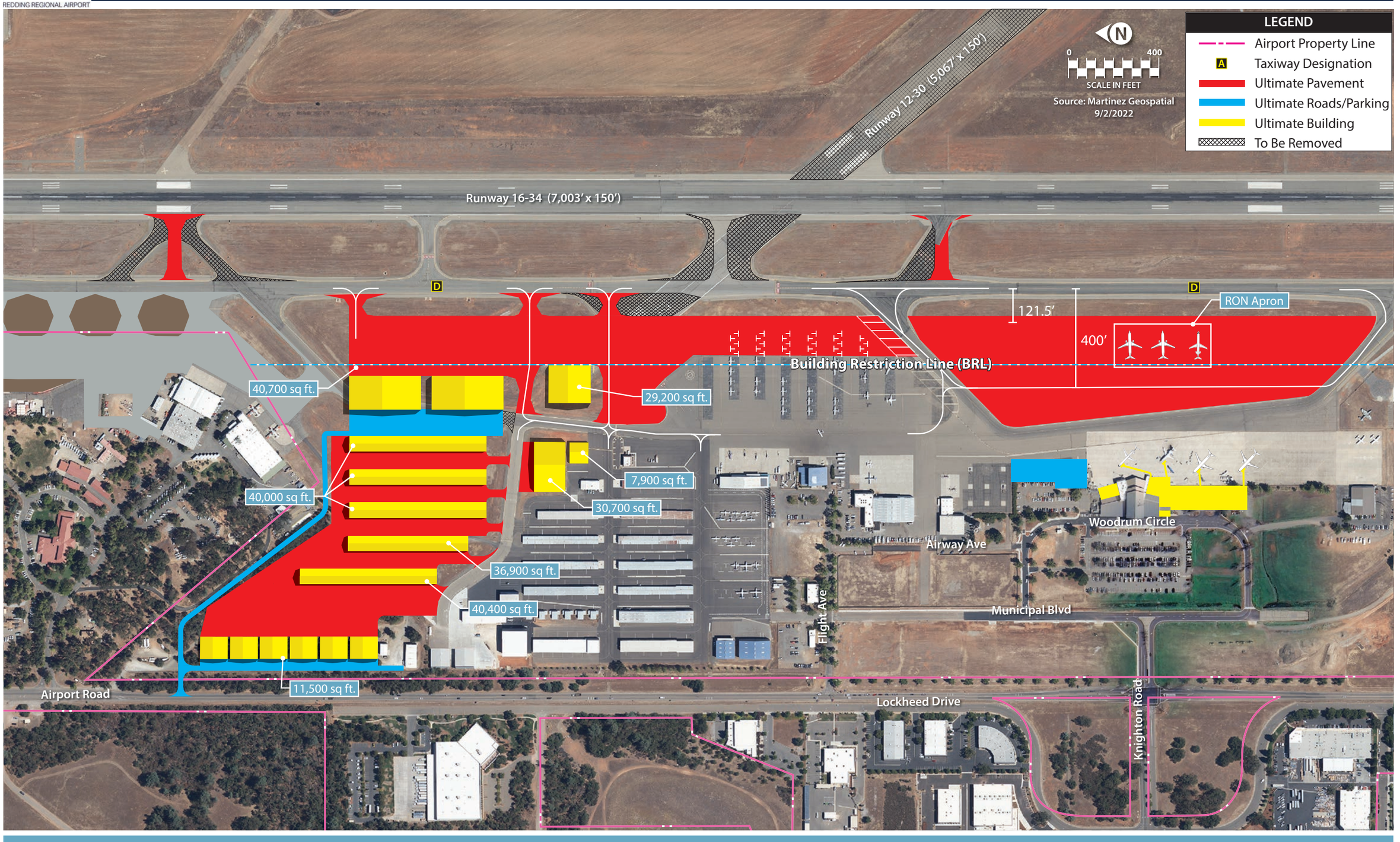
These initial alternatives present a proposed configuration of RDD to be developed over a long period of time. The next phase of the master plan will define a reasonable phasing program to implement a preferred master plan development concept over time.

Based on input from airport staff, the advisory committee, and members of the public, a final master plan concept can be formed. The resultant plan will represent an airside facility that fulfills safety and design standards, as well as a terminal area and landside complex that can be developed as demand dictates.

The preferred master plan development concept for RDD must represent a means by which RDD can grow in a balanced manner – on the airside, as well as the terminal area and landside – to accommodate forecast demand. In addition, it must provide for the flexibility to meet activity growth beyond the long-range planning period.

The remaining chapters will be dedicated to refining these basic alternatives into a final development concept with recommendations to ensure proper implementation and timing for a demand-based program.


LEGEND
Airport Property Line
A Taxiway Designation
Ultimate Pavement
Ultimate Roads/Parking
Ultimate Building
To Be Removed
N
0
400
SCALE IN FEET
Source: Martinez Geospatial
9/2/2022
Runway 12-30 (5,067' x 150')
Runway 16-34 (7,003' x 150')
D
D
10,800 sq ft.
40,000 sq ft.
16,900 sq ft.
8,000 sq ft.
11,800 sq ft.
26,000 sq ft.
121.5'
207'
Building Restriction Line (BRL)
Woodrum Circle
Airway Ave
Municipal Blvd
Flight Ave
Airport Road
Lockheed Drive
Knighton Road


LEGEND
Airport Property Line
A Taxiway Designation
Ultimate Pavement
Ultimate Roads/Parking
Ultimate Building
To Be Removed
N
0
400
SCALE IN FEET
Source: Martinez Geospatial
9/2/2022
Runway 12-30 (5,067' x 150')
Runway 16-34 (7,003' x 150')
D
D
121.5'
400'
RON Apron
Building Restriction Line (BRL)
40,700 sq ft.
29,200 sq ft.
7,900 sq ft.
30,700 sq ft.
40,000 sq ft.
36,900 sq ft.
40,400 sq ft.
11,500 sq ft.
Airport Road
Lockheed Drive
Flight Ave
Airway Ave
Municipal Blvd
Woodrum Circle
Knighton Road