CHAPTER FOUR: ALTERNATIVES

4.1 Introduction

Chapter 3, *Facility Requirements*, identified the airside and landside facilities needed to accommodate current and projected demand over a twenty-year planning period. In this chapter, a series of airport improvement alternatives will be presented for comparison which meet airfield, terminal, general aviation, and air cargo needs. The chapter will also discuss the potential for other improvements on the airport property which can provide revenue support. Subsequently, a master plan concept will be recommended.

The alternatives presented in this chapter provide a series of options for meeting short- and long-range facility needs. Since the levels of commercial and general aviation activity can vary from forecast levels, flexibility must be considered in the plan. If activity levels vary by significant levels within a five-year period, the Yellowstone Regional Airport should consider updating the plan to reflect the changing conditions.

The alternatives presented in this chapter were reviewed with the Yellowstone Regional Airport staff for further refinement. Then, a master plan concept was recommended in conjunction with airport layout plans and capital improvement programs (CIP). While the evaluation of airport improvement alternatives may always include the "no action" or "no build" alternative, this alternative will eventually reduce the quality of services provided to the public and potentially affect the Cody area's ability to accrue additional economic growth. However, a final decision with regard to pursuing a particular improvement plan which meets the needs of commercial and general aviation users rests with the Yellowstone Regional Airport Board. While this study does not deal with the potential relocation of services to other airports, this option also exists. It would be difficult to duplicate the services and convenience of the current facility at a nearby airport and the economic and environmental costs of new site development are generally far greater than the cost of developing the existing site. It is sometimes possible to relocate, or encourage the relocation of some services. However, most of the services which local users find attractive are not easily met at nearby airports. Therefore, the master planning process must attempt to deal with the facility needs which have been identified in the previous chapter, providing a logical decision path which the Yellowstone Regional Airport Board can follow in meeting projected needs. Through coordination with Yellowstone Regional Airport Staff, the Airport Board, and the public, the alternatives will be refined and modified as necessary to shape the recommended improvement program. The alternatives presented in this chapter can be considered a beginning point for formulating the updated master plan improvement program, and input will be necessary to define the resulting program.

4.2 Initial Considerations

It is the overall objective of this effort to provide for a balanced airside and landside complex to serve forecast aviation demands. However, prior to defining specific

alternatives, improvement objectives should be defined.

With this in mind, the following objectives have been defined:

- Develop an attractive, efficient, and safe aviation facility.
- Promote increased use of the airport for transportation of air passengers while providing for increased commercial airline competition to stimulate growth.
- Provide the means for the marketing and improvement of the airport and available land as unique business opportunities for both aviation related and non-aviation related commercial businesses.
- Target local economic growth through the improvement of available airport property for industrial and commercial uses.
- Encourage increased general aviation use of the airport by promoting increased business and corporate use of the airport.

In attempting to meet these objectives, improvement of facilities should be undertaken in such a manner as to minimize operational constraints. Flexibility is essential to assure adequate capacity while minimizing financial commitments until market potential is realized.

4.3 Airfield Alternatives

Airfield facilities are, by nature, a focal point of the airport complex. Because of their primary role and the fact that they physically dominate airport land use, airfield facility needs are often the critical factor in the determination of a viable airport improvement program. Analysis in the previous chapter indicated the need to continue to maintain the current runway length and width. Other factors considered include taxiway circulation and the potential to provide additional runway length if needed in the future.

4.3.1 Runways

As evaluated in Chapter 3, Facility Requirements, the existing runway length at Yellowstone Regional Airport (8,268 feet) is adequate to accommodate the forecast aircraft under most conditions.

An increase in runway length could benefit some of the larger aircraft using the airport under the most stringent hot day and long destination range conditions. The most likely way to accomplish a runway extension would be to relocate Beacon Hill Road and extend the runway to the northeast. In addition to the considerable cost, because of obstacles off the end of the runway, this could potentially lead to higher minimums on the straight-in approach.

Due to the cost vs. benefit, an increase in runway length is not recommended for the planning period at this time. However, future use of more demanding aircraft at the airport could necessitate lengthening of runway in

the long term future. The ability to ultimately extend the runway to the northwest should be preserved for the long term future through maintenance of clearances and airspace zoning.

Similarly, the existence of displaced thresholds at the airport can only be addressed with a "de facto" extension of the runway. The displaced thresholds were established in order to obtain full length and width Runway Safety Area (RSA) and Runway Object Free Area (ROFA) beyond each runway end. Because the objects causing the deficiencies are roads (Highway 14 to the southwest and Beacon Hill Road to the northeast), correcting this situation would require road relocation. Highway 14 cannot be feasibly relocated, so the remaining option is to relocate Beacon Hill Road and extend the runway approximately 1000 feet to the northeast, including full length and width RSA and ROFA. As noted, in addition to the considerable cost, this would likely lead to higher minimums on the straight-in approach to Runway 22. Due to the cost vs. benefit, this is not recommended for the planning period at this time, however, it is recommended that provision for ultimate runway expansion be depicted on the Airport Layout Plan to preserve the option for extension beyond the planning period.

An analysis of wind coverage on the current runway orientation indicated that the crosswind component at the airport is slightly over the threshold justifying planning for a crosswind runway. Development of a crosswind runway, however, would require the relocation of significant airport facilities, including the passenger terminal complex. In addition, the land area available for a crosswind runway would require a significant amount of earthwork fill and is considered cost prohibitive and impracticable. Therefore, a crosswind runway is not recommended in the 20 year planning horizon.

4.3.2 Taxiways

The facility needs evaluation for taxiways at the airport recommended a number of targeted improvements to improve operational efficiency.

- Remove or shift the perpendicular Taxiway A-2 segment .accessing the general aviation apron to reduce direct access from the apron to the runway.

- Consider adding holding aprons or bypass taxiways to serve the existing runway system.

- Extend taxiways / taxilanes into GA development areas.

With the exception of the access taxiway to the general aviation apron, these improvements have limited alternatives beyond build / no build.

Airport Design AC 150/5300-13A states that taxiway connectors that cross over a parallel taxiway from an apron and directly onto a runway are not recommended. In order to prevent runway incursion and promote good situational awareness by pilots, a staggered layout when taxiing from an apron onto a

parallel taxiway and then onto a runway is recommended.

Two alternatives for creating a staggered taxiway layout to the runway were considered; removal of the Taxiway A-2 segment between Runway 4-22 and parallel Taxiway A, and shifting the taxiway segment accessing parallel Taxiway A from the general aviation apron to the southwest. These alternatives are shown in **Figure 4-1**.

In order to determine the potential impacts of removal of the north apron access taxiway, aircraft utilization percentage guidance in Table 4-13 of AC150/5300-13A was consulted.

Taxiway A2 is 6480 feet from the displaced landing threshold of Runway 22. In this location, in dry conditions, Taxiway A2 accommodates 98 percent of large aircraft exiting Runway 22. Removal of the segment of Taxiway A2 between Runway 4-22 and parallel Taxiway A Taxiway A2 would require these aircraft to remain on the runway for an additional 1388 feet to reach Taxiway A-1, which increases runway occupancy time.

Shifting (removing and replacing) the southwest apron access taxiway to the southwest creates a staggered layout and eliminates the direct taxi route from the apron to the runway per FAA guidance. A shift of this distance retains the existing aircraft utilization percentages and low runway occupancy times. It also retains the current convenience and flexibility of having two apron access taxiways for entering and exiting aircraft

Removal and replacement of the apron exit taxiway between the apron and Taxiway A in a staggered location southwest of its current location is recommended.

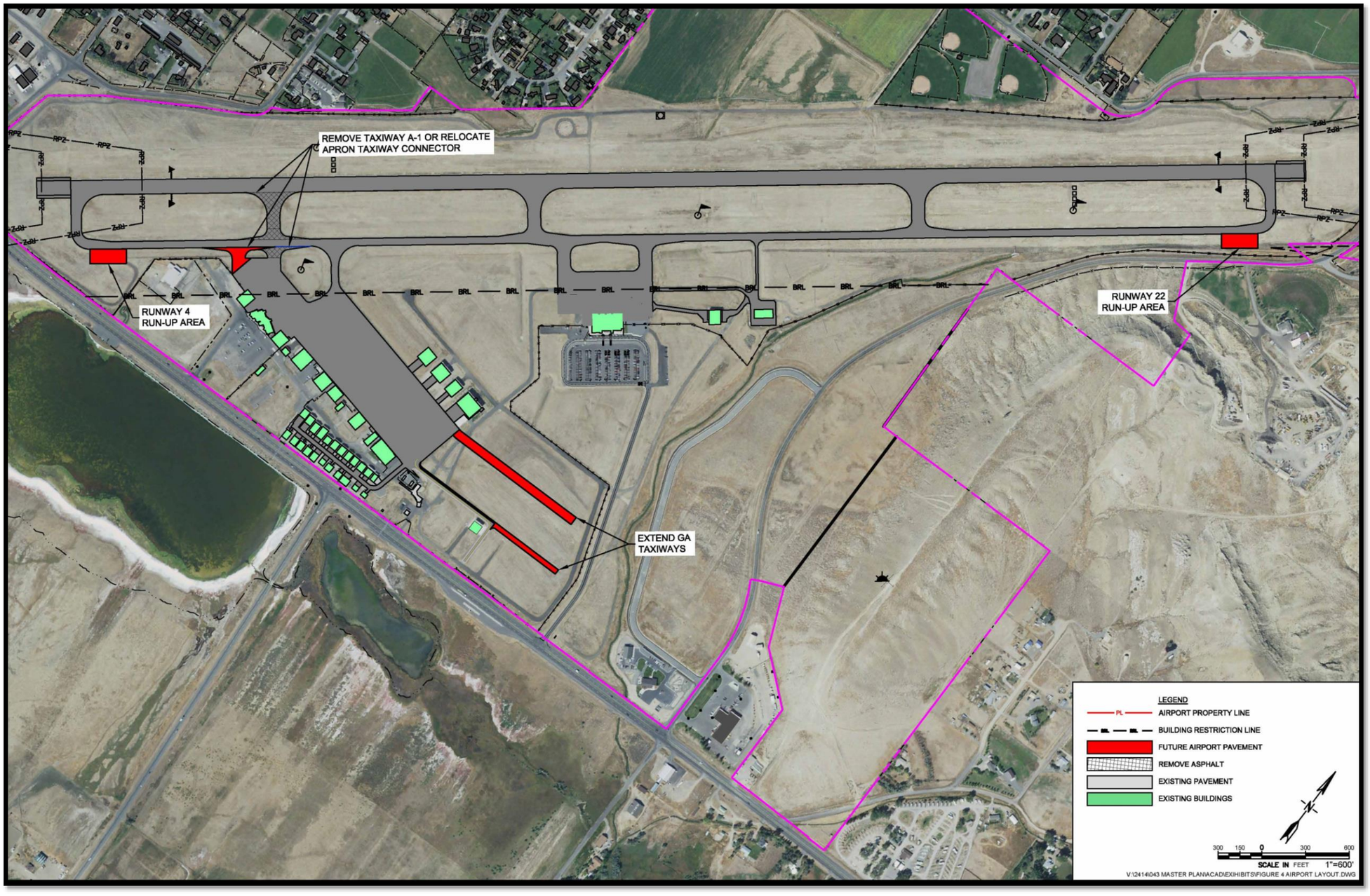

Figure 4-1: Potential Taxiway Extensions and Removals

4.3.3 Instrument Approaches, Lighting, Visual Approach Aids

Due to the terrain around the airport, the Yellowstone Regional Airport has historically had higher than optimal approach minimums into the airport. This has resulted in more weather-related flight cancellations than those experienced at other airports within the region. In order to reduce inconvenience to passengers / travelers caused by flight cancellations, the Yellowstone Regional Airport Authority has undertaken an approach feasibility study to reduce approach minimums into the airport.

Current approaches include conventional navigation approaches and RNAV navigation approaches.

Conventional navigation approaches utilize NAVAIDs based on ground installations such as

- NDB (Non-Directional Beacon)
- VOR (Very High Frequency Omni-Directional Range)
- DME (Distance Measuring Equipment)
- ILS (Instrument Landing System) & LOC (Localizer) installations.

RNAV navigation approaches utilize a Global Positioning System (GPS) from satellite based radio navigation systems which emit signals to receivers on board aircraft to determine location relative to a specific procedure path.

Approaches to Runway 4 are currently limited to either visual operations or the current laterally guided, VOR-A or RNAV (GPS)-B circling approaches. There is not currently a straight in approach available to Runway 04.

Regional air transport carriers currently serving the Cody area have limited operations and/or training related to circling approaches leaving few options for consistent year-round operations. This limits operations to the Yellowstone Regional Airport when weather and/or winds require Runway 04 to be utilized.

Runway 22 serves as the primary runway for the airport due to its alignment with prevailing winds and clearer approach paths. It is served by the same non-vertically guided, VOR-A and RNAV (GPS)-B, circling approach procedure as Runway 04, but also has the benefit of a straight-in approach.

This straight-in, precision approach procedure is available via the RNAV (GPS) Runway 22 procedure. This procedure approaches from the Northeast with feeder route options from the south. For aircraft that have a WAAS equipped receiver, vertical guidance is provided through and LPV line of minima. Four sets of minimums are published with this procedure, LPV, LNAV/VNAV, LNAV, CIRCLING.

A previous effort undertaken in 2005 ultimately resulted in improved minimums into Runway 22 (¼ mile lower/improvement from 1 ¼ mile best to 1 mile best) through minor modifications to the procedure elements of the RNAV GPS Runway 22 approach.

An effort is currently underway to establish a new straight in RNAV GPS approach to Runway 4.

An Operational Capability Assessment was completed in July 2017. This study assessed different approach options to both runways, including both land based and GPS methods. Following review by FAA a request form was submitted to the FAA via the Instrument Flight Procedures Gateway for the establishment of a straight in RNAV GPS approach to Runway 4. FAA is currently in in the process of evaluating and developing standard instrument procedures. Publication with the appropriate landing and takeoff minima is anticipated near the beginning of 2020. It is expected that the new approach will reduce weather visibility minimums to Runway 4 to as low as 1 mile horizontally and 400 feet vertically.

With the establishment of straight in GPS approaches to both runways, future reductions in weather minimums will be achieved through incremental improvements.

Options for instrument approach improvements to Runway 4 and Runway 22 may include:

- ILS (localizer & glideslope)
- Localizer only
- Approach Lighting (MALSF/MALSR),
- Incremental procedural modifications

Pursuit of these improvements will require ongoing evaluation in coordination with FAA flight procedures. Clearances for the approaches to both runways should continue to be preserved in anticipation of the ultimate development of full precision approaches.

4.3.4 Air Traffic Control Tower

As noted in Chapter 3, Facility Requirements the Yellowstone Regional Airport does not have an Air Traffic Control Tower (ATCT). The FAA is generally responsible for siting, constructing and maintaining an ATCT for an airport, therefore actions related to the ATCT are typically initiated by the FAA. The purpose of discussion within the context of this master plan is to protect land use and guide development so that future ATCT sites remain feasible should a tower prove warranted.

Options for addressing the deficiencies of the existing air traffic control tower include:

- Construct a standard tower and apply for participation in the FAA Contract Tower (FCT) Program
- Replace with new technology Remote Virtual Tower / Remote Tower Centre (RVT/RTC)

The contract tower program has recently resumed accepting applications for airports to join the program. To participate in the FCT Program and be eligible to receive Federal contract funds, an airport must, among other requirements, have an approved operational tower and receive a benefit-cost (BC) ratio of at least 1.0 from the FAA. The BC ratio is developed by using airport-specific information to estimate the benefits of establishing and operating a tower and comparing those to the airport-specific costs of having tower services. Total benefits are the sum of benefits from safety (avoided accidents) and efficiency (avoided aircraft operating cost and passenger value of flight time savings). Costs reflect the capital investment costs for establishing a tower (when these are paid by the FAA) and the annual operating and maintenance costs

paid by the FAA. If costs exceed benefits for certain towers already in the FCT program, the local tower sponsor is provided the opportunity to remain in the FCT program as part of the Cost Share Program, paying a pro-rata share of the tower operating cost. The cost of a new tower would be in the range of $1 to $1.5 million.

To replace the existing tower with a Remote Virtual Tower system, the capital cost is estimated to be upwards of $2 million. The program cost itself, including system development and implementation (not including construction) is estimated at $500,000. To operate and maintain an RVT, the estimated cost is $500,000. The system would allow Air Traffic Controllers to utilize cameras and potentially radar equipment in a building, such as the terminal or ARFF building, instead of building a new tower and having direct sights on the airfield. This system is still in the testing stages and not yet approved by the FAA, nor is it eligible for FAA funding.

It is recommended that discussions occur between the Yellowstone Regional Airport and the FAA regarding ATCT operations and the potential for participation in the FCT program. Likewise, the Airport should continue to monitor the progress and feasibility of RVT systems.

4.4 Terminal

Considerations relative to the passenger terminal and access into the passenger terminal area include:

- Provision for parking expansion. Increasing parking demands will required that the parking lots be expanded
- Provision for holdroom expansion. Holdroom requirements will increase as regional carriers transition to larger aircraft and as additional gates are utilized simultaneously.
- Provision for additional airline office space if third air carrier enters Cody market.
- Provision for additional baggage claim frontage and lobby area
- Expanded secure and non-secure side concessions
- Additional secure and non-secure side restroom space

A conceptual layout for the long term expansion of the existing terminal building to provide additional gates, baggage claim, secure and non-secure side concessions space is provided in **Figure 4-2**, with a commercial apron parking layout shown on **Figure 4-3**. Expansion of terminal auto parking areas is shown in the landside alternatives depicted in **Figures 4-4**, **4-5** and **4-6**.

The future terminal concept claims additional secure holdroom space by expanding into the existing non-secure restaurant and, ultimately into the existing airport administration office space. The central kitchen allows for the potential to service both secure and non-secure side concessions. An expansion of the building to the southwest accommodates new administrative space, expanded baggage claim and additional secure and non-secure side restrooms. Expansion to the northeast is shown to accommodate potential future airline ticketing and office space needs as well as baggage makeup.

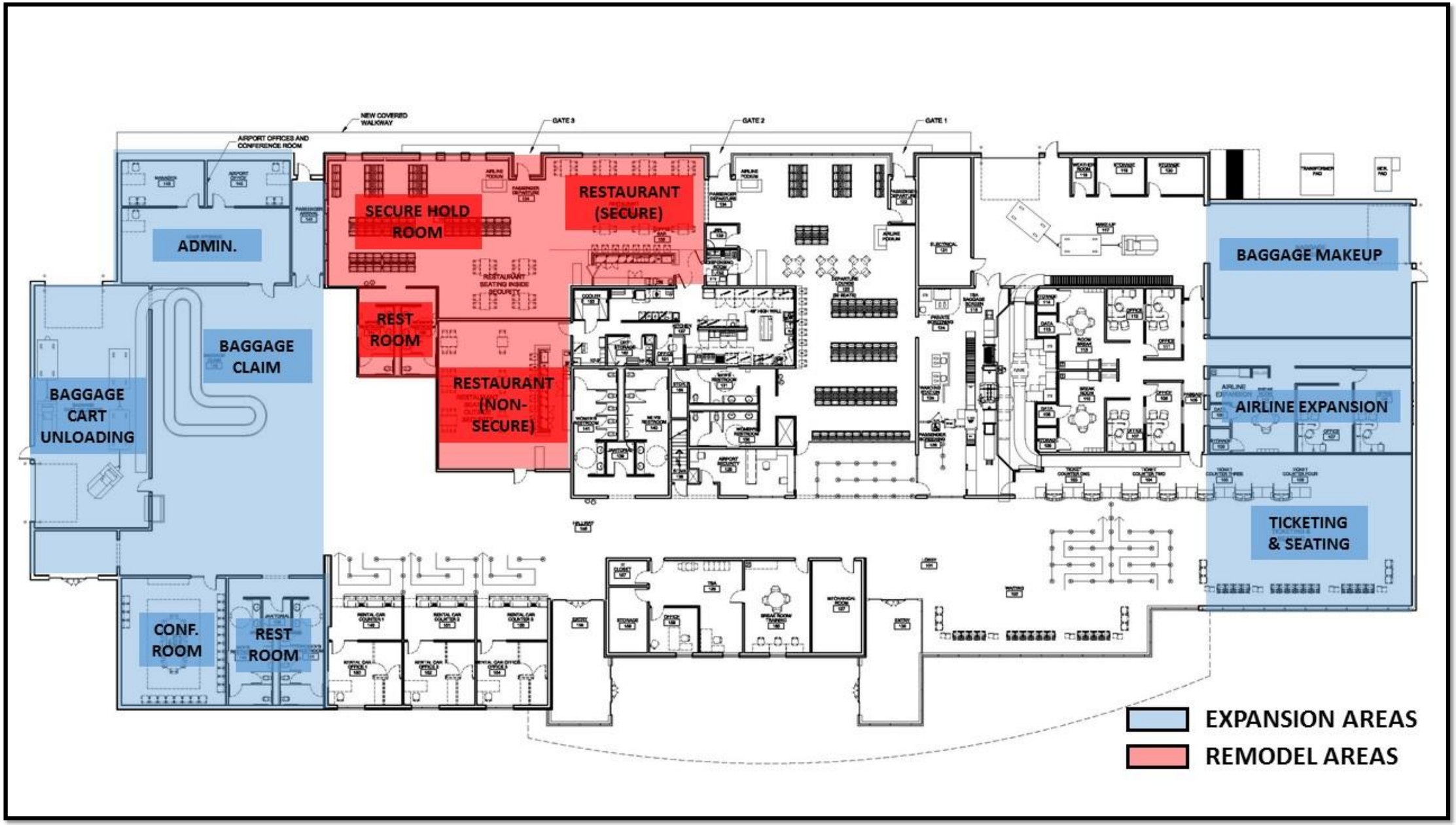

Figure 4-2: Conceptual Terminal Layout

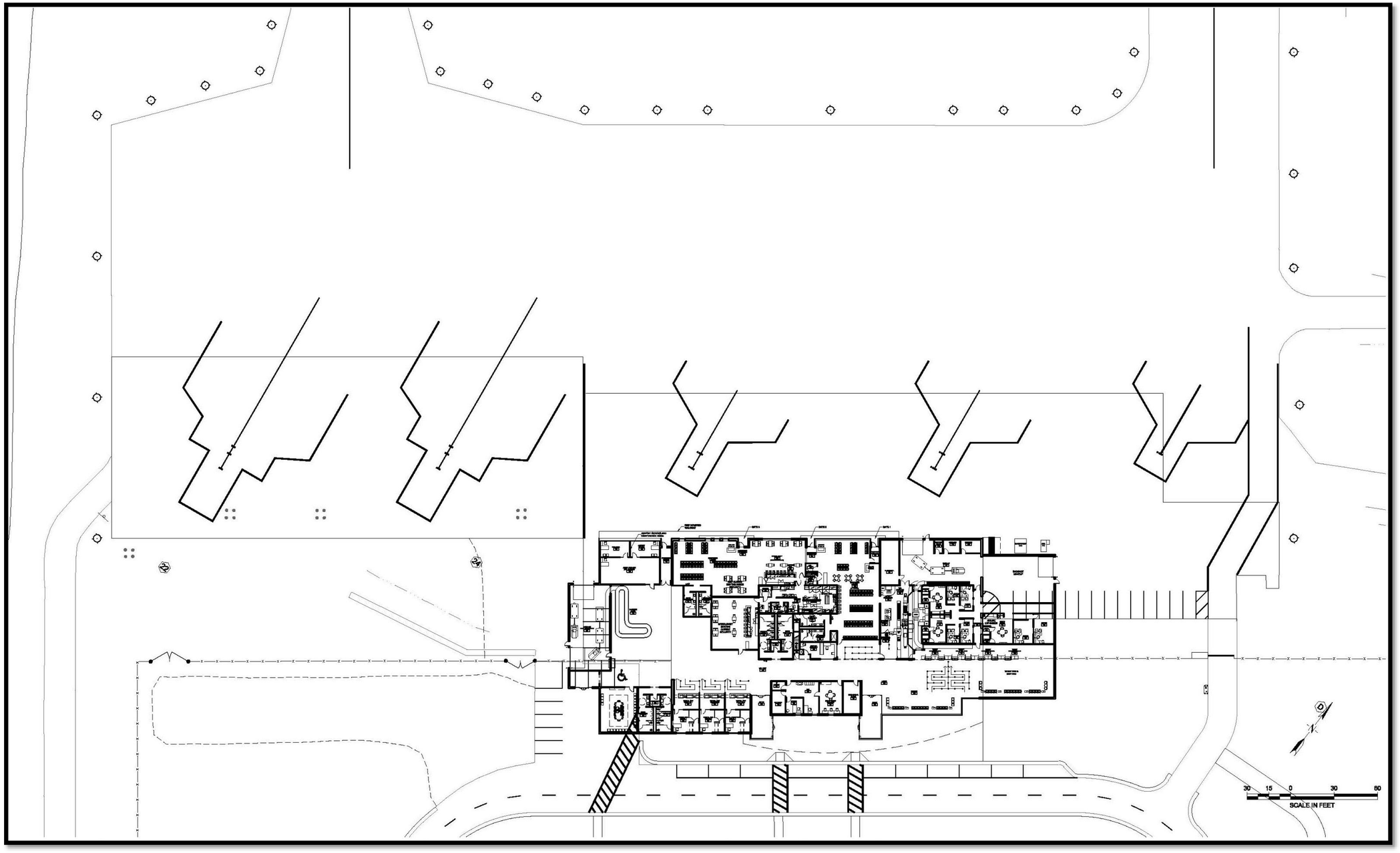

Figure 4-3: Terminal Apron Layout

4.5 General Aviation and Air Cargo Alternatives

Considerations relative to potential general aviation and air cargo alternatives include:

- **Additional storage hangars**
  The facility needs evaluation has projected the need for as many as 27 additional storage positions, for both small and large aircraft. Arrangements of a variety of hangar types and sizes and associated taxilanes and aprons is identified in Landside Alternatives 1-3 on **Figures 4-4**, **4-5** and **4-6**.

- **FBO Expansion**
  Current FBO facilities are located on the south side of the GA apron. Opportunities for expansion of the current facilities to include new services such as a flight school are limited in the current location. Opportunities for new FBO space are identified in Landside Alternatives 1-3 on **Figures 4-4**, **4-5** and **4-6**.

- **Segregated area for air cargo operators.**
  At the present time, FedEx utilizes a sort facility located between hangars on the south side of the general apron. This area is land locked and does not have the ability to expand for increased use by FedEx or to accommodate other operators. Alternate locations for additional air cargo sorting facilities are incorporated into the Landside Alternatives 1-3 on **Figures 4-4**, **4-5** and **4-6**.

Figures 4-4, **4-5** and **4-6** illustrate Landside Alternatives 1, 2 and 3. All three alternatives proposes development of conventional hangars with corresponding aprons taxilanes to the north and west of the current hangar area. A mixture of small general aviation and large executive hangars is shown. Future apron expansion and a future fuel farm are depicted in the southwest corner of the development area which could serve as the location for a future FBO or GA terminal.

Through further meetings and discussions with the Airport Board, a recommended concept will be brought forward. The recommended concept will represent a means by which the airport can continue to effectively serve general aviation needs within the overall operation and development of the airport.

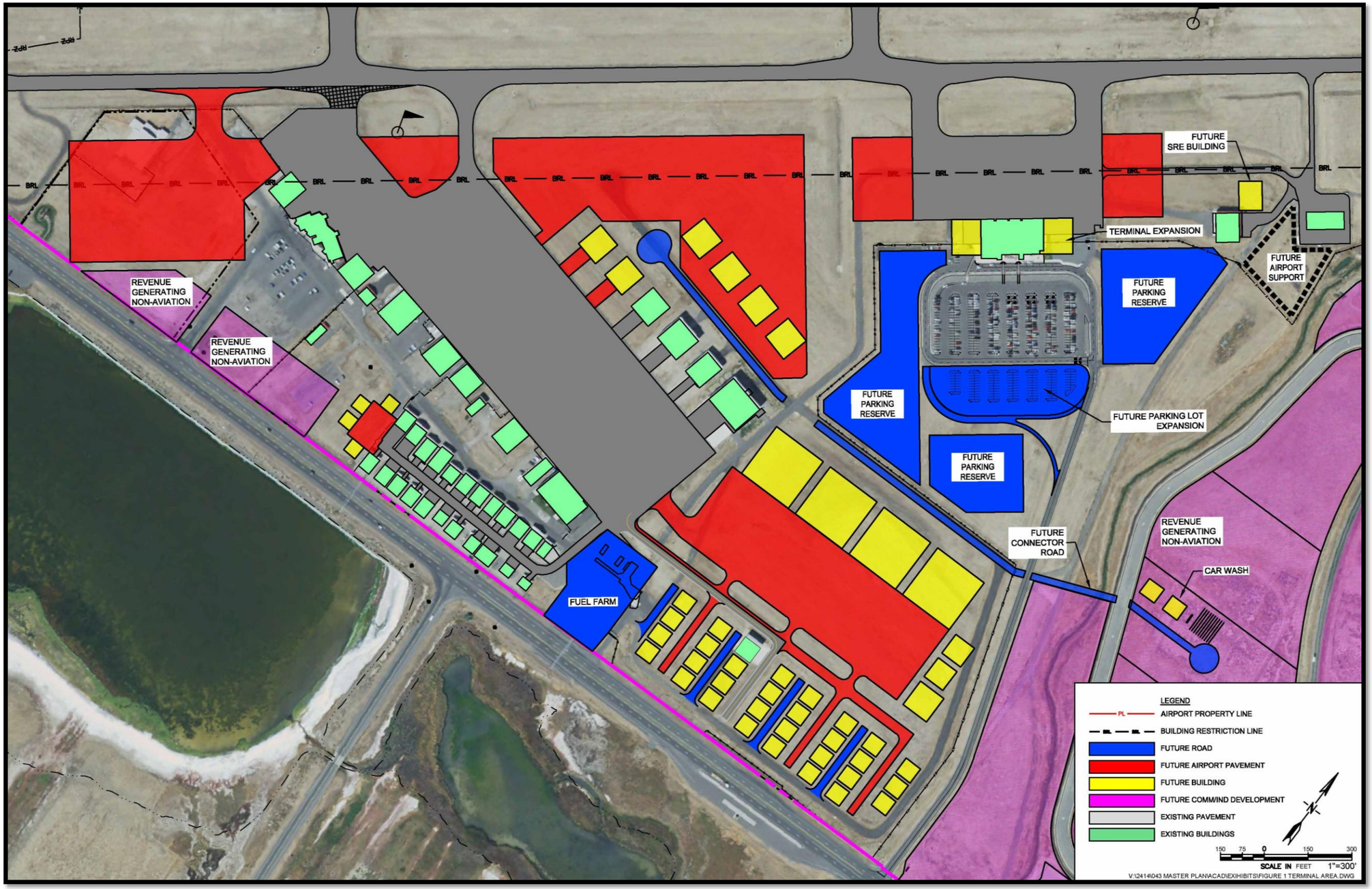

Figure 4-4: Landside Alternative 1

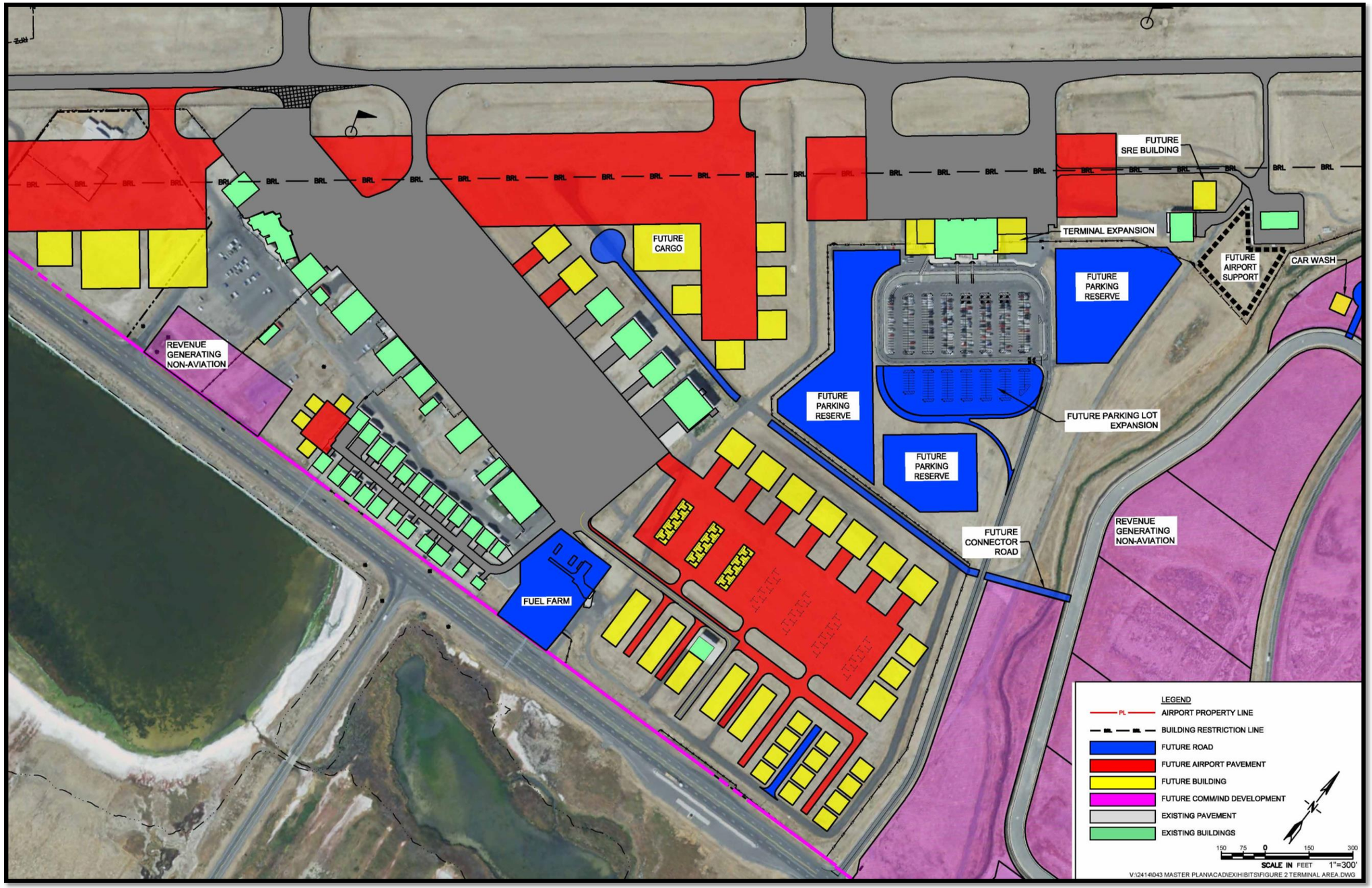

Figure 4-5: Landside Alternative 2

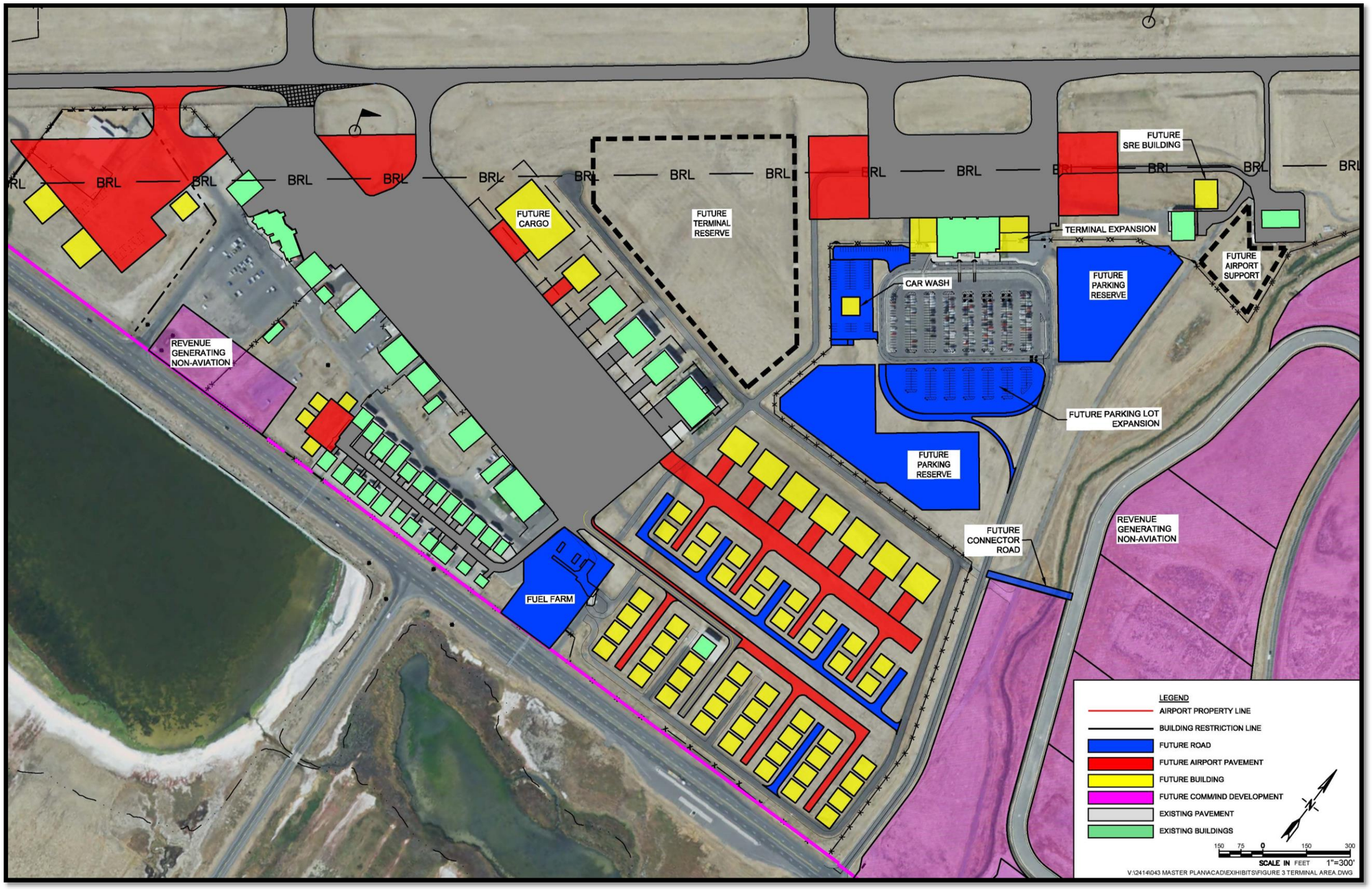

Figure 4-6: Landside Alternative 3