

Chapter 5

Alternatives Analysis

Based on the infrastructure needs that were identified from the review of facility requirements, a set of alternatives were prepared to offer development options that can meet existing and anticipated demand. Each alternative takes into consideration the short-, medium-, and long-term needs of the University Park Airport (Airport) and was developed considering economic, operational, environmental, and sustainability factors. This chapter presents each alternative and compares the advantages and disadvantages of each in an effort to identify a preferred development option for each facility need. The selection of the preferred alternatives are based on quantitative or qualitative rankings as compared to the other alternatives considering tangible and intangible factors. It should be noted that some preferred alternatives were selected based on a single, logical development action; as such, a comprehensive analysis was not conducted. It should be noted that alternatives presented in this chapter are conceptual in nature and are subject to further refinement through financial, environmental, and engineering means.

The presentation and analysis of alternatives presented in this chapter, as well as the selection of the preferred alternatives, is organized by the following sections:

- 5.1 Evaluation Criteria Methodology
- 5.2 Runway 6/24
- 5.3 Crosswind Runway
- 5.4 Taxiway System
- 5.5 Ultimate Commercial Airline Terminal
- 5.6 Commercial Airline Terminal Apron
- 5.7 Landside Access
- 5.8 Commercial Airline Terminal Vehicle Parking
- 5.9 General Aviation Development
- 5.10 Air Cargo Apron
- 5.11 Aircraft Rescue and Firefighting (ARFF)/Snow Removal Equipment (SRE) Facility
- 5.12 Summary of Recommended Alternatives

5.1 Evaluation Criteria Methodology

To evaluate the alternatives, a set of criteria was developed to review the advantages and disadvantages of each development option. These criterion focused on quantitative and qualitative factors that should be considered when weighing the merits and deficiencies of the alternatives:

- **Operational Factors** – Each alternative was evaluated for how well it accommodated projected demand during the planning period that included, but was not limited to, aircraft operations, passenger enplanements, landside vehicle traffic, based aircraft, air cargo activity, aircraft fuel sales, and the demand for hangar and apron space. Other operational factors such as aircraft delay, airfield circulation, and convenience to Airport users were also considered in the review of advantages and disadvantages of each development option.
- **Economic Factors** – Qualitative economic factors such as construction and operational costs were considered in evaluating the cost effectiveness of each alternative. This includes costs for design, construction, day-to-day operation, and maintenance. It is important to note that the focus of this evaluation was not to determine the cost to construct each alternative, but rather the type of costs that should be considered when comparing development options.
- **Environmental Factors** – Environmental conditions that could be directly impacted by the proposed development, such as noise, air quality, water quality, scenic oversight, land use, and socioeconomic impacts, were the focus of this criterion. It should be noted that significant environmental considerations as they pertain to each alternative were reviewed as a part of this evaluation. A more in-depth overview of the environmental factors that could impact development at the Airport is presented in the Environmental Overview chapter (Chapter 7).
- **Sustainability Factors** – Each alternative was reviewed for how well it supported the sustainability goals, objectives, and initiatives of the Airport as presented in Chapter 6. It is important to note that this review also considered the financial feasibility of each alternative in achieving these goals, objectives, and initiatives. Those alternatives deemed financially feasible were considered to be more advantageous than development options that required significant financial investment with limited benefits gained by the Airport.
- **Implementation Feasibility** – This criterion focused on the tangible and intangible factors that should be considered to implement each alternative. Factors such as logic, common sense, and probability of unknown contingencies were qualitatively evaluated for each alternative to help support or negate the feasibility of implementing the proposed action.

Each section of this chapter addresses a need that was identified through the review of facility requirements and is organized so that the evaluation of each alternative considers the previously described evaluation criteria. A summary table presented at the end of the discussion for each alternative reviews advantages and disadvantages that were considered so an easily identifiable comparison can be made with the other alternatives. Finally, at the end of each section, the preferred alternative is identified along with justification for why it is the best development option for the Airport to meet the demands of its users for the planning period.

5.2 Runway 6/24

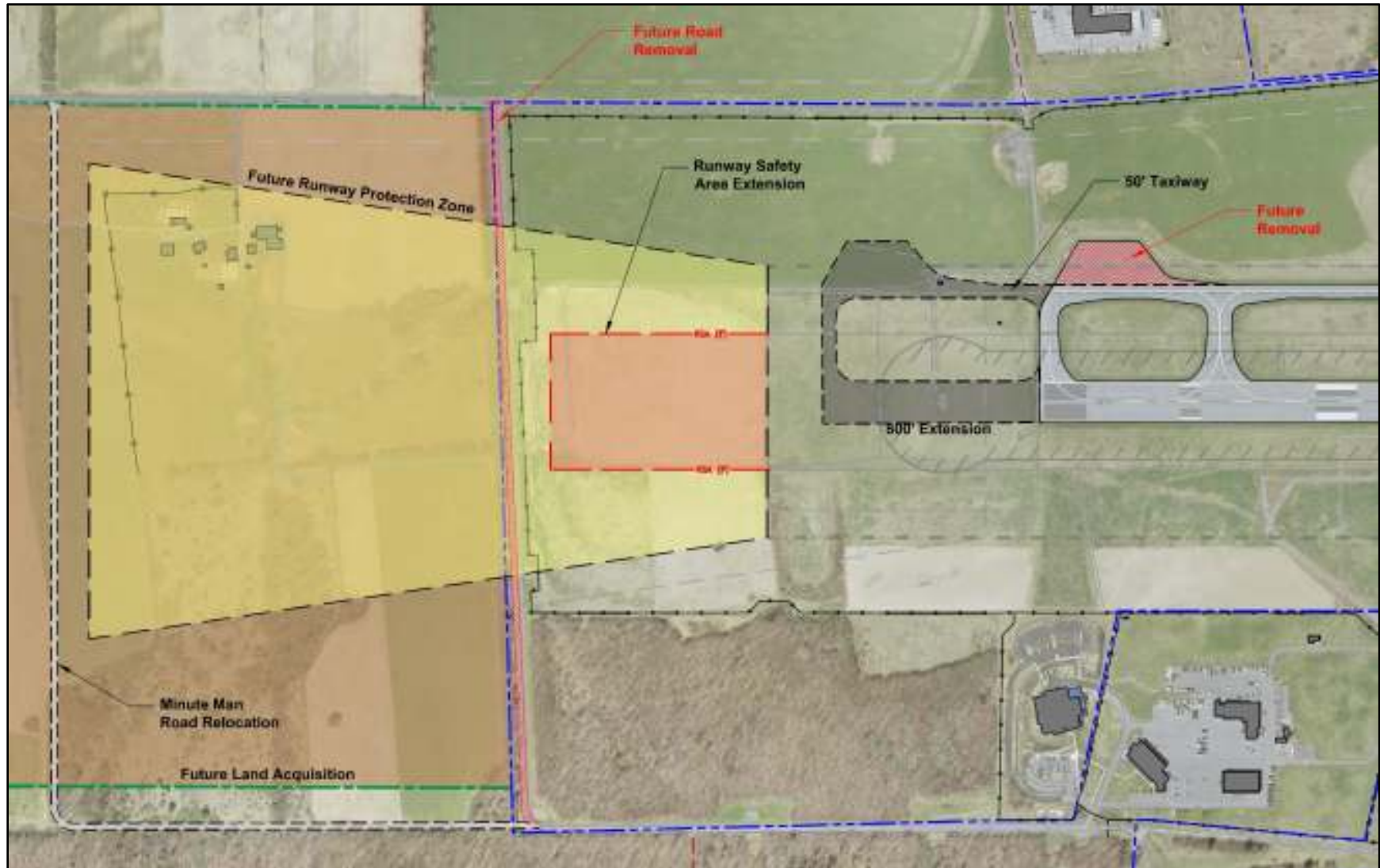
A review of the runway length requirements of existing and anticipated commercial aircraft types expected to operate at the Airport during the planning period found that the existing runway length is not adequate to meet takeoff length demands. The introduction of larger commercial aircraft types and longer stage lengths, which is being projected for the planning period, will require that Runway 6/24 be extended to meet increased runway takeoff distance needs. As such, it is recommended that planning be initiated to extend the length of Runway 6/24. A review of the takeoff distance requirements of commercial aircraft types anticipated to operate at the Airport during the planning period found that an additional 800 feet of runway length is needed to provide 7,501 feet of takeoff distance.

The Airport occasionally receives charter operations from narrow-body aircraft and has the potential to attract weekly service by a low cost carrier (LCC) operating narrow-body aircraft. While these narrow-bodied aircraft types such as the Boeing 737, Airbus A320, and McDonnell Douglas MD-80 are able to conduct operations at the Airport, their range is limited since concessions are needed in passenger, cargo, and fuel loads to operate on the existing length of the runway. While an 800-foot extension of Runway 6/24 to 7,501 feet would increase the takeoff distance that would be available for these aircraft, concessions may still be needed in passenger, cargo, and fuel loads, thus the range would continue to be limited. To provide the optimal runway length needed to meet the takeoff distance requirements of these aircraft types, it is recommended that planning be initiated to protect for an additional 800-foot extension of Runway 6/24 to increase its length to an ultimate distance of 8,301 feet.

5.2.a Alternative 1 – 800-Foot Extension at Approach End of Runway 6

Alternative 1 proposes an 800-foot extension at the approach end of Runway 6 as illustrated in **Figure 5-1**. In addition to the runway extension, an 800-foot extension of Taxiway A along with a relocated holding apron is also proposed. Relocation of Minute Man Road so that it is located outside the relocated runway protection zone (RPZ) is also illustrated in the figure.

Figure 5-1: Alternative 1 – 800-Foot Extension at the Approach End of Runway 6



Source: Mead & Hunt, Inc. (2014)

Extension of Runway 6/24 to 800 feet would provide additional runway length for aircraft types operated by existing commercial airlines at the Airport to conduct longer range flights, which is projected to occur during the planning period. The 800 feet of additional runway length would allow existing commercial airline operators at the Airport to conduct flights with full passenger, cargo, and fuel loads, thus opening up new markets that could be served with non-stop flights. This, in turn, would lead to a growth in aviation activity that would also generate increased revenue for the Airport. A final advantageous consideration with this alternative is that pulverized raw material from the removal of the existing Taxiway A holding pad could be used as a subbase layer for the runway and taxiway extensions.

While the 800-foot extension of the runway would meet the takeoff distance needs of existing commercial airline operators at the Airport, charter aircraft operators and LCCs operating narrow-body aircraft may still need to make passenger, cargo, and fuel load concessions. The acquisition of land necessary to control land uses within the RPZ is also a consideration with this alternative, since property from a private residence along Fox Hill Road would need to be purchased.

Other factors to consider with Alternative 1 are that relocation of the localizer antenna off the approach end of Runway 6 would be necessary as well as the possible relocation of Minute Man Road if it is found to be an incompatible use within the relocated RPZ. Interim guidance provided by the Federal Aviation Administration (FAA) states that the regional Airport District Office (ADO) must consult with the National Airport Planning and Environmental Division if a number of land uses are present within an RPZ, one of which is public roadways. Consultation with the FAA would be necessary at time of implementation to evaluate whether relocation of the road would be necessary. Finally, extension of the runway at the approach end of Runway 6 would lower the altitude of the flight path over the Toftrees resort, potentially increasing the level of aircraft noise over this area. **Table 5-1** summarizes the advantages and disadvantages with Alternative 1.

Table 5-1: Summary of Considerations – Alternative 1

Advantages	Disadvantages
<ul style="list-style-type: none"> • Provides recommended runway length for commercial airline operators • Facilitates growth in aviation activity and increases revenue generation potential • Pulverized raw material from holding apron removal could be reused as a subbase layer for runway and taxiway extensions 	<ul style="list-style-type: none"> • Land acquisition needed • Requires relocation of localizer antenna • May require relocation of Minute Man Road outside relocated RPZ • Potential to increase aircraft noise over Toftrees resort area

5.2.b Alternative 2 – 800-Foot Extension at Approach End of Runway 24

Alternative 2 proposes to extend the runway 800 feet at the approach end of Runway 24 (**Figure 5-2**). In addition to the runway extension, an extension of Taxiway A with a relocation of the taxiway apron holding pad is also proposed. To meet FAA airport design standards, a relocation of Taxiway H is also proposed as well as the construction of a new connector taxiway between the relocated taxiway holding apron and the T-style hangar area and a relocation of Rock Road outside of the boundary of the RPZ.

Figure 5-2: Alternative 2 – 800-Foot Extension at the Approach End of Runway 24



Source: Mead & Hunt, Inc. (2014)

An 800-foot extension at the approach end of Runway 24 has similar factors to consider as the 800-foot extension proposed in Alternative 1 at the approach end of Runway 6. Extension of the runway would provide commercial airline operators the needed runway length for the aircraft types anticipated to operate at the Airport during the planning period to conduct longer range flights which, in turn, could lead to an increase in aviation activity and increase revenue. This alternative offers the opportunity to reuse raw materials from the removal of the existing Taxiway A holding apron as a subbase for the runway and taxiway extensions. Alternative 2 also offers the advantage of creating additional area for aeronautical development, such as an expansion of the T-style hangar area. Finally, while the acquisition of land is needed, it is not a significant disadvantage to consider since only a small area of land will be needed to be purchased to control land use within the RPZ.

While the 800-foot extension of the runway would meet the runway takeoff distance needs of existing commercial airlines operating at the Airport, charter and LCC operators of narrow-body aircraft may still need to make passenger, fuel, and cargo concessions in order to operate at the Airport. Coordination with the FAA to relocate the Runway 24 glide slope antenna and the medium intensity approach lighting system with runway alignment indicator lights (MALSR) is also a disadvantage that should be considered with this alternative. An additional disadvantage to consider is that closure and relocation of Rock Road will be necessary to meet Runway Safety Area (RSA) design standards. A summary of the disadvantages and advantages to consider with Alternative 2 are summarized in **Table 5-2**.

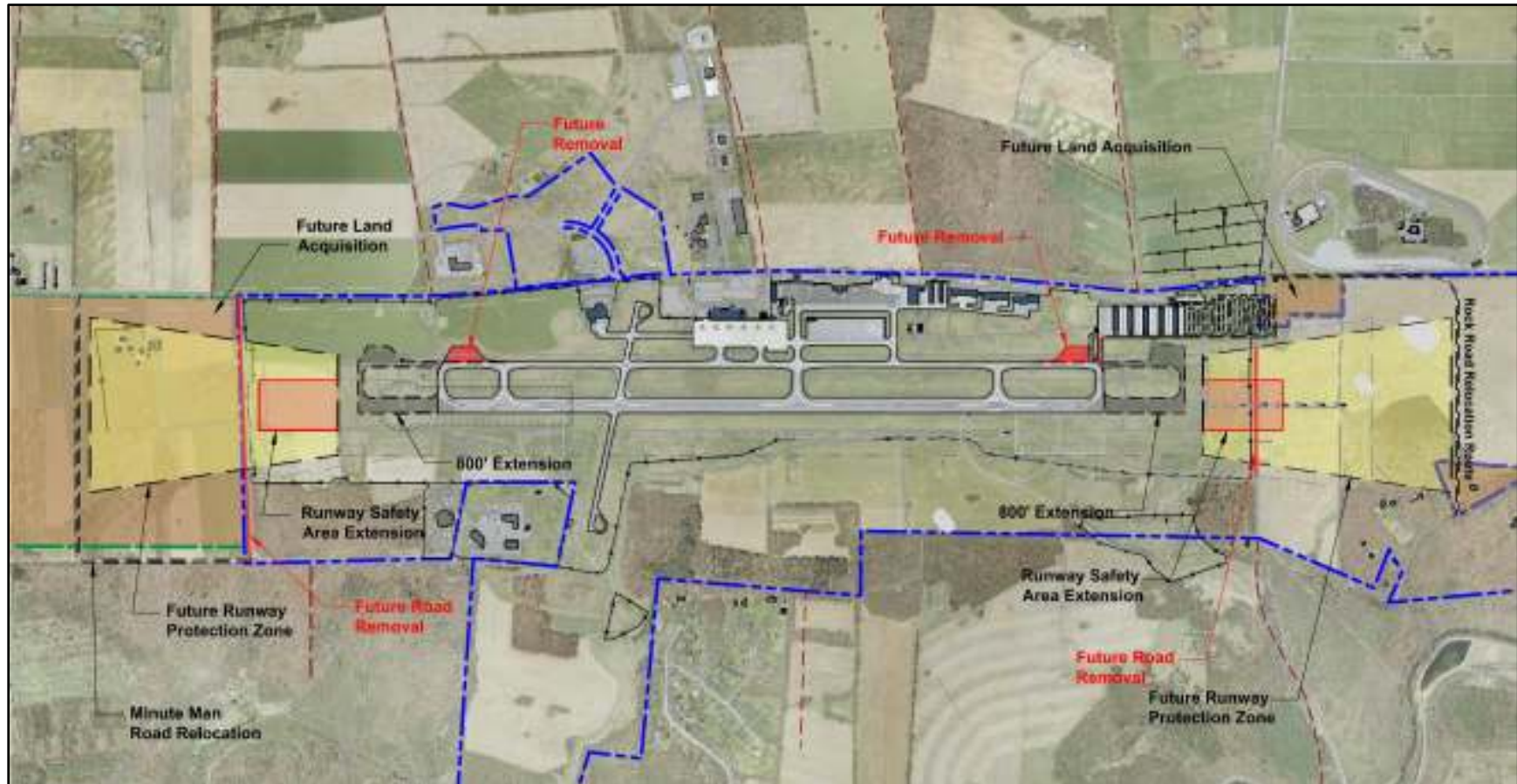
Table 5-2: Summary of Considerations – Alternative 2

Advantages	Disadvantages
<ul style="list-style-type: none"> • Provides recommended runway length • Facilitates growth of aviation activity and increase revenue generation for Airport • Pulverized raw materials could be used as subbase layer for runway/taxiway extensions • Additional area for aeronautical development • Significant land acquisition not needed 	<ul style="list-style-type: none"> • Closure and relocation of Rock Road needed • Relocation of glide slope antenna and MALSR necessary

5.2.c Alternative 3 – 800-Foot Extensions at Each End of Runway 6/24

Alternative 3 proposes to increase the length of Runway 6/24 by 1,600 feet through a pair of 800-foot extensions at either end of the runway (**Figure 5-3**). At the approach end of Runway 6, an 800-foot extension of Taxiway A and a relocated taxiway holding apron are proposed as well as relocation of Minute Man Road outside of the relocated RPZ. An 800-foot extension of Taxiway A as well as a relocated taxiway holding apron is also proposed at the approach end of Runway 24. Relocation of Taxiway H to meet FAA airport design standards and the construction of a new connector taxiway between the taxiway holding apron and the T-style hangar area are also proposed with this alternative. An area to expand the T-style hangar area is also proposed with this alternative since the extension of the runway would create additional area for aeronautical-related development. Finally, Alternative 3 proposes to close and relocate Rock Road at the approach end of Runway 24 so that it is located outside of the RPZ.

Figure 5-3: Alternative 3 – 1,600-Foot Extension of Runway 6/24



Source: Mead & Hunt, Inc. (2014)

Alternative 3 provides sufficient runway length to meet the takeoff distance needs of all aircraft types operated by commercial airlines, LCCs, and charter operators that could conduct operations at the Airport during the planning period without the need to make concessions in fuel, passenger, and cargo loads. The proposed 1,600-foot extension of the runway also has the potential to grow aviation activity at the Airport and increase revenue generation opportunities. Reuse of pulverized raw material from the removal of the existing Taxiway A holding aprons as a subbase layer for the runway and taxiway extensions is an additional advantage to consider with this alternative. A final advantage with Alternative 3 is that additional area is available for aeronautical development at the approach end of Runway 24.

Environmental and implementation factors should also be considered with Alternative 3. Coordination with the FAA would be necessary to relocate the localizer antenna, glide slope antenna, and MALSR associated with the Runway 24 instrument landing system (ILS). Land acquisition would also be necessary to control land uses within the relocated RPZs and to prevent objects that could penetrate Federal Aviation Regulation (FAR) Part 77 design surfaces. Relocation of Minute Man Road at the approach end of Runway 6 and the closure and relocation of Rock Road at the approach end of Runway 24 to control land uses would also be necessary. In addition, a runway extension at the approach end of Runway 6 has the potential to increase aircraft noise over the Tofrees resort area.

Finally, Alternative 3 requires construction at both ends of the runway, which is an additional factor to consider given that 1,000-foot safety areas must be maintained at all times when the runway is open to aircraft operations. Due to this, construction would likely need to be implemented in phases, because a 2,000-foot reduction in the length of the runway if the two extensions were constructed simultaneously would significantly impact Airport operations. This would increase construction time and the coordination needed to inform users of the temporary runway lengths available for landing and takeoff during construction. The advantages and disadvantages with Alternative 3 are summarized in **Table 5-3**.

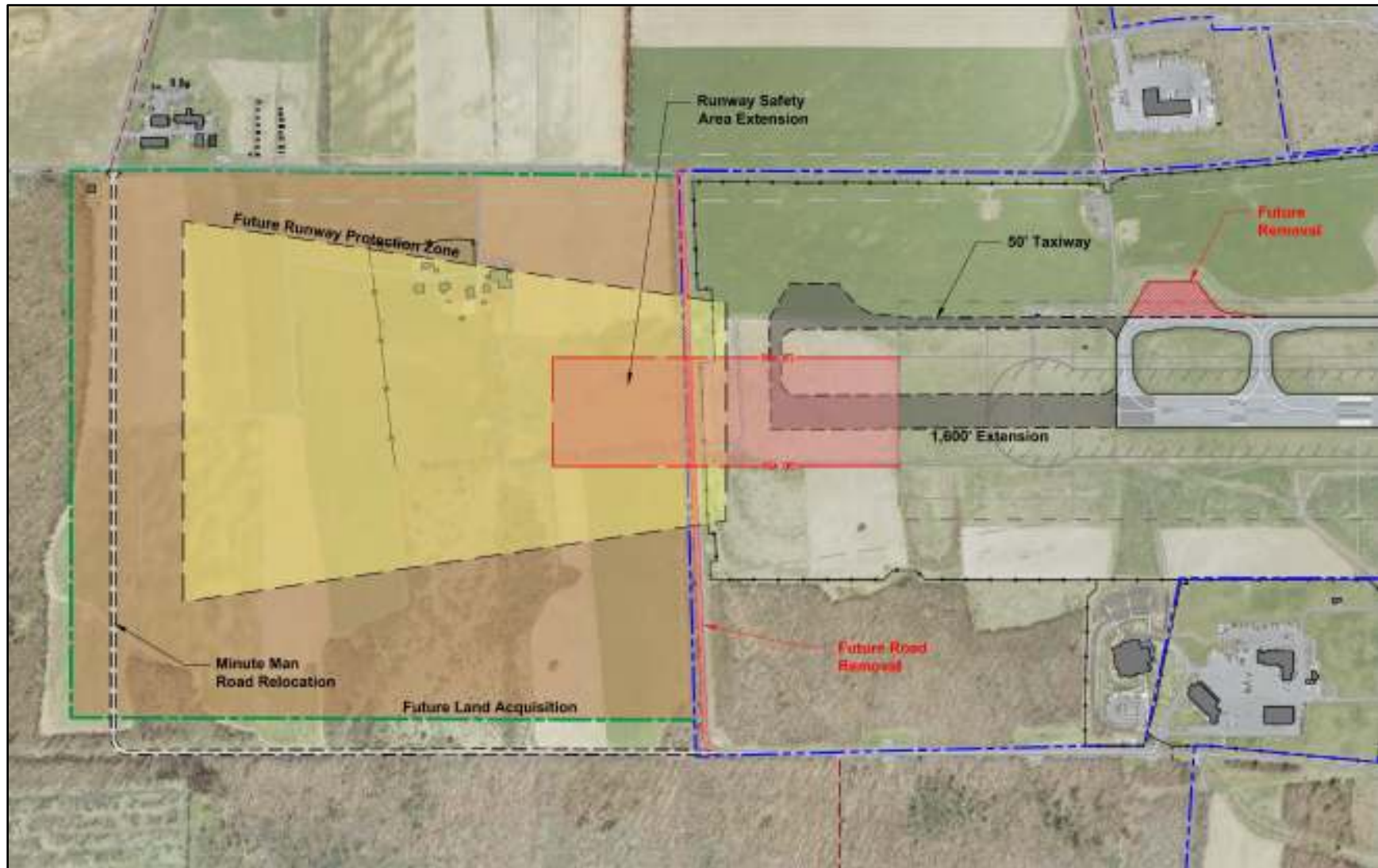
Table 5-3: Summary of Considerations – Alternative 3

Advantages	Disadvantages
<ul style="list-style-type: none"> • Runway length meets needs of users • Facilitates growth in aviation activity and revenue generation opportunities for Airport • Pulverized material can be reused as subbase layer for runway and taxiway extensions • Additional area for aeronautical development 	<ul style="list-style-type: none"> • Land acquisition may be needed • Relocation of Minute Man Road and closure/relocation of Rock Road may be necessary • Relocation of localizer antenna, glide slope antenna, and MALSR necessary • Requires construction on both runway ends • Potential aircraft noise increase over Tofrees

5.2.d Alternative 4 – 1,600-Foot Extension at Approach End of Runway 6

Alternative 4 (**Figure 5-4**) proposes a 1,600-foot extension at the approach end of Runway 6 that would require the acquisition of land for the RSA and RPZ as well as the relocation of Minute Man Lane. Taxiway A would also be extended 1,600 feet in addition to relocate the taxiway holding pad.

Figure 5-4: Alternative 4 – 1,600-Foot Extension at Approach End of Runway 6



Source: Mead & Hunt, Inc. (2014)

A 1,600-foot runway extension at the approach end of Runway 6 has advantages similar to those with the 1,600-foot extension of the runway proposed in Alternative 3. The increased length of the runway would provide sufficient takeoff distance for all aircraft types that are anticipated to operate at the Airport during the planning period by commercial airlines, LCCs, and charter operators. The extended length of the runway would also likely increase aviation activity and generate additional revenue for the Airport. A final advantage to consider is that pulverized raw materials from the removal of the existing Taxiway A holding apron could be reused as a subbase layer for the runway and taxiway extensions.

A disadvantage with Alternative 4 is that the acquisition of land and relocation of Minute Man Lane would be necessary to control land uses within the RSA and RPZ to meet FAA design standards. It should be noted that as a result of this land acquisition, people would be displaced from the farm/residence that would need to be acquired. Another factor to consider is that relocation of the localizer antenna at the approach end of Runway 6 would be necessary and would require coordination with the FAA prior to construction. One final disadvantage to consider is that extension of the runway at the approach end of Runway 6 would lower the flight path of aircraft over the Toftrees resort to the west, resulting in a potential increase in aircraft noise over this area.

A summary of the advantages and disadvantages with Alternative 4 is presented in **Table 5-4**.

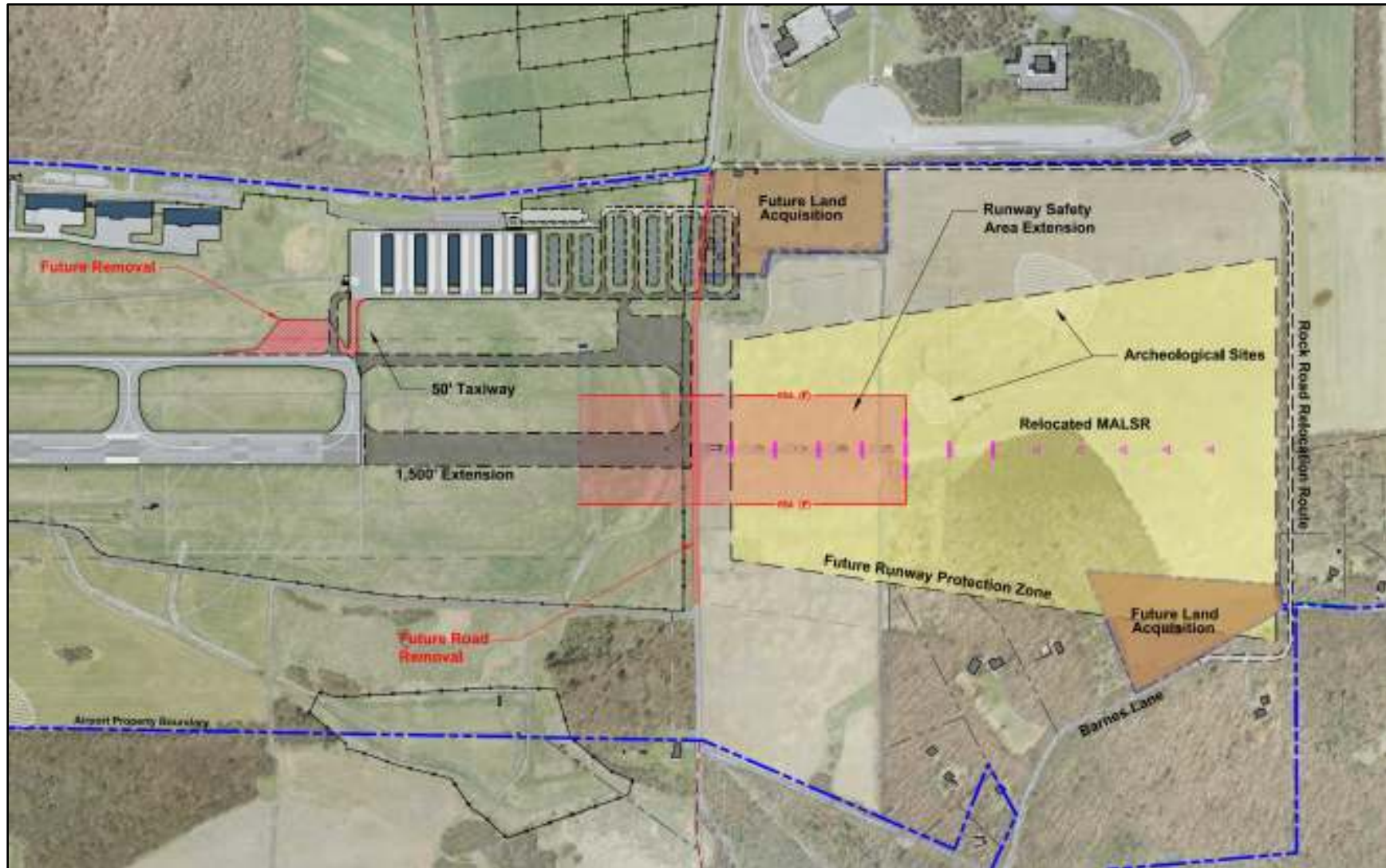
Table 5-4: Summary of Considerations – Alternative 4

Advantages	Disadvantages
<ul style="list-style-type: none"> • Provides additional runway length for potential long haul routes • Facilitates growth of aviation activity and increased revenue generation for Airport • Raw material can be reused from holding apron removal as subbase layer for runway and taxiway extensions 	<ul style="list-style-type: none"> • Land acquisition needed • Requires relocation of localizer antenna • Relocation of Minute Man Road outside of RSA and RPZ • Potential to increase aircraft noise over Toftrees resort area

5.2.e Alternative 5 – 1,500-Foot Extension at Approach End of Runway 24

Figure 5-5 illustrates Alternative 5 that proposes a 1,500-foot extension of the runway at the approach end of Runway 24. In addition to the runway extension, Taxiway A would also be extended 1,500 feet and the taxiway holding apron would be relocated. Construction of an additional entrance to the T-style hangar area is also proposed with this alternative in addition to an expansion of T-style hangar units. Relocation of the glide slope antenna, MALSR, Rock Road, and Barns Lane are also illustrated, since it is anticipated this will be needed to accommodate the RSA and RPZ of the extended runway. Land acquisition may also be necessary to control land uses within the boundaries of the RPZ, which could be utilized to support future aeronautical development.

Figure 5-5: Alternative 5 – 1,500-Foot Extension at Approach End of Runway 24



Source: Mead & Hunt, Inc. (2014)

An advantage with Alternative 5 is that a 1,500-foot extension of Runway 6/24 would provide sufficient runway length for aircraft types that could be potentially operated by commercial airlines, LCCs, and charter operators to conduct non-stop long haul routes from the Airport at full fuel, cargo, and passenger loads. This would facilitate growth in aviation activity at the Airport that could lead to an increase in revenue generation opportunities. Also, raw materials from the removal of the existing Taxiway A holding apron and Taxiway H could be reused as a subbase material for the runway and taxiway extensions, and/or for the relocation of Taxiway H and the construction of an additional taxiway into the expanded T-style hangar area.

An additional benefit with Alternative 5 is that an extension of the runway and taxiway at the approach end of Runway 24 opens up an opportunity to increase land for future aeronautical development, such as an expansion of the T-style hangar area. A final advantage to consider is that the amount of land that would need to be acquired to implement this alternative is less than if a similar extension was constructed at the approach end of Runway 6 as proposed by Alternative 4.

The acquisition of land is also a disadvantage to consider given that the purchase of two residential properties may be needed. The closure/relocation of Rock Road, potential relocation of Barns Lane, and the relocation of the glide slope antenna/MALS approach lighting system are other disadvantages to consider given the cost and level of coordination that would be necessary. Finally, the relocated RSA associated with the extension of the runway may impact an archeological site identified to the northeast of the Airport. Additional research and coordination with appropriate historical preservation groups and agencies would be necessary to determine the significance of this site and how it may be impacted with the implementation of this alternative.

Table 5-5 summarizes the advantages and disadvantages of Alternative 5.

Table 5-5: Summary of Considerations – Alternative 5

Advantages	Disadvantages
<ul style="list-style-type: none"> • Provides additional runway length for potential long haul routes • Facilitates growth in aviation activity leading to increase revenue generation opportunities • Pulverized raw material from pavement removals could be reused as new subbase for runway and taxiway extensions • Increases available land for future aeronautical development 	<ul style="list-style-type: none"> • Land acquisition needed • Requires relocation of glide slope antenna and MALS approach lighting system • Closure/relocation of Rock Road necessary • May require relocation of Barns Lane outside boundary of relocated RPZ • RSA may impact an archeological site

5.2.f Recommendation

It is important to note that the physical or environmental constraints at either end of Runway 6/24 are similar. As such, selection of the preferred alternative to extend the length of the runway could be considered as a matter of preference; however, extension of the runway at the approach end of Runway 24 as presented in Alternative 5 offers the following benefits as compared to the other runway extension alternatives:

- **Additional Land for Aeronautical Development** – Since there is limited room for development within the existing footprint of the Airport, an advantage to consider with Alternative 5 is that relocation of the RPZ due to the runway extension creates additional room to expand aeronautical-related infrastructure. This offers an opportunity to expand the T-style hangar area with the acquisition of land adjacent to the intersection of Fox Hill Road and Rock Road, which could generate additional aeronautical-related revenue through additional hangar leases.
- **Reduces Need for Land Acquisition** – Expansion of the runway at the approach end of Runway 24 reduces the amount of land that would need to be acquired for a runway extension. Alternatives 1, 3, and 4, which propose an extension of the runway at the approach end of Runway 6, would require a significant amount of land acquisition for the runway and/or to control land uses within the relocated RPZ as compared to Alternative 5. While the acquisition of land would remain necessary if the runway were extended at the approach of Runway 24, only two small parcels would need to be purchased in comparison with the larger parcel of land that would need to be purchased if the runway were to be extended at the approach end of Runway 6.

It is also important to note that extension of the runway at the approach end of Runway 24 may reduce noise impacts from departing aircraft to the southwest of the Airport over the Toftrees Golf Resort & Conference Center and surrounding residential areas. Since not all aircraft departing from Runway 24 will require the full length of the runway, a relocation of the threshold due to a runway extension will increase the height of departing aircraft flight paths to the southwest, reducing noise impacts over these areas. While the flight paths of aircraft over these areas on approach to land to Runway 6 will remain the same, the louder noise intensity often experienced with departing aircraft engines is anticipated to decrease with the implementation of Alternative 5.

Thus, it is recommended that Alternative 5 be considered as the recommended option to increase the length of Runway 6/24. If construction of the full 1,500-foot extension of the runway is found to be not feasible in one project, Alternative 5 could be implemented in phases. An initial extension of the runway could be completed to meet the runway length needs of commercial airline operators while a full extension to 1,500 feet could be completed when long-haul flights by narrow-bodied aircraft are desired. Whether constructed at once or in phases, it is recommended that Alternative 5 be considered as the preferred alternative to increase the length of Runway 6/24.

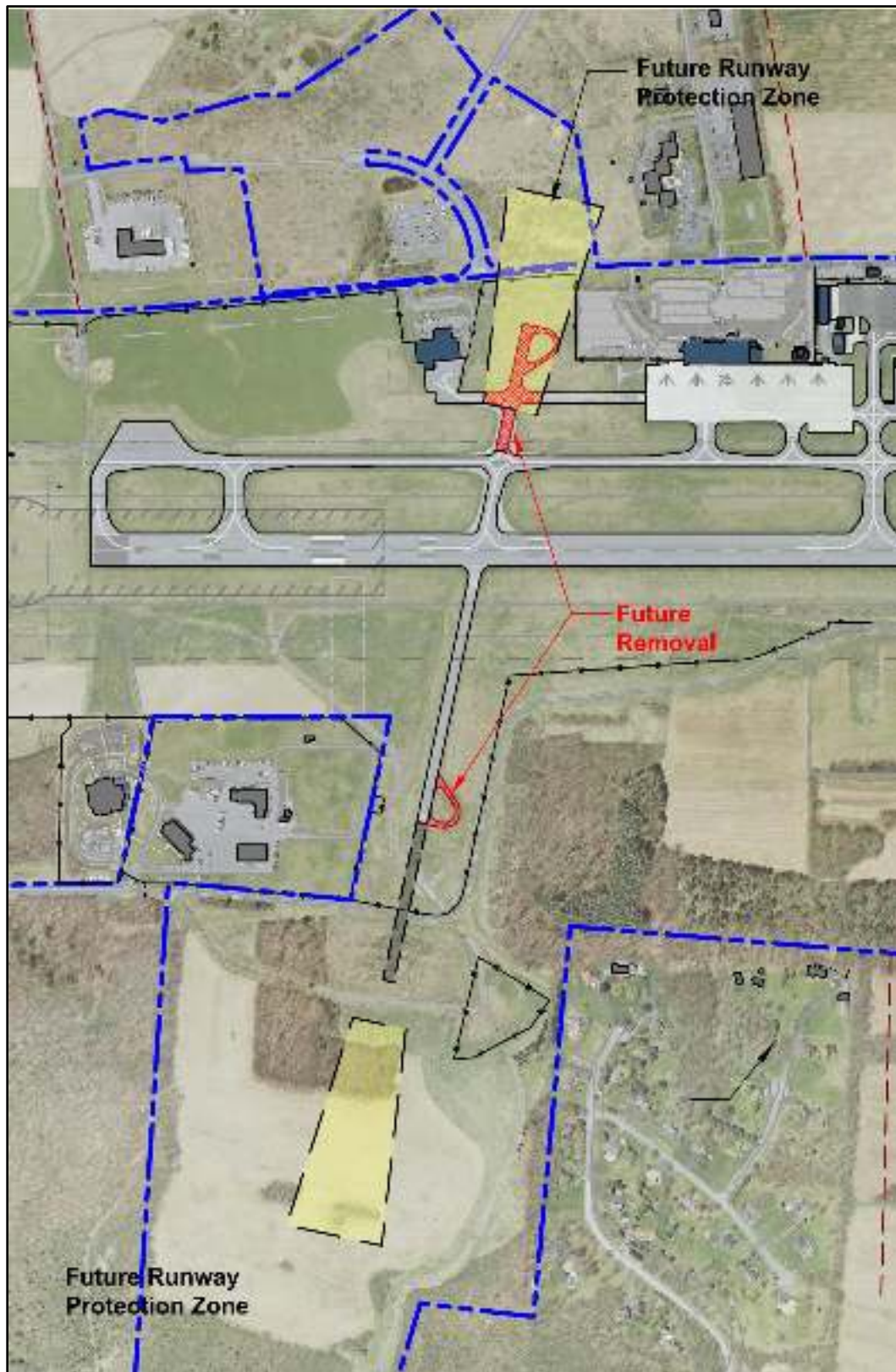
5.3 Crosswind Runway

Prior to its closure in 2006, the Airport had a second runway, Runway 16/34, that was primarily used by pilots of small, single-engine aircraft during crosswind conditions. The runway was 2,349 feet in length, 50 feet wide, and had visual approaches. Constraints such as the surrounding topography and locations of perimeter fencing, airfield drainage structures, and an access road limited the dimensions of the RSA that did not meet FAA design standards. Since Runway 16/34 had limited use and was only capable of handling a portion of the small aircraft fleet during ideal weather conditions, it was decided that the runway would be permanently closed. This decision was further supported since a displacement of the runway threshold so that RSA design standards could be met would further place limits on the utility of the runway. In addition, future terminal area improvements that were being planned at the time would have required a closure of the runway.

Through the master planning process, inquiries were received from pilots of small, single-engine aircraft on the possibility of re-opening this runway since it would be beneficial for them during crosswind conditions. The wind analysis conducted for the Airport found that Runway 6/24 provides 94.38 percent wind coverage, which is 0.62 percent less than that FAA's preferred 95 percent wind coverage. While it appears justification could be made to reopen the crosswind runway, a number of significant financial and environmental challenges would need to be overcome. Since it is likely the FAA would not be willing to contribute federal funds for the reopening of Runway 16/34 due to the limited use that it would likely receive, it was the opinion of the Master Plan Advisory Committee (MPAC) to keep the former crosswind runway closed.

However, in the event it is decided during the planning period that a crosswind runway is needed to meet the needs of the Airport's users, Alternative 6, which is illustrated in **Figure 5-6**, was prepared to conceptualize what would be necessary to reopen the runway. As illustrated in the drawing, an approximate 720-foot shift of the runway towards the approach end of Runway 34 near the Air National Guard (ANG) Air Operations facility would be necessary in order to accommodate the RSA and RPZ at the approach end of Runway 16. This would require significant fill and grading at the approach end of Runway 34 to improve this area to meet RSA design standards. In addition, land within the boundary of the RPZ at the approach end of Runway 16 would have to be cleared of all existing uses and would not be available for future terminal area development. This would impact the ability to improve the terminal building, terminal apron, and vehicle parking, which would result in a loss of long-term parking spaces and a possible relocation of Fox Hill Road. Finally, the intersection of the runway with Taxiway A at the approach end of Runway 16 would be a configuration that is not recommended by FAA design standards since it increases the potential for a runway incursion.

Figure 5-6: Alternative 6 – Reopen Crosswind Runway 16/34



Source: Mead & Hunt, Inc. (2014)

It is not recommended that Alternative 6 be implemented since significant cost would be needed to improve and open 2,500 feet of runway that would receive a limited number of operations due to its length. However, its inclusion as a part of this master planning effort is intended to conceptualize what would be necessary to reopen the runway if it is desired during the planning period. A summary of the advantages and disadvantages that should be considered if this is desired is presented in **Table 5-6**.

Table 5-6: Summary of Considerations – Alternative 6

Advantages	Disadvantages
<ul style="list-style-type: none"> • Provides an additional runway to meet crosswind runway needs of small aircraft • Provides Airport with 95 percent wind coverage 	<ul style="list-style-type: none"> • Significant fill required • Loss of long-term parking spaces within RPZ • Limits future terminal area development • Non-desirable runway/taxiway intersection configuration • May require relocation of Fox Hill Road from RPZ • 2,500-foot length limits aircraft types that can operate on the runway • Significant cost for limited use

5.4 Taxiway System

A review of the taxiway system found that some improvements are needed to meet design standards outlined in FAA Advisory Circular (AC) 150/5300-13A, *Airport Design*. Some of these improvements are based upon the taxiway system accommodating Taxiway Design Group (TDG) 4 aircraft, which are anticipated to increase in operations at the Airport during the planning period. Most of the existing TDG-3 design standards of Taxiway A also meet design standards for TDG-4 aircraft; however, the construction of 20-foot wide paved shoulders are needed. In addition, if the critical design TDG-4 aircraft type is also classified as an Airplane Design Group (ADG) IV aircraft, improvements to the widths of the safety area and object free area of Taxiway A may also be needed. Additional taxiway system improvements based on guidelines in FAA AC 150/530-13A, *Airport Design*, were also found to be needed.

The following summarizes the taxiway system improvements that were identified as a part of the facility requirements analysis:

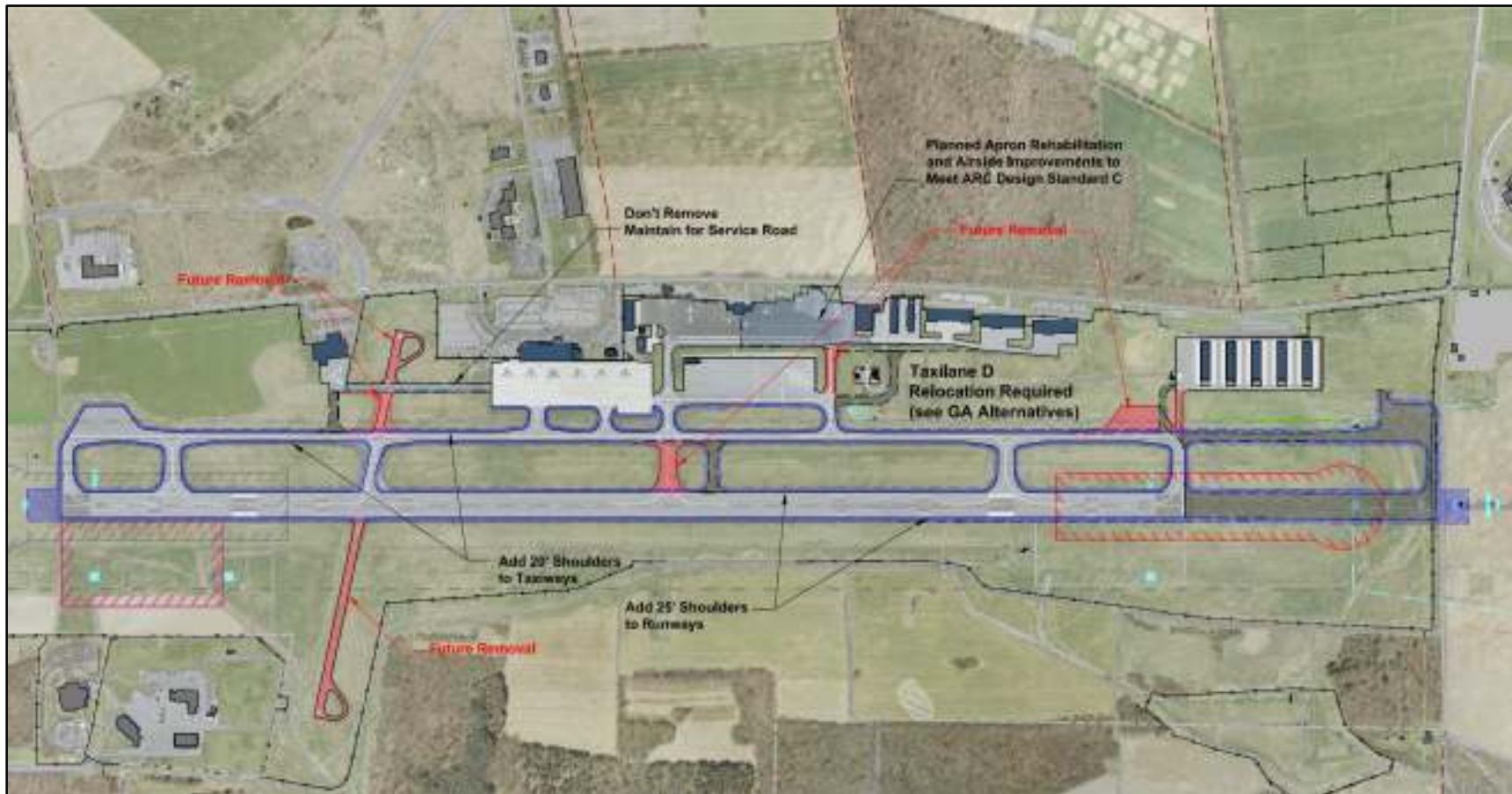
- During any pavement reconstruction project, the taxiway fillets should be evaluated for compliance with current FAA design standards that at least meet TDG-4 design standards.
- Protect for parallel Taxiway A and some connector taxiways to be upgraded to meet the design standards for TDG-4 aircraft. This includes the addition of 20-foot wide paved shoulders as well

as potential improvements to the width of the taxiway safety area and taxiway object free area based on the ADG classification of the critical design TDG-4 aircraft type.

- The longitudinal grade of Taxiway D exceeds the 1.5 percent standard as identified in FAA AC 150/5300-13A, *Airport Design*; as such, this non-standard longitudinal grade needs to be corrected since it receives operations from Aircraft Approach Category (AAC) C and D aircraft.
- FAA AC 150/5300-13A, *Airport Design*, recommends that connecting taxiways from aprons not have direct access to a runway so that the potential for an aircraft to taxi from an apron directly onto a runway is reduced. As such, relocation of Taxiway C, Taxiway H, and Taxiway J should be considered so that direct access from the apron to the runway is not provided.
- The naming of connector taxiways between Runway 6/24 and Taxiway A should be changed to meet naming nomenclature identified in FAA AC 150/5340-18F, *Standards for Airport Sign Systems*. Guidelines in this AC suggest that designations such as “A1,” “A2,” and “A3” be used in a sequential order for connector taxiways between Runway 6/24 and Taxiway A.

Figure 5-7 illustrates the taxiway system improvements that are being proposed by Alternative 7. As shown in the graphic, it is recommended planning be initiated to add 20-foot wide paved shoulders to taxiways that could potentially accommodate TDG-4 aircraft. In addition, planning should also be initiated to improve the dimensions of the taxiway safety area and object free area if the critical design TDG-4 aircraft type is also classified in ADG IV. In addition, improvements are needed to the geometry of taxiway intersection fillets to meet design standards identified in FAA AC 150/5300-13A, *Airport Design*. Alternative 7 also proposes the closure and relocation of Taxiway C between Runway 6/24 and parallel Taxiway A, as well as Taxiway H between the T-style hangar area and Taxiway A, to remove direct access from these apron areas to Runway 6/24. Alternative 7 also proposes the removal of pavement surfaces associated with the former crosswind Runway 16/34 and construction of a new connector taxiway from the FedEx air cargo facility to Taxiway A to also eliminate direct access to the runway from this aircraft taxiway route. Additionally, removal of the existing Taxiway A holding aprons are also proposed by Alternative 7 with the understanding that this would occur as a part of any future runway length extension. Finally, a relocation of Taxiway D is illustrated to improve the longitudinal grade of this surface. It should be noted that alternatives to relocate Taxiway D are presented as a part of the general aviation (GA) development alternatives discussed later in this chapter.

Figure 5-7: Alternative 7 – Taxiway System Improvements



Source; Mead & Hunt, Inc. (2014)

An advantage with Alternative 7 is that Taxiway A and associated connector taxiways that could receive operations from TDG-4 aircraft would meet design standards. Another advantage to consider is that the removal of pavement surfaces associated with the closed crosswind runway and the connector taxiways providing direct access from an apron to Runway 6/24 would reduce the potential for a runway incursion by taxiing aircraft. Removal of these pavements also reduces the area of impermeable surfaces at the Airport and offers an opportunity to reuse pulverized raw material as a subbase layer for other future runway and taxiway system improvements. Finally, the closure and relocation of Taxiway D to correct the longitudinal grade of this surface opens up an opportunity to develop an area of land between the existing box-style hangars and Taxiway A for future aeronautical-related development.

The primary disadvantage to consider with Alternative 7 is the cost that will be associated with these proposed taxiway system improvements. It is recommended that these taxiway system improvements be implemented as they are needed, such as when the critical design aircraft changes and/or when taxiway pavement surfaces are in need of rehabilitation. **Table 5-7** summarizes the advantages and the disadvantage of Alternative 7.

Table 5-7: Summary of Considerations – Alternative 7

Advantages	Disadvantages
<ul style="list-style-type: none"> • Taxiways meet TDG-4 design standards • Removes closed pavement surfaces, reducing pilot confusion when taxiing • Reduces impermeable surfaces at the Airport • Raw material from the removal of closed taxiways can be reused as a subbase layers for other airfield pavement improvements • Taxiway geometry improvements comply with current FAA design standards 	<ul style="list-style-type: none"> • Cost for implementation

5.5 Ultimate Commercial Airline Terminal

A study was conducted in 2005 to evaluate options for the construction of a new commercial airline terminal building. At the time, it was anticipated that a new commercial airline terminal building would be needed to accommodate the projected demand. The study evaluated potential locations for a new terminal building as well as layout configurations for support infrastructure, such as the apron, vehicle parking, and landside access roadways. The result of this study was the terminal area development plan illustrated in **Figure 5-8** (Alternative 8). As shown in the figure, a new commercial airline terminal building would be constructed at a site occupied by the former crosswind runway while access roads and a vehicle parking lot would be constructed to the west that would require the closure of Fox Hill Road and relocation of the air cargo facility. Removal of the existing long-term vehicle parking lot as well as the existing terminal building would also be necessary to accommodate this proposed terminal area plan.

Figure 5-8: Alternative 8 – Ultimate Commercial Airline Terminal Layout



Source: Mead & Hunt, Inc. (2014)

A review of facility requirements for the commercial airline terminal area found that it does not appear construction of a new commercial airline terminal building will be needed to meet the demand that is projected for the planning period. However, it is prudent to continue to plan for the ultimate construction of a new commercial airline terminal building for when demand is realized for this facility. It is important to note that the need to construct a new commercial airline terminal will be driven by peak hour passenger demand, or the period of time that arriving and departing passengers occupying the building is at its greatest. While the peak hour demand is anticipated to grow during the planning period, it is not anticipated to increase at a level that will necessitate the construction of a new terminal building. It is recommended that the peak hour demand be continually monitored, particularly as airline schedules change and new aircraft equipment types are introduced at the Airport. When it is anticipated that demand will reach a level to necessitate the construction of a new terminal building, it is recommended that this terminal area layout be visited as needs are evaluated and initial plans developed.

5.6 Commercial Airline Terminal Apron

The review of facility requirements found that the commercial airline terminal apron should be sized to accommodate at least six aircraft parking positions during the planning period containing the following fleet mix:

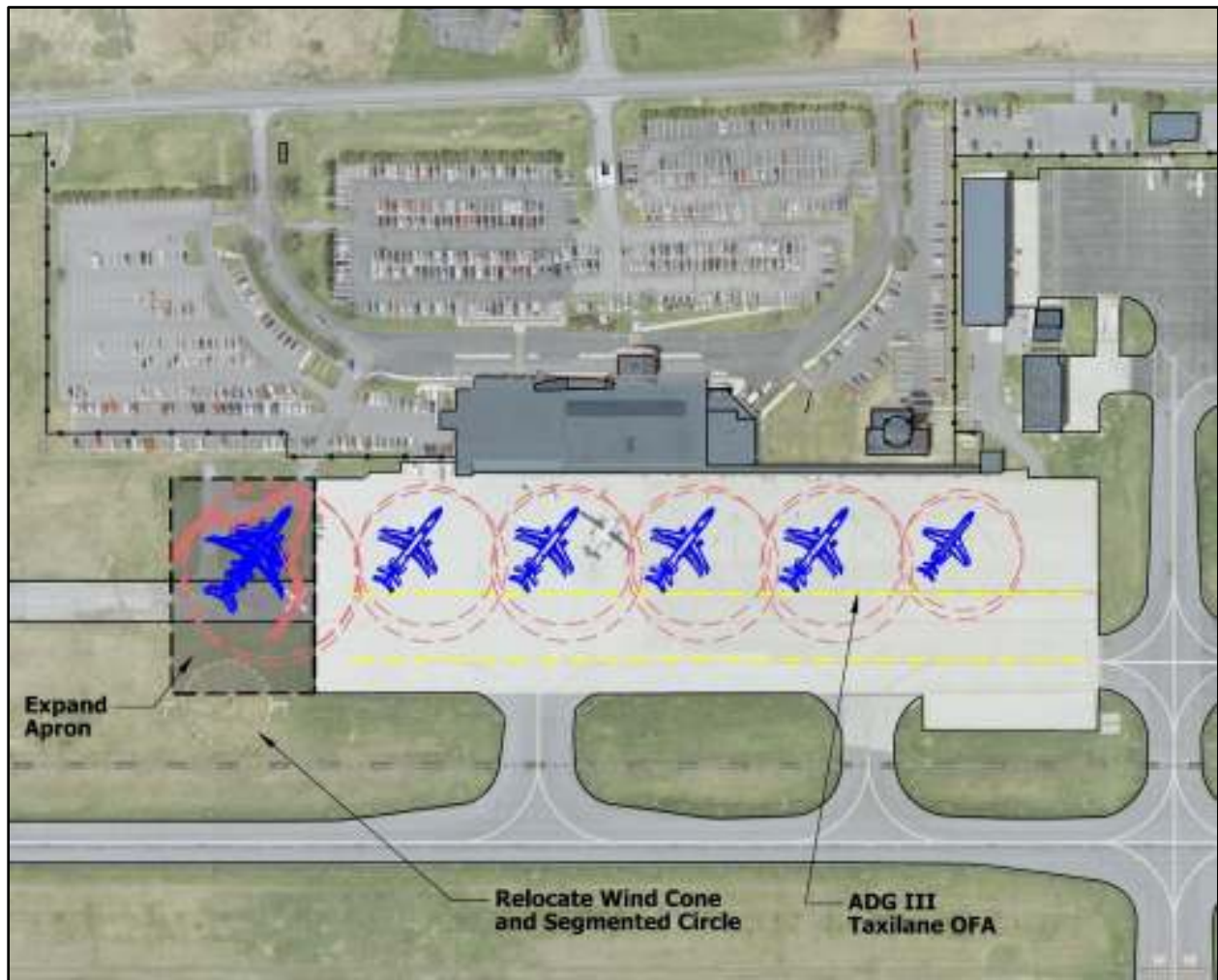
- One (1) 50-seat regional jet/turboprop aircraft (Examples: CRJ-200, Dash-8)
- Four (4) 70-90 seat regional jets (Examples: CRJ-700, CRJ-900, ERJ-175)
- One (1) narrow-body jet (Examples: 737, A320, MD-80)

Currently, the existing terminal apron has six aircraft parking positions; however, they are configured to accommodate six (6) 50-seat regional jet/turboprop aircraft and are not capable of parking the fleet mix that is projected for the planning period. As such, an expansion of the commercial airline terminal apron or reconfiguration of existing aircraft parking spaces is needed. This section reviews two alternatives that were developed to illustrate how the commercial airline terminal apron can be expanded or reconfigured to accommodate this projected fleet mix of aircraft.

5.6.a Alternative 9 – Expansion of Commercial Airline Terminal Apron

Alternative 9, which is illustrated in **Figure 5-9**, proposes an expansion of the commercial airline terminal apron so that six power out parking positions are available for the fleet mix of aircraft projected for the planning period. Relocation of the segmented circle and lighted wind cone located at the southwest corner of the commercial airline terminal apron would be necessary to implement Alternative 9. As illustrated in the drawing, the footprint of 50-seat regional jets, 70- to 90-seat regional jets, and narrow-bodied aircraft types that could operate at the Airport during the planning period are illustrated, with their turning radii identified by a dashed red-colored line.

Figure 5-9: Alternative 9 – Expansion of Commercial Airline Terminal Apron



Source: Mead & Hunt, Inc. (2014)

Alternative 9 permits aircraft to enter and exit the apron parking positions under their own power, eliminating the need for aircraft to be pushed back away from the terminal building by a tug. It should be noted that the spacing of the parking positions allow aircraft to taxi in and out while adjacent parking positions are occupied. The cost associated with an apron expansion is a disadvantage to consider with Alternative 9 in addition to the increase in impermeable surfaces that would be present at the Airport.

Table 5-8 provides a summary of the advantage and the disadvantages to consider with Alternative 9.

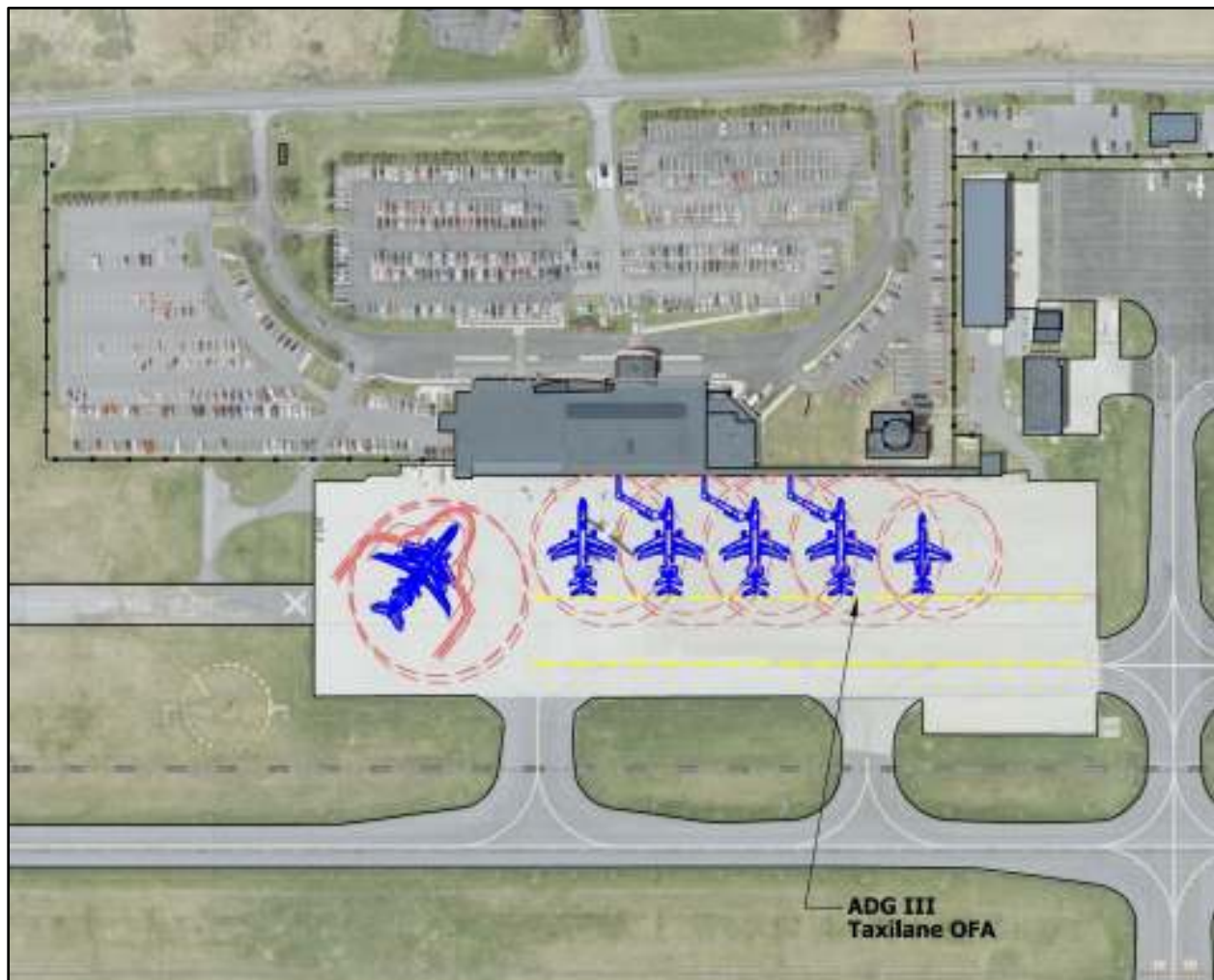
Table 5-8: Summary of Considerations – Alternative 9

Advantage	Disadvantages
<ul style="list-style-type: none"> Maintains power out parking positions 	<ul style="list-style-type: none"> Cost associated with apron expansion
	<ul style="list-style-type: none"> Increases impermeable surfaces at the Airport

5.6.b Alternative 10 – Reorganization of Aircraft Parking Positions

Alternative 10 offers a method to accommodate the projected demand for parking on the commercial airline terminal apron by reorganizing the six existing aircraft parking positions. As illustrated in **Figure 5-10**, four parking positions would be reorganized to push-back style parking, requiring a tug to push the aircraft back away from the terminal building. Aircraft parked at the remaining two parking positions would be capable of entering and exiting on their own power. In addition to the reorganization of the six parking positions, Alternative 10 also proposes that three push-pack style parking positions be equipped with aircraft boarding bridges.

Figure 5-10: Alternative 10 – Reorganization of Aircraft Parking Positions



Source: Mead & Hunt, Inc. (2014)

The primary advantage with Alternative 10 is that the existing commercial airline terminal apron can be reconfigured to accommodate the projected fleet mix of commercial airline aircraft types without the need of an apron expansion. Another advantage with Alternative 10 is that the four push-back type parking positions better support the installation of boarding bridges for the transfer of passengers between aircraft and the terminal building. This would greatly benefit passengers and improve customer service since

passengers would not be required to walk on the terminal apron to transfer between an aircraft and the commercial airline terminal building, exposing them to weather elements, such as rain, snow, and ice, as well as apron hazards, such as aircraft exhaust and maneuvering ground vehicles. Alternative 10 also would not increase impermeable surfaces at the Airport. The disadvantage to consider with Alternative 10 is that five aircraft parking positions would require push back from a tug to maneuver away from the terminal building. **Table 5-9** presents a summary of the advantages and the disadvantage to consider with Alternative 10.

Table 5-9: Summary of Considerations – Alternative 10

Advantages	Disadvantage
<ul style="list-style-type: none"> • Existing apron can be used to accommodate projected aircraft parking needs • Parking configuration accommodates the installation of boarding bridges • Does not increase impermeable surfaces 	<ul style="list-style-type: none"> • Tug vehicles are necessary to push back aircraft away from four parking positions

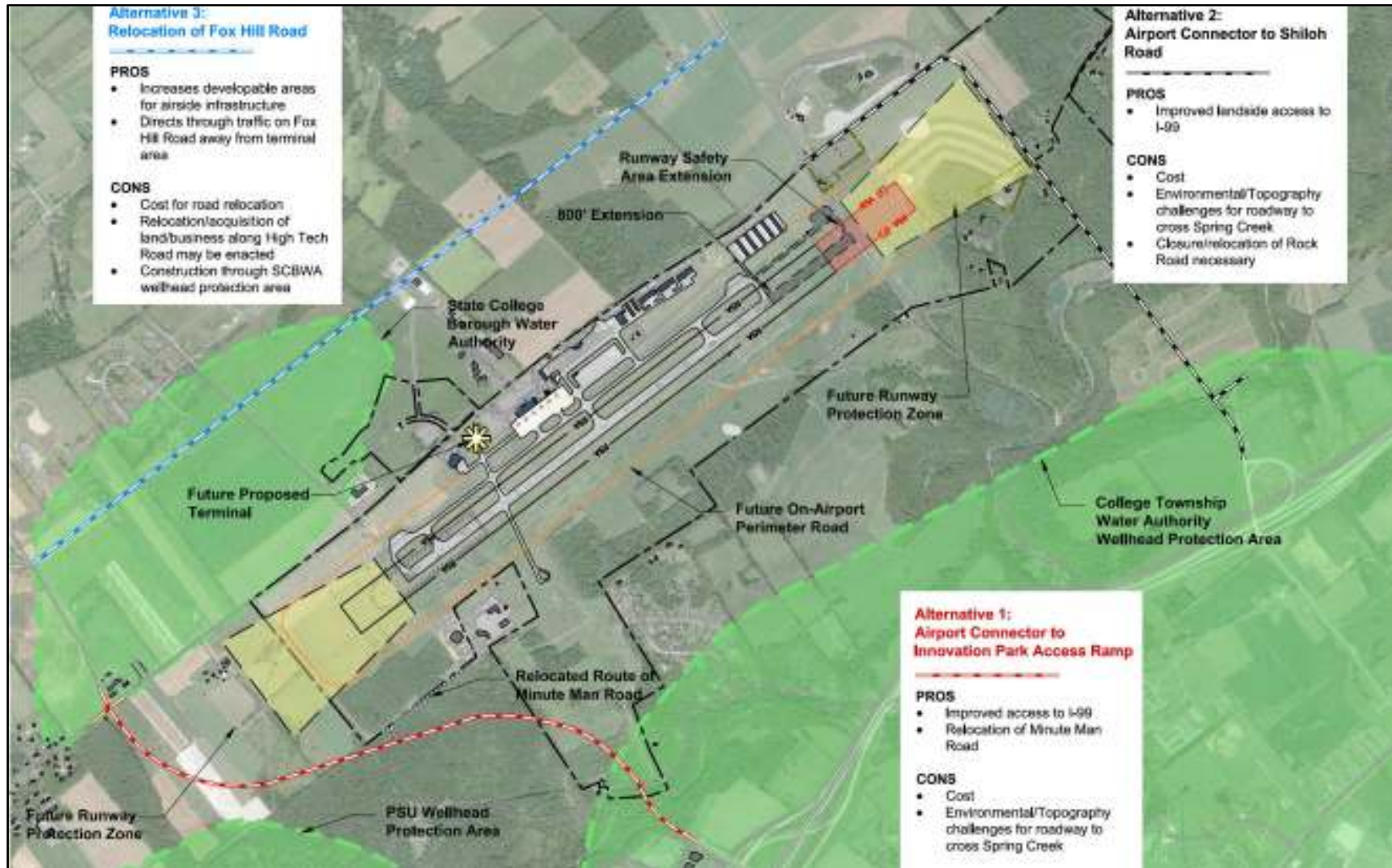
5.6.c Recommendation

Alternative 10 is recommended as the preferred alternative to accommodate the demand for commercial airline terminal aircraft parking during the planning period. A reconfiguration of aircraft parking positions within the footprint of existing apron pavement appears to be the most economic option to accommodate the demand for parking as compared to the apron expansion proposed by Alternative 9. Alternative 10 also does not increase impermeable surfaces at the Airport. The reconfiguration of aircraft parking positions also better accommodates the installation of aircraft loading bridges at the terminal building, which are needed to protect passengers from environmental elements when transferring between aircraft at the terminal. In addition, Alternative 10 also allows a portion of the terminal apron adjacent to the Airport's fire station to be considered as a possible site for a new fire station and/or maintenance equipment facility, which will be discussed later in this chapter. It is important to note that while Alternative 10 does not propose an apron expansion, an ultimate extension of the apron to the southwest may be necessary if a portion of the existing apron nearest the Airport's fire station is considered for other future infrastructure development.

5.7 Landside Access

Improved landside access to the Airport from Interstate 99 has been considered in the past and was reviewed again as a part of this sustainable master plan. Unique environmental elements such as the locations of the Airport, Spring Creek, Interstate 99, and the surrounding topography are factors to consider when evaluating options to improve landside access. **Figure 5-11** (Alternative 11) on the following page illustrates two proposed routes to improve landside access between the Airport and Interstate 99. In addition, the figure illustrates a relocation of Fox Hill Road to support the future development of the ultimate commercial airline terminal area as well as a future on-Airport perimeter access road.

Figure 5-11: Alternative 11 – Landside Access Alternatives



Note: Routes of future proposed roadways are conceptual in nature; the actual routes of future roadways will be dependent upon engineering and environmental reviews.

Source: Mead & Hunt, Inc. (2014)

It is important to note that the landside access routes illustrated by Alternative 11 are conceptual in nature and should not be conceived as the actual routing for any of the proposed roadways. The actual alignment of any Interstate 99 connector or relocation of Fox Hill Road will depend on environmental and engineering reviews to determine the best route given the surrounding topographical and environmental challenges. Also, implementation of each alternative will require coordination with appropriate federal, state, and local environmental agencies, as well as those associated with the Spring Creek Canyon Cooperative Management Area, since the crossing of Spring Creek would be necessary for a connector to Interstate 99.

A detailed description of the proposed alternatives to improve landside access at the Airport in addition to advantages and disadvantages that should be considered with each are presented in the following sections.

5.7.a Landside Access Alternative 1

Landside Access Alternative 1 proposes to construct a connector roadway between the Innovation Park Access Ramp exit on Interstate 99 and the intersection of Fox Hill Road/Bernel Road. In addition to this roadway, a connection to Minute Man Road would also be constructed with this alternative to provide more direct and efficient access to this area of the Airport. This alternative also proposes to improve the configuration of the Fox Hill Road and Bernel Road intersection. It should be noted that the tie-in of the connector roadway to the intersection of Fox Hill Road and Bernel Road would be designed so that other future community development could have access to the roadway, such as a sports complex that has been proposed at a site to the west.

The most significant advantage to consider with Landside Access Alternative 1 is that direct access would be made available between the Airport and Interstate 99, which would improve the efficiency at which vehicles could access that Airport from this major traffic artery. Landside Access Alternative 1 also offers the advantage of providing more efficient access to the southwest of the Airport, increasing the attractiveness of land along Minute Man Road to be developed for future aeronautical-related purposes. While these advantages should be considered, the significant cost as well as the environmental and engineering challenges that would need to be overcome to implement this alternative are disadvantages to consider. Consideration should also be given to the routing of the roadway so that it avoids as much as possible the wellhead protection areas that surround the Airport.

Table 5-10 summarizes the advantages and disadvantages to consider with Landside Access Alternative 1.

Table 5-10: Summary of Considerations – Landside Access Alternative 1

Advantages	Disadvantages
<ul style="list-style-type: none"> • Direct access provided between Airport and Interstate 99 • Improved access to the southwest of the Airport 	<ul style="list-style-type: none"> • Significant cost • Environmental and topographical challenges associated for roadway to cross Spring Creek

5.7.b Landside Access Alternative 2

A connector roadway to the north of the Airport between the Shiloh Road exit on Interstate 99 and the intersection of Fox Hill Road and Rock Road is proposed by Landside Access Alternative 2. The routing of this roadway would be located around the boundaries of future airfield design surfaces associated with a future extension of Runway 6/24 so that it does not pass within critical areas such as the RSA and RPZ.

Direct access to Interstate 99 is the primary advantage to consider with Landside Access Alternative 2. The primary disadvantages to consider are the financial, engineering, and environmental challenges that would need to be solved to construct a roadway across Spring Creek. In addition, the closure and relocation of Rock Road is an additional disadvantage to consider given that access to residences along the road to the south of Airport could be impacted. A final disadvantage is that while an environmental review has not yet been conducted for a future connector roadway to Interstate 99, it is anticipated that Landside Access Alternative 2 will have more environmental challenges than Landside Access Alternative 1. This is due to the proximity of archeological sites located off the approach end of Runway 24 and the State of Pennsylvania Fish & Boat Commission fish hatchery located downstream along Spring Creek.

A summary of the advantage and disadvantages to consider with Landside Access Alternative 2 is presented in **Table 5-11**.

Table 5-11: Summary of Considerations – Landside Access Alternative 2

Advantage	Disadvantages
<ul style="list-style-type: none"> • Direct access provided between Airport and Interstate 99 	<ul style="list-style-type: none"> • Significant cost • Environmental and topographical challenges associated for roadway to cross Spring Creek • Closure/relocation of Rock Road necessary

5.7.c Landside Access Alternative 3

Landside Access Alternative 3 proposes a relocation of Fox Hill Road to the north of the Airport to create additional areas for aeronautical and non-aeronautical development as well as to support development of the ultimate terminal area. Currently, the route of Fox Hill Road is located in close proximity to existing Airport facilities and limits opportunities for expansion and additional development to the north. Landside Access Alternative 3 proposes that Fox Hill Road would be relocated at an alignment extending from the intersection of Seibert Road and Rock Road to an intersection with Bernel Road.

Increasing areas for future aeronautical and non-aeronautical development and providing room for the construction of an ultimate commercial airline terminal building are the most significant advantages to consider with this alternative. The redirection of Fox Hill Road traffic away from the terminal area is also an additional advantage to consider given that congested traffic levels would decrease in front of Airport facilities. The significant cost necessary to implement this alternative is a disadvantage that should be considered since land acquisition to relocate businesses and residences along the route of the proposed roadway would be necessary. An additional disadvantage to consider with this alternative is that the proposed routing of the road is located within a State College Borough Water Authority (SCBWA) wellhead

protection area. Coordination with the SCBWA would be necessary to implement this alternative which could result in change of the proposed routing alignment if significant impacts are anticipated to the wellhead protection area.

Table 5-12 summarizes the advantages and disadvantages with Landside Access Alternative 3.

Table 5-12: Summary of Considerations – Landside Access Alternative 3

Advantages	Disadvantages
<ul style="list-style-type: none"> • Increases areas for aeronautical and non-aeronautical development • Directs Fox Hill Road traffic away from the commercial airline terminal area 	<ul style="list-style-type: none"> • Significant cost for implementation • Acquisition of land necessary • Relocation of businesses and homes necessary

5.7.d Recommendation

It is recommended that planning be initiated for a connector roadway between the Airport and Interstate 99 at the routing proposed by Landside Access Alternative 1. While a number of financial, engineering, and environmental challenges would need to be solved prior to design and construction, it is anticipated that less challenges would be experienced with a routing as proposed by Landside Access Alternative 1 than by a routing proposed by Landside Access Alternative 2. This is due to the location of known environmental constraints to the east such as the location of archeological sites at the approach end of Runway 24 and the location of the Spring Creek fish hatchery. It is important to note that a full environmental review would be needed prior to the implementation of any landside access alternative to identify all potential environmental concerns and constraints that could be experienced. The Airport should continue to be involved with the transportation planning efforts of federal, state, regional, and local officials to promote this landside access infrastructure improvement project.

It is also recommended that planning be initiated for the implementation of Landside Access Alternative 3 for when demand is realized for the construction of the ultimate commercial airline terminal building. While there does not appear to be a need for this roadway other than to supplement development of the ultimate terminal area, it should be noted that the relocation of Fox Hill Road would open up opportunities to expand development at the Airport to the north of Runway 6/24. Coordination with federal, state, regional, and local transportation officials would be needed prior to implementation of this alternative, as well as with business and residential property owners who may be impacted by the road's relocation. In addition, coordination with the SCBWA would also be necessary to limit the impact, if any, that the relocated road's route may have on its wellhead protection area adjacent to the Airport.

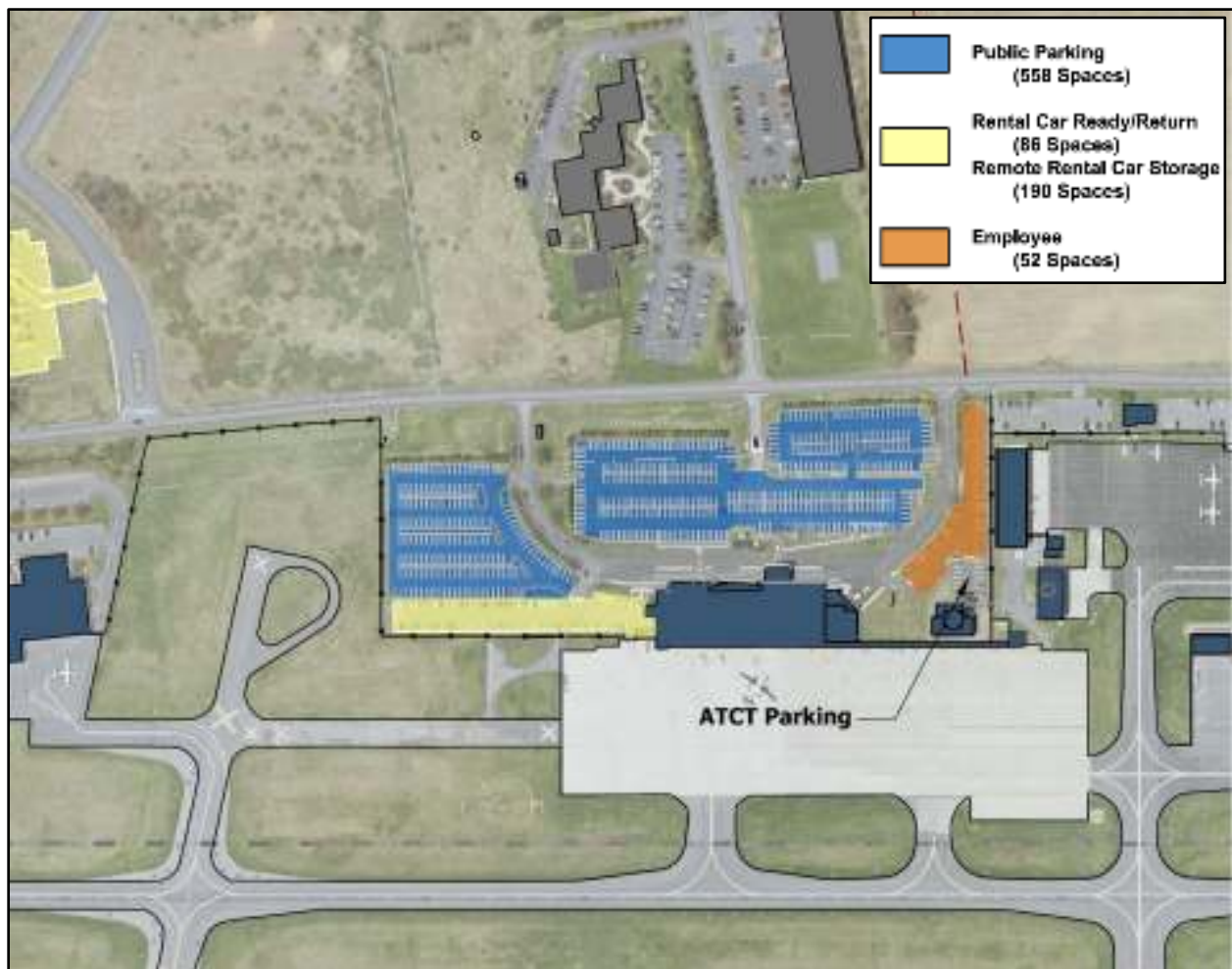
Finally, it is recommended that an improved perimeter access road be constructed around the Airport so that maintenance, security, and emergency response vehicles can have better access to the airfield when completing tasks and responding to incidents. The ultimate route of this roadway is dependent upon other infrastructure improvements such as an extension of Runway 6/24 and its airfield design surfaces and navigational aid critical areas.

5.8 Commercial Airline Terminal Vehicle Parking

A review of the projected demand for vehicle parking at the commercial airline terminal building during the planning period found that capacity deficits are anticipated for the public, rental car ready/return, employee, and rental car storage lots. As such, planning should be initiated for additional parking capacity. **Figure 5-12** illustrates the parking lots at the commercial airline terminal with public parking lots shaded in blue, the rental car ready/return lot shaded in yellow, and the employee lot shaded in orange. An additional parking lot for the Airport Traffic Control Tower is also identified in the figure. The capacities of the four lots as determined from the parking demand/capacity analysis are:

- Public Parking Lots – 558 spaces
- Rental Car Ready/Return Lot – 86 spaces
- Remote Rental Car Storage Lot – 190 spaces
- Employee Lot – 52 spaces

Figure 5-12: Existing Commercial Airline Terminal Parking Facilities



Source: Mead & Hunt, Inc. (2014)

Table 5-13 provides a summary of the projected parking demand at the Airport. As indicated in the table, an additional 279 spaces for public parking is projected to be needed by 2032 while a need for an additional 8 parking spaces is projected to be needed for employee parking. Additional parking spaces are also projected to be needed by 2032 for rental car parking with a need of an additional 53 spaces forecasted for ready/return parking and 26 spaces forecasted for rental car storage parking.

Table 5-13: Summary of Projected Parking Demand

Parking Lot	2017	2022	2027	2032
Public Parking				
Projected Demand	661	715	774	837
Parking Supply	558	558	558	558
Surplus/Deficit	(103)	(157)	(216)	(279)
Employee Parking				
Projected Demand	47	51	55	60
Parking Supply	52	52	52	52
Surplus/Deficit	5	1	(3)	(8)
Rental Car Ready/Return				
Projected Demand	110	119	129	139
Parking Supply	86	86	86	86
Surplus/Deficit	(24)	(33)	(43)	(53)
Rental Car Storage				
Projected Demand	170	184	199	216
Parking Supply	190	190	190	190
Surplus/Deficit	20	6	(9)	(26)

Projections: Mead & Hunt, Inc. (2013)

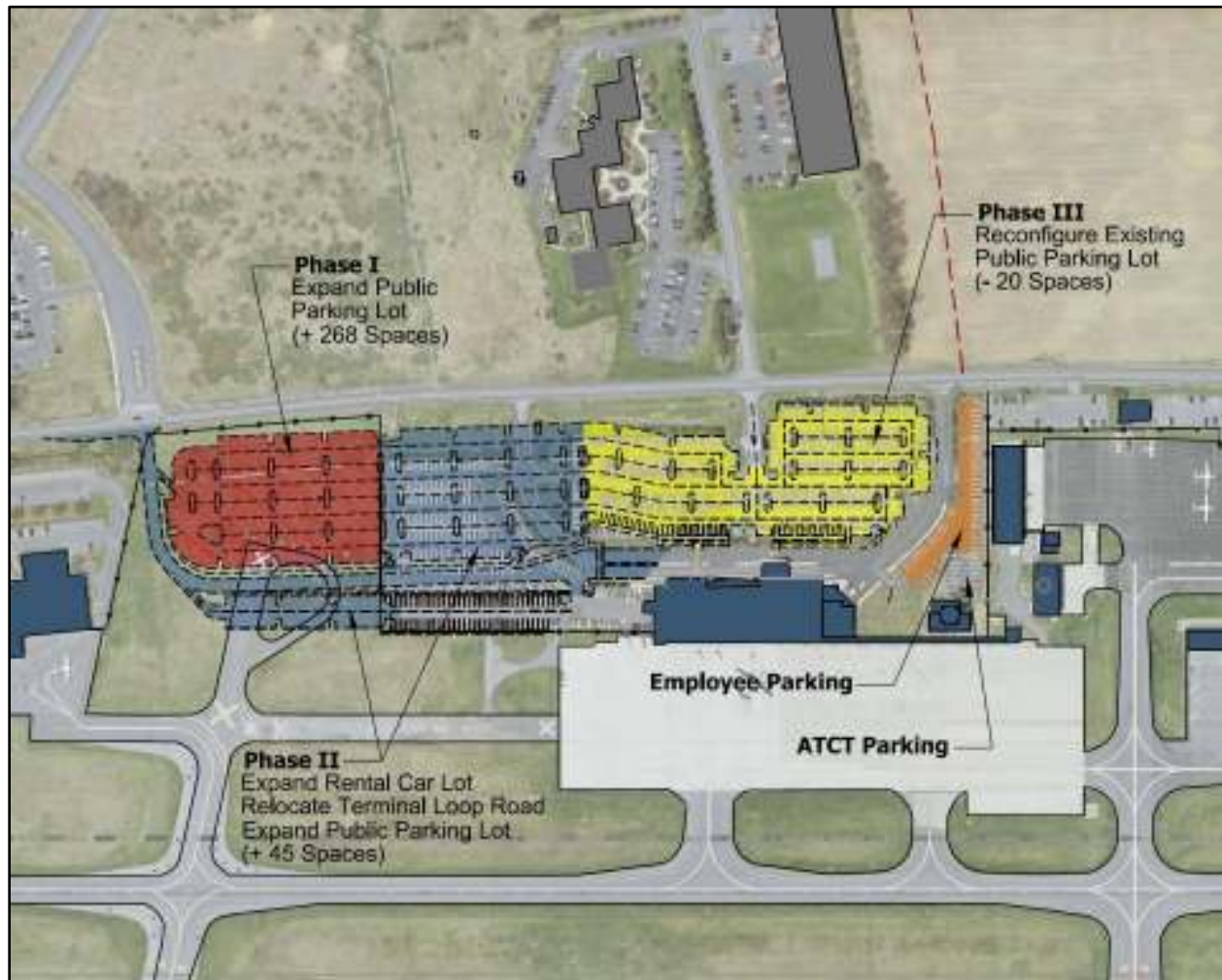
Two alternatives were prepared to illustrate options that are available to expand parking facilities for the commercial airline terminal. One alternative proposes to use existing Airport property south of Fox Hill Road to expand parking while the other proposes to use property north of Fox Hill road, which was acquired by the Centre County Airport Authority (CCAA) and was intended to be used to expand parking. Each alternative is presented in greater detail in the following sections. It is important to note that the implementation of the alternatives will require close coordination between the sponsor of the Airport, The Pennsylvania State University (Penn State), and the CCAA, sponsor of the commercial airline terminal building.

5.8.a Alternative 12 – Expand Airport Parking to the South of Fox Hill Road

Alternative 12, illustrated in **Figure 5-13**, proposes to expand commercial airline terminal parking on existing Airport and CCAA property to the south of Fox Hill Road. This alternative is proposed to be completed in three phases with the first being an expansion of public parking that would increase capacity by 268 spaces on land currently owned by the Airport. Phase two of this parking expansion would construct a new terminal loop road while further expanding the public parking lot and constructing an expansion to the rental car ready/return lot. The third phase of Alternative 12 would be a reconfiguration of the existing public parking

lot to increase capacity and to align the traffic flow to more consistently match the parking improvements made during the first and second phases of the alternative.

Figure 5-13: Alternative 12 – Expand Airport Parking to the South of Fox Hill Road



Source: Mead & Hunt, Inc. (2014)

As illustrated in the drawing, Alternative 12 provides enough additional capacity to meet the 20-year demand for public and rental car ready/return parking. The primary advantage to consider with this alternative is that it offers an option to expand vehicle parking on the terminal side of Fox Hill Road, reducing the distance passengers would need to walk between their vehicles and the commercial airline terminal building. Close, convenient parking is typically a level of customer service that is desired by passengers traveling from non-hub airports such as the Airport; as such, the expansion of parking near the commercial airline terminal as proposed by this alternative will allow the Airport to continue to provide this expected level of customer service to passengers. Since the site of the proposed parking expansion on land currently occupied by Airport development, this alternative promotes the sustainable use of land since the need to build on undisturbed land is reduced.

Expanding parking near the commercial airline terminal also has a disadvantage to consider. The transfer of land from Penn State to the CCAA would be necessary to implement phase I of this alternative, which would have to be coordinated and approved by the FAA to fulfill federal grant assurance requirements. Another disadvantage to consider with this alternative is that a temporary reduction in parking capacity may be experienced as each phase of the alternative is implemented. A final disadvantage to consider is that when the ultimate commercial airline terminal building is implemented, removal of the entire parking lot expansion will be necessary.

A summary of the advantages and disadvantages to consider with Alternative 12 is presented in **Table 5-14**.

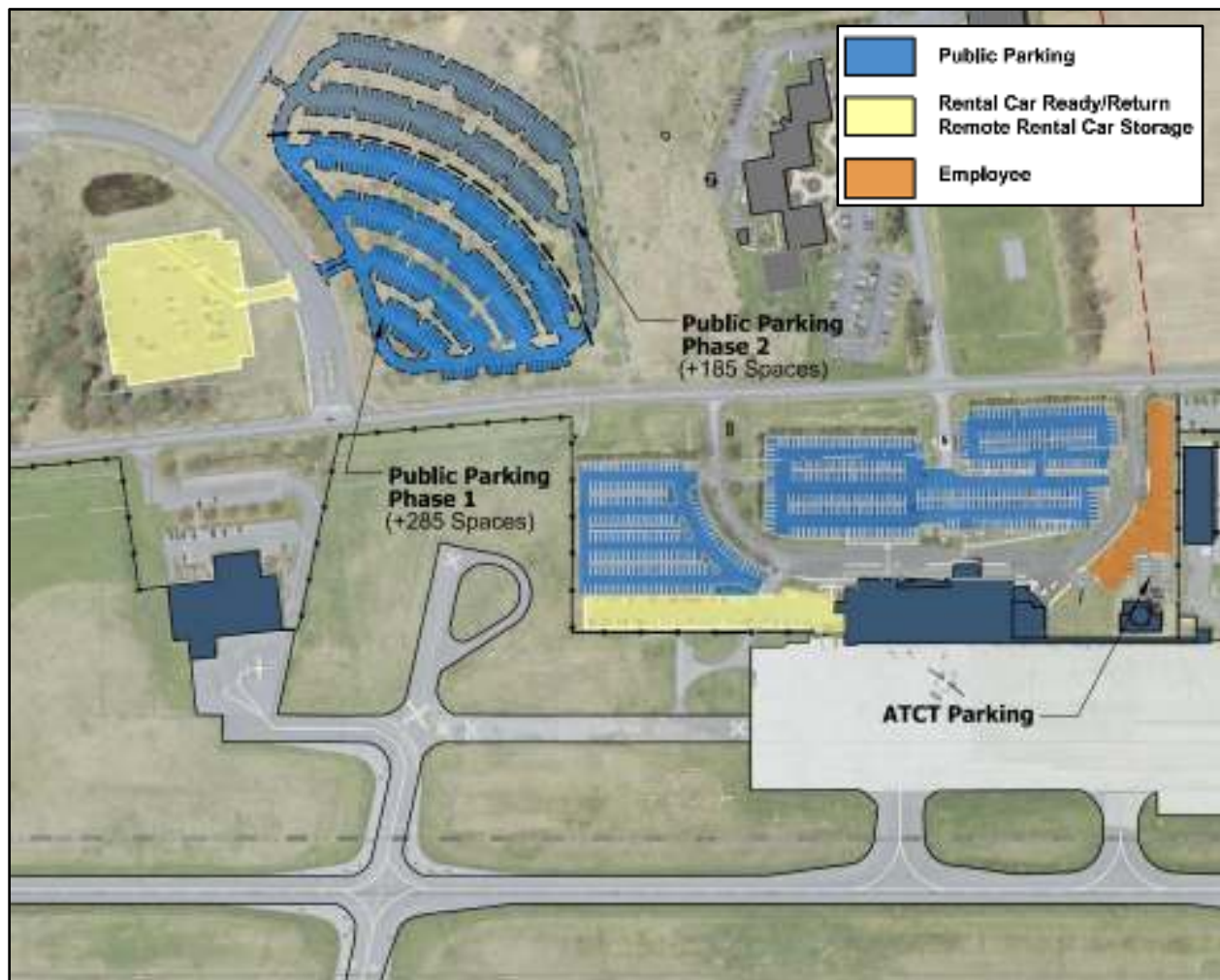
Table 5-14: Summary of Considerations – Alternative 12

Advantages	Disadvantages
<ul style="list-style-type: none"> • Provides additional parking on terminal side of Fox Hill Road • Continues to provide close and convenient public parking to terminal building • Meets public parking and rental car ready/return parking demand for the planning period 	<ul style="list-style-type: none"> • Requires property transfer from Penn State to the CCAA • Temporary reductions in parking capacity may be experienced during construction • Removal of the parking lot expansion will be necessary to implement the ultimate commercial airline terminal building
<ul style="list-style-type: none"> • Limits the need to build on undisturbed land 	

5.8.b Alternative 13 – Expand Airport Parking to the North of Fox Hill Road

Alternative 13 proposes to expand public parking to the north of Fox Hill Road on property currently owned by the CCAA adjacent to the intersection of Fox Hill Road and Alexander Drive (**Figure 5-14**). Development of parking on this site as proposed by Alternative 13 would be constructed in phases with 285 parking spaces constructed during Phase 1 and an additional 185 spaces constructed in Phase 2. Rental car storage parking would continue at an existing remote lot adjacent to the site of the proposed public parking expansion. Alternative 13 does not propose any capacity improvements to the rental car ready/return lot adjacent to the commercial airline terminal building.

Figure 5-14: Alternative 13 – Expand Airport Parking to the North of Fox Hill Road



Source: Mead & Hunt, Inc. (2014)

The advantage with Alternative 13 is that additional capacity is provided to meet the demand for public parking projected for the planning period that can be implemented without interrupting existing parking operations. Also, Alternative 13 offers the advantage that an expansion for parking could be constructed on existing property owned by the CCAA that would likely not require a federal grant assurance review and land transfer approval process by the FAA. A final advantage to consider is that only minor modifications of the parking lot expansion would be necessary to implement the proposed ultimate commercial airline terminal building area in the future.

Alternative 13 has a number of disadvantages to consider as well. The most significant disadvantage is that passengers are required to transverse a lengthy distance between the lot and the commercial airline terminal building, either by walking or by use of a shuttle service. Walking is not anticipated to be preferred by most passengers due to the lengthy distance that would need to be traveled and the need to cross Fox Hill Road. Likewise, use of a shuttle service is also not anticipated to be advantageous since passengers would likely need to wait several minutes for a shuttle to pick them up. In addition, significant costs are anticipated to be incurred to maintain and operate a fleet of vehicles on a 24-hour a day basis to provide

service between the lot and the terminal building. A disadvantageous sustainability factor to consider with Alternative 13 is that the use of shuttle buses will increase greenhouse gas emissions at the Airport. Construction of the lot on currently undisturbed land is also a disadvantageous sustainability factor to consider. The location for the parking lot expansion itself is another disadvantage to consider since there is a potential for drivers to miss the entrance to the lot when traveling on Fox Hill Road since it is not contiguous with the commercial airline terminal and existing public parking lots. One final disadvantage to consider is that Alternative 13 does not provide any additional rental car ready/return spaces that are needed to meet the demand that is projected for the planning period.

Table 5-15 summarizes the advantages and disadvantages to consider with Alternative 13.

Table 5-15: Summary of Considerations – Alternative 13

Advantages	Disadvantages
<ul style="list-style-type: none"> • Provides additional capacity to meet the demand for public parking • Can be implemented without interrupting existing parking operations • Only minor modifications are necessary to the parking lot expansion to implement the ultimate commercial airline terminal plan 	<ul style="list-style-type: none"> • Lengthy distance to terminal building • Parking lot is not contiguous with existing parking infrastructure • Requires passengers to walk across Fox Hill Road or use shuttle service • Requires use of currently undisturbed land • Costs associated with maintaining and operating a shuttle service • Operation of shuttle service will increase greenhouse gas emissions • Does not provide additional rental car ready/return parking capacity

5.8.c Recommendation

Alternative 12, which proposes to expand the existing long-term parking lot on land currently owned by the Airport and the CCAA, is recommended as the preferred alternative to increase parking capacity at the Airport. The site's close proximity to the commercial airline terminal building would allow the Airport to continue to provide convenient parking for its customers while eliminating the need for passengers to cross Fox Hill Road. This would eliminate a potential pedestrian/traffic safety concern, and does not require the Airport to operate a costly shuttle service to provide transportation to and from the remote lot. Also, Alternative 12 promotes the sustainable use of land since the need for undisturbed land would be reduced.

One consideration should be noted, however, with this recommended parking expansion alternative. At the time of the construction of the ultimate commercial airline terminal area, the removal of the parking lot expansion would be necessary. While it is not anticipated that construction of the ultimate commercial airline terminal building will be needed during the planning period, it is important to note this when considering this recommended alternative.

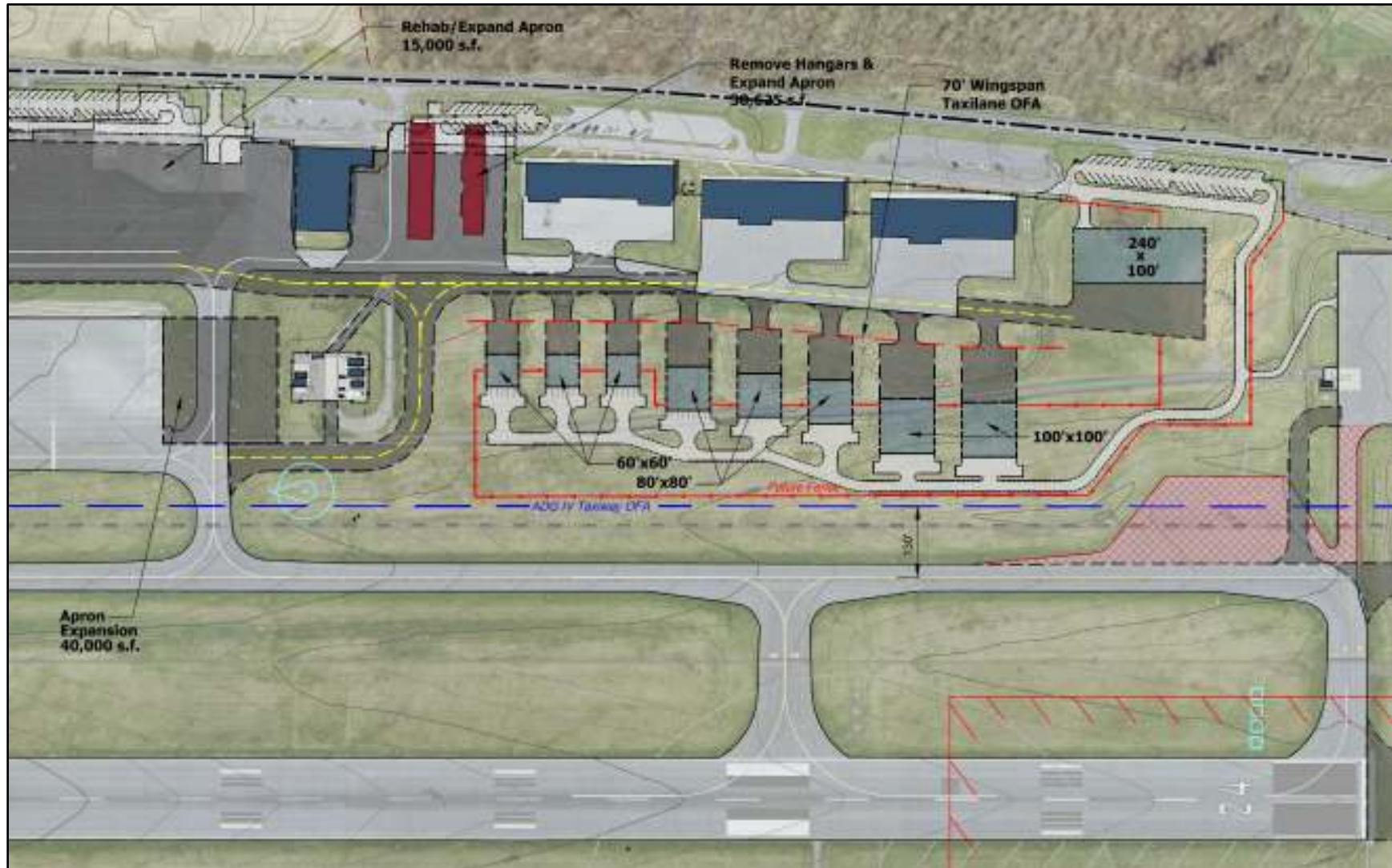
5.9 General Aviation Development

Over the planning period, GA operations are anticipated to increase approximately 27 percent at the Airport; as such, it is recommended that planning be initiated to expand GA development so that future demands for apron space, hangars, and aeronautical-related businesses can be met. Two areas of the Airport are well suited for future GA development: an area of land adjacent to the touchdown zone of Runway 24 bordered by the fuel farm, Taxiway A, and the existing box-style hangars; and an area of land at the approach end of Runway 6 adjacent to the ANG facility along Minute Man Road. The following section presents a number of layouts that could be implemented to expand apron space, add additional hangars, and create areas for future aeronautical-related development within these areas. It should be noted that the recommended layouts are conceptual in nature and are not intended to be a concrete plan of how development will actually occur within these areas.

5.9.a General Aviation Development Alternative 1

GA Development Alternative 1 proposes that hangars of various sizes be constructed within an area adjacent to the taxiway leading from the box-style corporate hangar area (**Figure 5-15**). Construction of a 100-foot-by-240-foot box style hangar with multiple units is proposed adjacent to the existing corporate style hangars while a variety of 60-foot-by-60-foot, 80-foot-by-80-foot, and 100-foot-by-100-foot box-style hangars would be constructed within the remainder of the development area. Dedicated landside access would be provided to the hangars through the construction of a landside access road that would extend from an expanded vehicle parking lot located along Fox Hill Road. In addition to the construction of the hangars, GA Development Alternative 1 also proposes three apron expansions: a 15,000-square-foot rehabilitation/expansion to the GA apron, removal of existing T-style hangars for a 30,625-square-foot apron expansion between the maintenance hangar and existing box-style hangars, and a 40,000-square-foot expansion of the deicing apron. GA Development Alternative 1 also proposes a relocation of Taxiway D around the fuel farm to the existing corporate hangar taxiway to correct its non-standard surface gradient.

Figure 5-15: General Aviation Development Alternative 1



Source: Mead & Hunt, Inc. (2014)

GA Development Alternative 1 allows for a variety of hangar sizes to be implemented as needed. Smaller box-style hangars, such as those 60 feet by 60 feet in size, can be incorporated into the layout as well as larger 100-foot-by-100-foot hangars. In addition, the proposed layout supports the construction of a fourth corporate box-style hangar structure along Fox Hill Road. Also, this alternative requires minimal taxilane construction, reducing the need for raw materials for taxilane construction and thus reducing the overall cost for development. Also, this alternative reduces the need to create additional impermeable surfaces at the Airport. Finally, all hangars are provided with direct landside access and do not require landside vehicles to enter the airfield and drive on or cross taxilanes to access the hangars.

A disadvantage with GA Development Alternative 1 is that the orientation of most hangars would face north, which is undesirable during winter months since the front of the buildings would have limited exposure to sunlight from the south. Hangars in northern climates are generally designed to face towards the south since the prolonged exposure to sunlight during the winter months can help expedite the melting of snow and ice from hangar doors and apron surfaces. Another disadvantage to consider with this alternative is that only a single taxi route is available for aircraft to enter and exit the hangar area. Should two or more aircraft need to enter or exit the hangar area simultaneously, each would need to coordinate its movements based on the movements of the other aircraft. This could lead to a potential situation where aircraft could block access for each other when taxiing simultaneously.

Another disadvantage to consider with GA Development Alternative 1 is that the additional 85,625 square feet of additional apron space that would be provided does not meet the long-term demand of an additional 93,000 square feet of space. Implementation of this alternative would result in a need for an additional 7,375 square feet of apron space to meet projected demand. Also, significant off-Airport fill would be necessary for hangar development given the change in topography in this area, which varies by more than 20 feet in some areas. Finally, some hangars may penetrate FAR Part 77 surfaces, which would require obstruction lighting and coordination with the FAA.

Table 5-16 summarizes the considerations with GA Development Alternative 1.

Table 5-16: Summary of Considerations – General Aviation Development Alternative 1

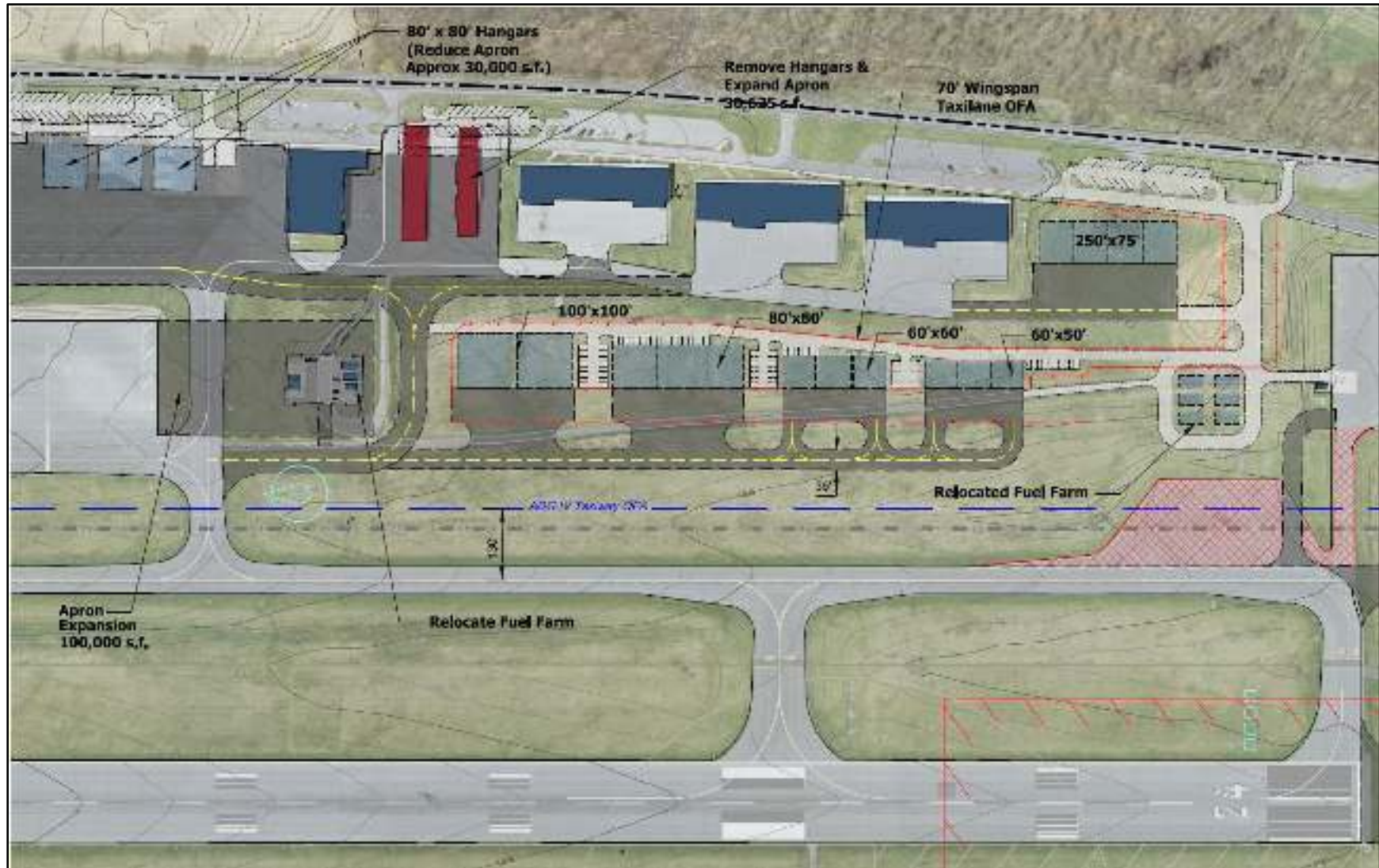
Advantages	Disadvantages
<ul style="list-style-type: none"> • Provides variety of hangar sizes that can be implemented as needed • Minimal additional taxilane construction required • Direct landside access provided to all hangars • Reduces the need to create additional impermeable surfaces 	<ul style="list-style-type: none"> • Some hangars have north facing doors • A single aircraft taxi route is available for hangar access • Provides 85,625 square feet of additional apron space that is less than the projected need of 93,000 square feet of additional space • Significant off-airport fill required for hangar development • Some hangars may penetrate FAR Part 77 surfaces

5.9.b General Aviation Development Alternative 2

GA Development Alternative 2 proposes to construct a variety of box-style hangars sizes in which most would have access to the airfield by a new taxiway extending from a relocation of Taxiway D. A fourth corporate style hangar along Fox Hill Road sized 250 feet by 75 feet is proposed with this alternative as well as the construction of three 80-foot-by-80-foot box-style hangars on the general aviation apron. Removal of two T-style hangar structures that are located adjacent to the maintenance hangar for additional apron space is also proposed that would provide an additional 30,625 square feet of apron space. Direct landside access to the hangars would be provided by an access road that would be connected to an expansion of a vehicle parking lot located along Fox Hill Road. Construction of an airside access road for mobile aircraft fueling vehicles between the hangar development area and the relocated fuel farm is also proposed with this alternative. Finally, a 100,000-square-foot extension of the deicing apron is proposed that would require the relocation of the fuel farm to a site northeast of the GA development site near the self-serve fuel tank by the T-style hangar area.

Figure 5-16 illustrates the hangar layout that is proposed by GA Development Alternative 2.

Figure 5-16: General Aviation Development Alternative 2



Source: Mead & Hunt, Inc. (2014)

An advantage to consider with GA Development Alternative 2 is that the layout supports the construction of a variety of hangar sizes that can be implemented based on demand. This flexible approach to developing the site allows for a variety of hangar sizes to be implemented such as individual box-style hangars that are 100 feet by 100 feet in size to large box-style hangar structures that have multiple units. Another advantage to consider is that the 100,000-square-foot extension of the deicing apron exceeds the long-term 93,000-square-foot demand for apron space that is anticipated to be needed for the planning period. This alternative also provides direct landside access to all hangars, eliminating the need for landside traffic to cross and/or drive on taxilanes.

A number of disadvantages should also be considered with GA Development Alternative 2. The proposed layout requires the construction of an additional taxilane, which is anticipated to contribute to the cost to implement this alternative. An increase in impermeable surfaces at the Airport is also a disadvantage to consider. The single taxi route that would be available for aircraft to enter or exit from the hangars will require pilots to more closely coordinate the movement of taxiing aircraft. Relocation of the fuel farm is also a factor to consider given that this will contribute to the cost to implement this alternative. Significant off-airport fill is another disadvantage to consider since it would be needed for taxilane and hangar development, as well as for the relocation of the fuel farm. Finally, some hangars may penetrate FAR Part 77 surfaces, requiring obstruction lighting and coordination with the FAA.

The advantages and disadvantages of GA Development Alternative 2 are presented in **Table 5-17**.

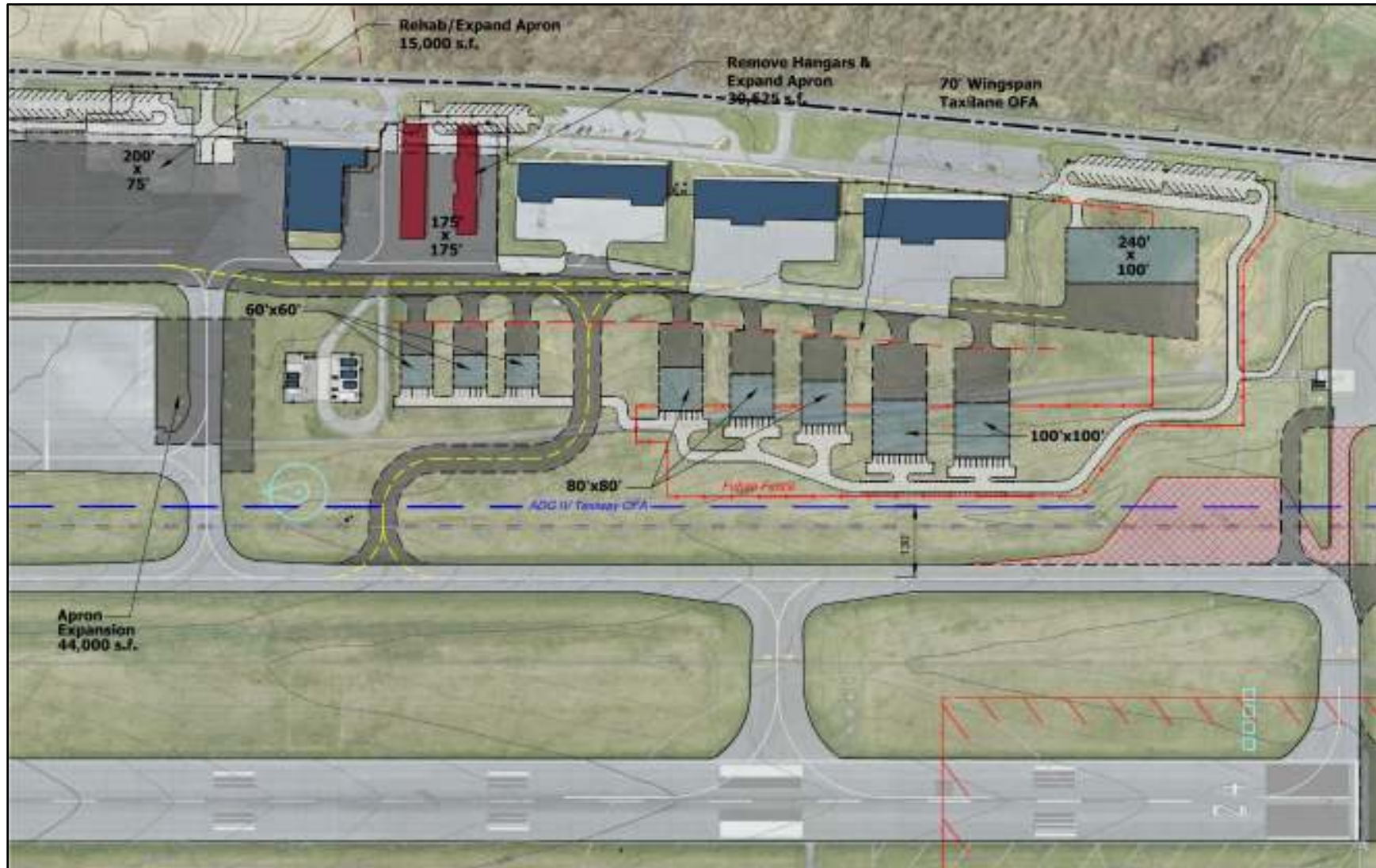
Table 5-17: Summary of Considerations – General Aviation Development Alternative 2

Advantages	Disadvantages
<ul style="list-style-type: none"> • Provides variety of hangar sizes that can be implemented as needed • Provides over 100,000 square feet of additional apron space, meeting the long-term demand for apron space • Provides direct landside access 	<ul style="list-style-type: none"> • Additional taxilane construction required, increasing impermeable surfaces • Vehicles are required to use taxilanes to access some of the hangars • Requires relocation of the fuel farm • Significant off-airport fill necessary for taxilane and hangar development • Only a single taxi route is available for aircraft to access hangars

5.9.c General Aviation Development Alternative 3

GA Development Alternative 3 (**Figure 5-17**) proposes that hangars be constructed of various sizes adjacent to the existing box-style hangar taxilane. A relocation of Taxiway D is also proposed that would route it further away from the fuel farm than the alignment proposed in Alternative 2, allowing for the construction of smaller box-style hangars immediately adjacent to the fuel farm. A proposed expansion of the deicing apron, rehabilitation of the GA terminal apron, and removal of two existing T-style hangar structures would provide additional apron area. Finally, direct landside access would be provided to most hangars while vehicles would be required to cross Taxiway D to access others.

Figure 5-17: General Aviation Development Alternative 3



Source: Mead & Hunt, Inc. (2014)

GA Development Alternative 3 offers the advantage of providing a variety of hangar sizes that can be implemented as needed based on demand, offering flexibility to develop the site over the planning period. An additional advantage to consider with GA Development Alternative 3 is that minimal additional taxilane construction would be necessary, since use of the existing box-style hangar taxilane would provide access to the airfield. Use of the existing taxilane also reduces the need to create additional impermeable surfaces at the Airport. A final advantage is that most hangars would have direct landside access that limits the number of vehicles that would need to cross Taxiway D for proposed hangar development adjacent to the fuel farm.

The landside access layout is also a disadvantage to consider since vehicles must cross Taxiway D to access hangars located adjacent to the fuel farm. The need for vehicles to cross the taxiway could potentially increase the chances of a vehicle/aircraft incursion if drivers who are unfamiliar with the airfield will be entering the airfield. Another disadvantage with the layout proposed with this alternative is that most hangars would be northward facing, reducing their exposure to primarily southward facing sunlight during the winter months, which would reduce the potential sunlight would have in melting snow and ice away from hangar doors. The single airside access route to the hangars is also a disadvantage to consider since aircraft may be blocked from entering or exiting the hangar area in situations that the taxilane is being occupied by other parked/taxiing aircraft. GA Development Alternative 3 also does not provide for sufficient additional apron space (89,625 square feet) to meet the demand that is anticipated for the planning period (90,000 square feet). Significant off-airport fill required for hangar development is another disadvantage to consider given that the topography in this area varies as much as 20 feet in some places. Finally, some hangars may penetrate FAR Part 77 surfaces, requiring obstruction lighting and coordination with the FAA.

Table 5-18 provides a summary of the advantages and disadvantages that should be considered with GA Development Alternative 3.

Table 5-18: Summary of Considerations – General Aviation Development Alternative 3

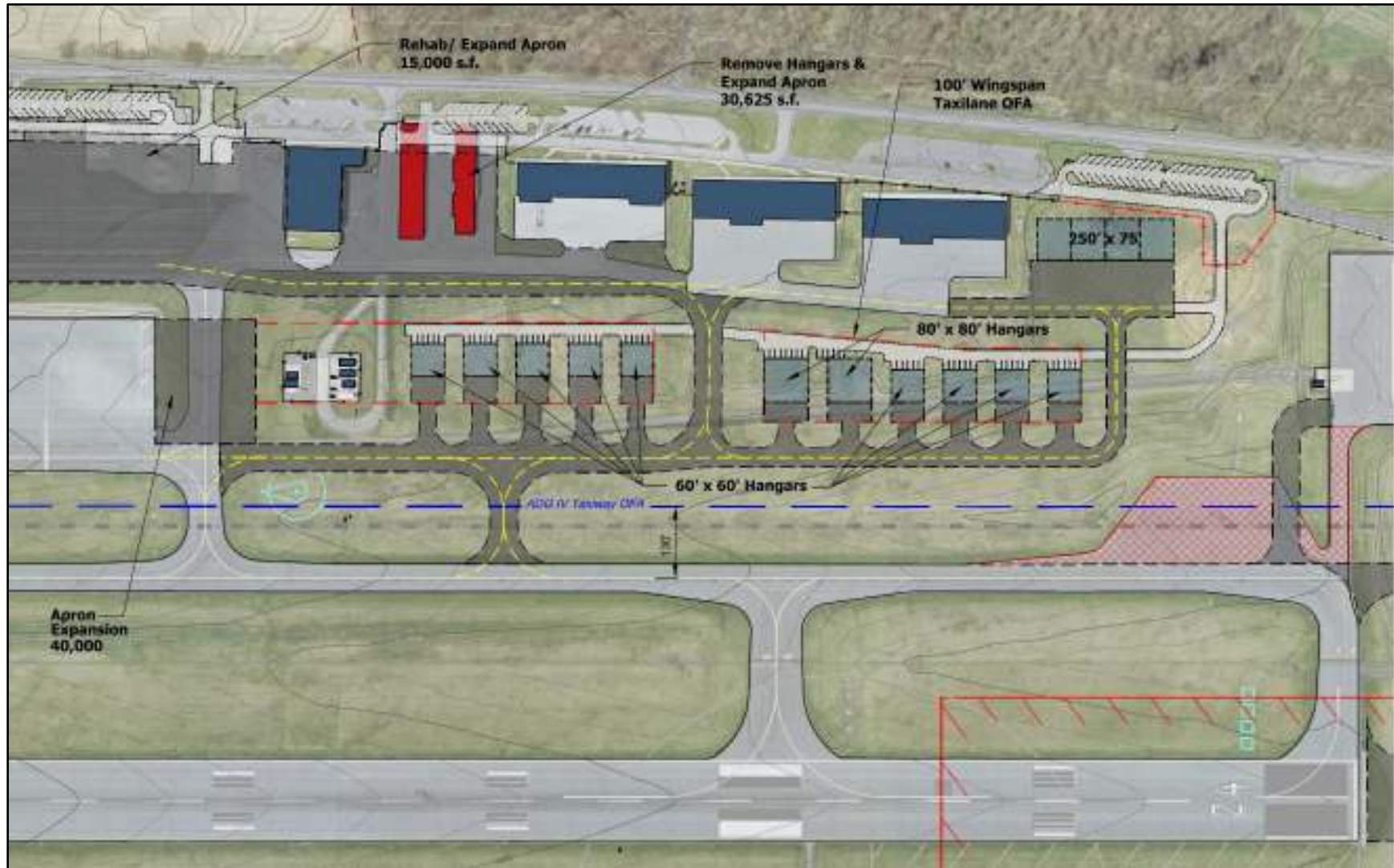
Advantages	Disadvantages
<ul style="list-style-type: none"> • Provides variety of hangar sizes that can be implemented as needed • Minimal additional taxilane construction required • Most hangars are provided with direct landside access • Reduces need to create additional impermeable surfaces at the Airport 	<ul style="list-style-type: none"> • Some hangars have north facing doors • Airside hangar access is provided by a single aircraft taxi route • Does not provide sufficient additional apron space to meet anticipated demand • Significant off-airport fill necessary for hangar development • Some hangars may penetrate FAR Part 77 surfaces

5.9.d General Aviation Development Alternative 4

GA Development Alternative 4 combines concepts from GA Development Alternatives 1, 2, and 3 as illustrated in **Figure 5-18**. Construction of a new taxilane leading from the deicing apron to the existing

box-style hangar taxilane is proposed that would provide access to number of 60-foot-by-60-foot and 80-foot-by-80-foot hangars. Construction of an additional 250-foot-by-75-foot box-style hangar structure with four hangar units is also proposed with this alternative that would be located adjacent to the three existing box-style hangar structures. Closure of Taxiway D and construction of a new connector taxiway between the taxilane and parallel Taxiway A is proposed that would provide access to the airfield from the hangar area and also allow a 40,000-square-foot expansion of the deicing apron. A rehabilitation/expansion of the GA terminal apron and the removal of two existing T-style hangar units are also proposed with this alternative to provide additional apron space. Finally, this alternative proposes an additional landside vehicle parking lot and hangar access road be constructed that would direct hangar traffic through a secured gate and across taxilanes to provide vehicle access to the hangar area.

Figure 5-18: General Aviation Development Alternative 4



Source: Mead & Hunt, Inc. (2014)

Similar to the other GA development alternatives, GA Development Alternative 4 offers the advantage of allowing a variety of hangar sizes to be constructed on the site so that future hangar demands can be met. GA Development Alternative 4 also offers the advantage of providing two taxi routes for entering and exiting aircraft so that access can be maintained when a taxi route is blocked by a parked or taxiing aircraft.

The cost to construct the taxilanes is a disadvantage to consider with this alternative given the amount of additional pavement that would be needed to build the taxiway, taxilane, and apron infrastructure. This increase in paved surfaces is also a disadvantage to consider since additional impermeable surfaces would be present at the Airport. The significant amount of off-airport fill that would be needed to implement this alternative is also a disadvantage that should be considered given the varying topography within the development area. The lack of direct landside access to the hangar sites is another disadvantage given that vehicles would be required to cross the taxilanes to access the hangars. The proposed expansion of apron space (85,625 square feet) is also not sufficient to meet the long-term demand for apron space that is projected for the planning period (90,000 square feet). Finally, some hangars may penetrate FAR Part 77 surfaces, which would likely require them to be illuminated with obstruction lighting after being coordinated with the FAA.

A review of the advantages and disadvantages to consider with GA Development Alternative 4 is presented in **Table 5-19**.

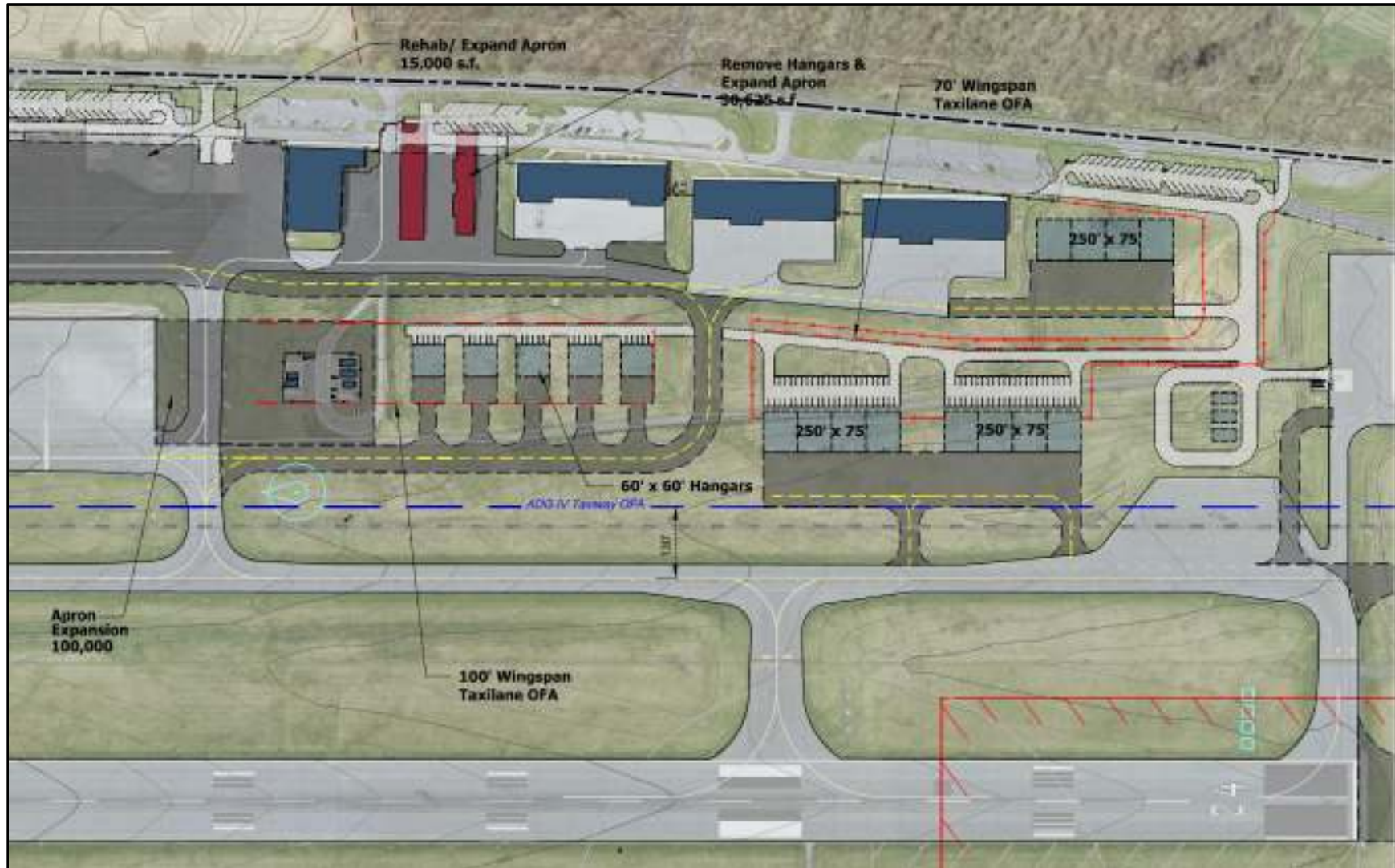
Table 5-19: Summary of Considerations – General Aviation Development Alternative 4

Advantages	Disadvantages
<ul style="list-style-type: none"> • Provides variety of hangar sizes that can be implemented as necessary • Provides two hangar taxi routes 	<ul style="list-style-type: none"> • Additional taxilane construction needed, increasing impermeable surfaces • Requires significant off-airport fill • Vehicles required to cross taxilane to access some hangars • Does not provide sufficient apron space • Some hangars may penetrate FAR Part 77 surfaces and require obstruction lighting

5.9.e General Aviation Development Alternative 5

GA Development Alternative 5 (**Figure 5-19**) proposes the construction of three additional box-style hangar structures, each with four hangar units, similar in style to the existing box-style hangar structures located along Fox Hill Road. Smaller 60-foot-by-60-foot hangars are also proposed with this alternative along with a relocation of Taxiway D. Landside access to the hangars would be provided by a new roadway that would give some hangars direct landside access while requiring vehicles to cross Taxiway D to access others. Finally, this alternative proposes to also expand the deicing apron, expand the GA terminal apron, remove two existing T-style hangars for additional apron space, and relocate the fuel farm.

Figure 5-19: General Aviation Development Alternative 5



Source: Mead & Hunt, Inc. (2014)

Similar to the other GA development alternatives, GA Development Alternative 5 offers the advantage of allowing for a variety of hangar sizes to be constructed on the site based on the demand realized during the planning period. GA Development Alternative 5 also provides direct landside access to some hangars so that not all hangar vehicle traffic will be required to cross Taxiway D. A final advantage to consider is that the proposed expansion of apron space meets the demand for itinerant aircraft parking that is projected for the planning period.

The cost and increase in impermeable surfaces as a result of the taxiway and apron construction are disadvantages to consider with this alternative. Vehicles crossing Taxiway D to be provided landside access to the hangars is also a disadvantage to consider. A single taxi route to some hangars is another disadvantage to consider since it prevents the simultaneous movement of multiple aircraft in some taxiway locations. The significant fill and grading needed to implement this alternative should also be considered given the varying topography within this area. The cost and regulatory compliance needed to relocate the fuel farm is another disadvantage to consider. Finally, some hangars may penetrate FAR Part 77 surfaces, which would require coordination with the FAA and the likely installation of obstruction lighting. A summary of the disadvantages and advantages with GA Development Alternative 5 is presented in **Table 5-20**.

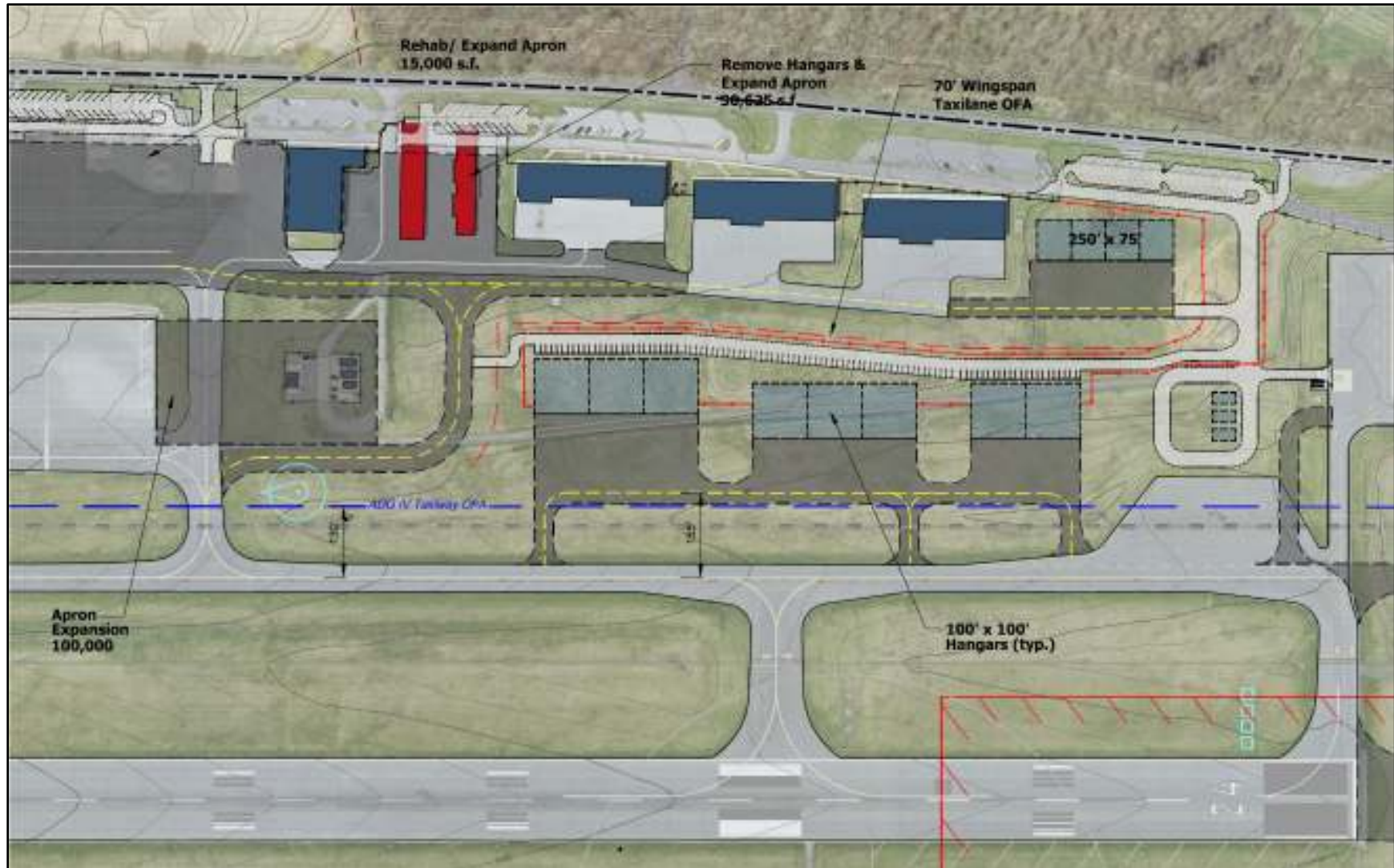
Table 5-20: Summary of Considerations – General Aviation Development Alternative 5

Advantages	Disadvantages
<ul style="list-style-type: none"> • Provides for a variety of hangar sizes that can be implemented as needed • Provides landside access to some hangars • Provides additional itinerant aircraft parking apron space to meet projected demand 	<ul style="list-style-type: none"> • Single taxi route available to access hangars • Increase in impermeable surfaces • Significant fill and grading required • Requires relocation of fuel farm • Vehicles are required to cross relocated Taxiway D to access some hangars • Some hangars may penetrate FAR Part 77 surfaces and require obstruction lighting

5.9.f General Aviation Development Alternative 6

General Aviation Development Alternative 6, as illustrated in **Figure 5-20**, proposes that box-style hangar structures with multiple units be constructed within the proposed development area that are similar in design and style to the existing corporate hangars located adjacent to Fox Hill Road. Direct landside access would be made available to all hangars through the construction of a new access road. Finally, this alternative proposes to: relocate Taxiway D; rehabilitate and expand the GA apron; remove two existing T-style hangar structures; and expand the deicing apron by 100,000 square feet, which would require the relocation of the fuel farm.

Figure 5-20: General Aviation Development Alternative 6



Source: Mead & Hunt, Inc. (2014)

An advantage to consider with GA Development Alternative 6 is that a variety of hangar sizes can be implemented within the development area as needed based upon demand. GA Development Alternative 6 also offers the advantage of reducing the number of taxiways that need to be constructed to support hangar development, thus reducing cost and the need to create additional impermeable surfaces at the Airport. Multiple taxi routes that are proposed from both ends of the new hangar development area is also an advantage that should be considered. Direct landside access to all hangars is another advantageous factor to consider given that vehicles would not be required to enter the airfield for access to the hangars. Finally, the expansion of the apron area as proposed by this alternative would meet the long-term apron demand that is projected for the planning period.

A few disadvantages should also be considered with this alternative. Due to the topography of the development area, significant fill and grading would be necessary to develop the site for hangar construction. Also, some hangars may be found to penetrate FAR Part 77 surfaces, which would require coordination with the FAA and the likely installation of obstruction lighting. Finally, implementation of this alternative would require a relocation of the fuel farm to accommodate the deicing apron expansion that is needed to meet the anticipated demand for the planning period.

A summary of the advantages and disadvantages to consider with this alternative are presented in **Table 5-21**.

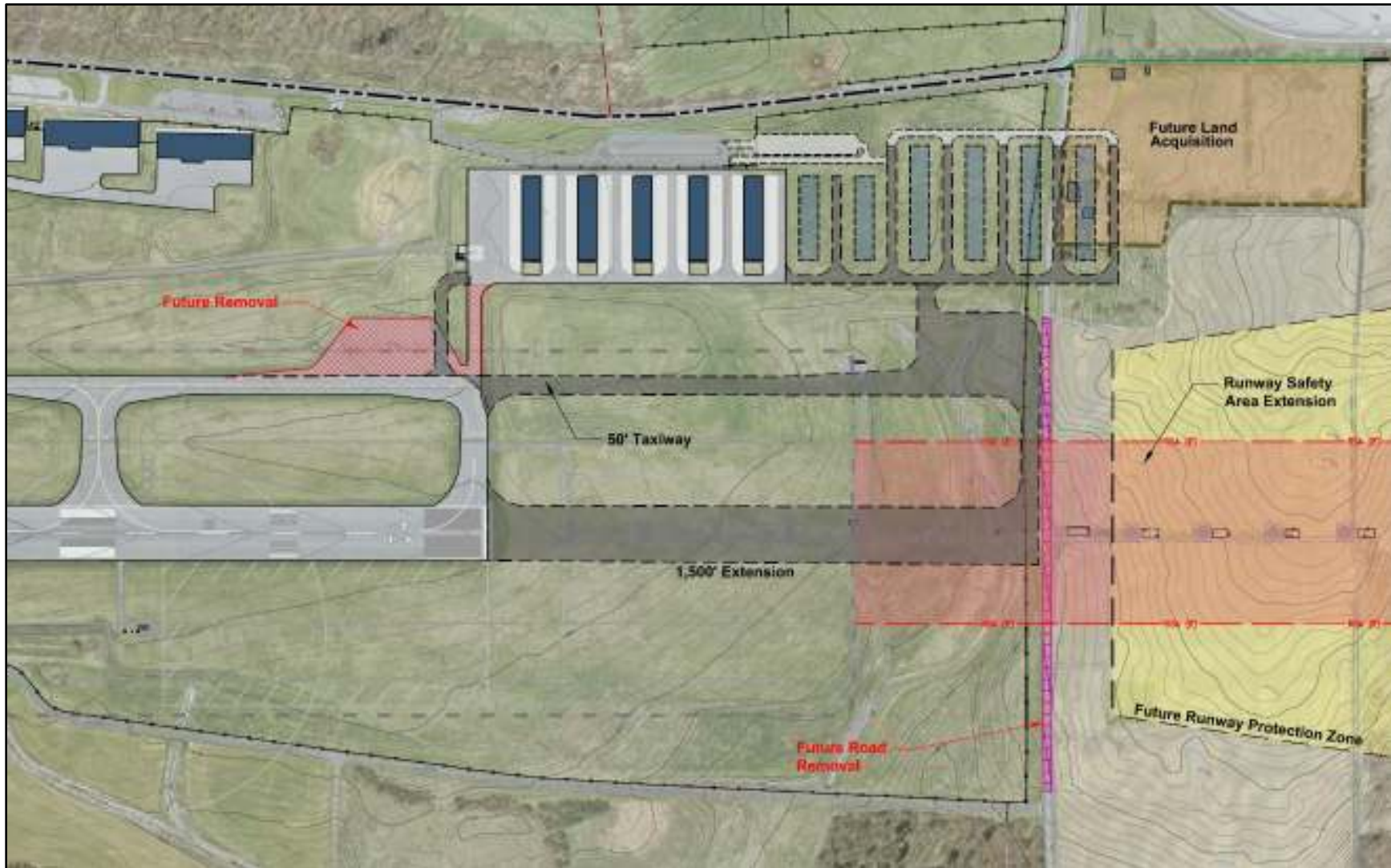
Table 5-21: Summary of Considerations – General Aviation Development Alternative 6

Advantages	Disadvantages
<ul style="list-style-type: none"> • Provides for a variety of hangar sizes that can be implemented based on demand • Minimal additional taxiway construction needed, reducing need to create additional impermeable surfaces • Multiple taxi routes to the new hangar development prevents taxiing conflicts • Provides landside access to all hangars • Provides sufficient itinerant apron space to meet long-term demand 	<ul style="list-style-type: none"> • Significant fill and grading required for hangar development • Some hangars may penetrate FAR Part 77 surfaces and require obstruction lighting • Requires relocation of the fuel farm

5.9.g General Aviation Development Alternative 7

GA Development Alternative 7 (**Figure 5-21**) illustrates an expansion of the T-style hangar area located adjacent to the approach end of the Runway 24. In addition to the construction of additional T-style hangar structures, this alternative also proposes the construction of additional taxiways and an additional vehicle parking lot to support the hangar development. Access to the airfield would be provided by the construction of a new connector taxiway to a future extension of Taxiway A and through the relocation of Taxiway H to meet FAA airfield design standards.

Figure 5-21: General Aviation Development Alternative 7



Source: Mead & Hunt, Inc. (2014)

GA Development Alternative 7 offers the advantage of providing additional T-style hangar units to meet the demand for covered parking of single- and small twin-engine aircraft types that can be anticipated for the planning period. The creation of additional hangar units also would facilitate the growth of aviation activity at the Airport as well as create additional revenue generation opportunities. Construction of new T-style hangar structures as proposed by this alternative also offers the opportunity for larger hangar doors to be incorporated into the design of each unit, thus allowing a greater number of single- and small twin-engine aircraft types to be parked in the units. Currently, some single- and small twin-engine aircraft types are sized to fit within existing T-style hangar units, but are unable to do so due to the limited size of the hangar doors that do not provide enough room for wingtip clearances.

A disadvantage to consider with this alternative is that land acquisition may be necessary to expand the T-style hangar area to meet the long-term demand for single- and small twin-engine aircraft parking.

Table 5-22 provides a summary of the considerations with GA Development Alternative 7.

Table 5-22: Summary of Considerations – General Aviation Development Alternative 7

Advantages	Disadvantage
<ul style="list-style-type: none"> • Provides additional T-style hangar units • Facilitates growth in aviation activity and revenue generation opportunities • Provides larger T-style hangar doors for a greater number of single- and twin-engine aircraft types 	<ul style="list-style-type: none"> • Land acquisition may be needed

5.9.h General Aviation Development Alternative 8

The State of Pennsylvania recently passed a sales tax exemption for fixed wing aircraft, parts, and maintenance; as such, it is logical to plan for future aeronautical-related business development at the Airport. GA Development Alternative 8 (**Figure 5-22**) proposes a site near the approach end of Runway 6 adjacent to the ANG facility that could be developed for an aeronautical related business, such as an aircraft manufacturer, parts supplier, or aircraft maintenance operation.

Figure 5-22: General Aviation Development Alternative 8



Source: Mead & Hunt, Inc. (2014)

There are a number of advantages to consider with GA Development Alternative 8. First, the site can be easily accessed from the landside with the construction of a connector roadway to Interstate 99. This ease of access to a major traffic artery in the region would increase the attractiveness of the site to a business with ground transportation access needs, such as a manufacturer or a parts distributor. The ease of access to the site from the airside is also an advantage to consider since aircraft can quickly enter or exit the development area from the approach end of Runway 6. This is would be advantageous for an aircraft manufacturer or aircraft maintenance operation that may have numerous aircraft taxiing into and out of the facility each day. Access to existing utility infrastructure installed for the ANG facility is an additional advantage to consider since the cost to provide water, sewer, electricity, and other needed utilities to the site would be minimal. Finally, the development of the site so that it can accommodate future aeronautical-related businesses would provide additional aeronautical and non-aeronautical revenue opportunities for the Airport.

Engineering challenges appear to be the most significant disadvantage with this alternative. Due to the topography of the site, which is lower in elevation than the adjacent airfield, significant off-airport fill would be needed that would add cost to any development project. The significant environmental and engineering challenges that would need to be overcome to construct a connector to Interstate 99 are also disadvantages to consider since the site is less accessible from the landside without this proposed roadway. Construction of a taxiway to connect the site to the airfield is another disadvantage to consider given the cost and amount of off-airport fill that would be necessary to install this infrastructure. Finally, some hangars at the site may penetrate FAR Part 77 surfaces associated with Runway 6/24 and could require the installation of obstruction lighting. Coordination with the FAA would be necessary during the design phase of any proposed development at this site to determine if it would impact FAR Part 77 surfaces associated with Runway 6/24.

Advantages and disadvantages to consider with GA Development Alternative 8 are presented in **Table 5-23**.

Table 5-23: Summary of Considerations – General Aviation Development Alternative 8

Advantages	Disadvantages
<ul style="list-style-type: none"> • Site can be easily accessed with the construction of a connector to Interstate 99 	<ul style="list-style-type: none"> • Environmental and engineering challenges impact the construction of Interstate 99
<ul style="list-style-type: none"> • Site provides efficient access to runway, which would be desirable for commercial aeronautical users 	<ul style="list-style-type: none"> • Construction of a dedicated taxiway needed
<ul style="list-style-type: none"> • Provides additional aeronautical and non-aeronautical revenue opportunities 	<ul style="list-style-type: none"> • Significant off-airport fill required for development
<ul style="list-style-type: none"> • Site has access to existing utility infrastructure 	<ul style="list-style-type: none"> • Some hangars may penetrate FAR Part 77 surfaces and could require obstruction lighting

5.9.i Recommendation

The proposed area for future GA development can incorporate a variety of hangar, taxiway, and apron layouts; however, it is important that a layout be planned that best suits the needs of the Airport's existing and future users. Input received from existing tenants, as well as Airport officials, indicated that direct landside access to hangars is desired since it eliminates the need for vehicles to enter the airfield and potentially interfere with aircraft operations. Having the ability to construct box-style hangar structures with multiple hangar units was also desired since cost, energy, and operational efficiencies can be gained in comparison to the construction and operation of a number of standalone single aircraft hangar structures. The need to construct additional hangars while also considering other Airport infrastructure needs such as expanding apron space and correcting the longitudinal grade of Taxiway D were also factored in the selection of the recommended GA development layout. Taking all of this into consideration, it is recommended that GA Development Alternative 2 be pursued as the plan to develop this area for future GA needs.

The layout proposed by GA Development Alternative 2 is similar to the other development options in that it provides a layout with the flexibility to incorporate a variety of hangar sizes to be constructed based on demand during the planning period. However, GA Development Alternative 2 is unique in that its layout allows for an expansion in the GA apron area to meet projected demand while also accommodating a loss of approximately 30,000 square feet of existing apron area that would be used for the construction of 80-foot-by-80-foot hangars adjacent to the GA terminal building. GA Development Alternative 2 also provides direct landside access to all hangars, which satisfies the following user needs:

- **Efficient Access** – GA Development Alternative 2 provides quick and efficient landside access to the hangars and eliminates the delay that would be experienced if vehicles were required to stop and enter or exit the airfield through a secured gate.
- **Eliminates Need for Badging Credentialing** – If vehicles were to be required to enter the airfield, vehicle drivers would likely need to obtain an Airport-issued badge to do so in accordance with Transportation Security Administration (TSA) regulations. Vehicle drivers without a badge may be required to be escorted by a badged personnel.
- **Eliminates Potential Vehicle/Aircraft Collisions** – The introduction of landside vehicles on the airfield would increase the potential for a vehicle/aircraft incursion. If vehicles were required to enter the airfield and cross taxilanes for hangar access, drivers unfamiliar with the layout of the airfield could inadvertently turn onto a taxiway and create a potential vehicle/aircraft conflict.

It should be noted that opportunities are available with the construction of new hangars to implement energy-saving measures that can be incorporated with new building construction as well as the use of renewable and/or alternative energy sources. Other sustainable building elements, such as incorporating water-saving features, using environmentally friendly building materials, and reducing waste generated from daily use can also be implemented with new hangar construction.

GA Development Alternative 2 also has a few disadvantages that should be considered, but are not anticipated to significantly impact the implementation of this alternative. First, additional taxiway construction is required with GA Development Alternative 2 as compared to GA Development Alternatives 1 and 3, which will add cost for implementation. While an increase in impermeable surfaces would occur with the implementation of this alternative, it is not anticipated to be at a level that significantly impacts the drainage of storm water from the Airport. If it is determined that drainage of storm water would be impacted, improvements to this system should be made as the site is developed for future hangar construction. Relocation of the fuel farm as would be required to expand the deicing apron is also another cost consideration. Due to the topography of the land, significant off-Airport fill would be necessary for taxiway and hangar development to occur which, again, contributes to the implementation cost of this alternative. Also due to the topography of the site, some hangars may be found to penetrate FAR Part 77 surfaces associated with Runway 6/24; however, it is anticipated that coordination with the FAA will find these structures not to be hazards to air navigation, since it is likely they would only penetrate the transitional surface and would only require obstruction lighting. Finally, only a single taxi route would be available to all hangars meaning that access could be blocked for some users if the taxi route happens to be occupied by another aircraft or if a temporary closure for construction or maintenance is needed. While this is a concern, the frequency of aircraft taxiing to and from the hangar area and the need for pavement maintenance is not anticipated to reach a frequency that users would often experience delays to enter or exit the hangar area.

In addition to GA Development Alternative 2, it is recommended the GA Development Alternative 7 and GA Development Alternative 8 also be implemented. GA Development Alternative 7 proposes an expansion of the T-style hangar area near the approach end of Runway 24 while GA Development Alternative 8 proposes a site near the approach end of Runway 6 that could be developed for aeronautical-related uses. GA Development Alternative 7 will allow the Airport to provide additional T-style hangar units to meet the demand for the next 20 years and beyond while constructing units with larger hangar doors to accommodate a greater number of types of single-engine and small twin-engine aircraft. Land acquisition is the only disadvantage to consider with GA Development Alternative 7. It should be noted that the Airport has been in contact with the current owner of this land who expressed interest in selling the property to the Airport, if needed. While the potential remains for a costly and lengthy land acquisition process, it is not anticipated to significantly impact the long-term development of this site for additional T-style hangar units.

In addition, GA Development Alternative 7 facilitates a growth in aviation activity at the Airport, leading to increased opportunities for revenue generation.

Facilitating the growth in aviation activity and increasing opportunities for revenue generation are also advantages to consider with GA Development Alternative 8. The land within this proposed development area is currently owned by the Airport and would provide a site ideal for aeronautical-related businesses development since it offers efficient access landside with the construction of a future connector to Interstate 99 and airside to Runway 6/24. Likewise, the site also has access to existing utility infrastructure that would reduce the cost to provide electricity, water, sewer, and telecommunication lines for future aeronautical development. While environmental challenges are anticipated to fill and grade the site for development, it

is not anticipated that this will significantly impact the ability to develop the site for future aeronautical related uses. As such, it is recommended that this alternative also be implemented.

5.10 Air Cargo Apron

The review of facility requirements found that the size of the existing air cargo apron is not adequate to meet the demand for air cargo aircraft parking at the Airport. Currently, the size of the apron is only capable of parking a maximum of two Cessna 208 Caravan aircraft that are used by Wiggins Aviation to provide FedEx air cargo feeder services at the Airport. Often, three to four Cessna 208 Caravan aircraft are parked at the Airport on a daily basis, requiring that these aircraft be parked on both the air cargo apron and on the GA apron near the GA terminal building. Increasing the size of the air cargo apron would offer a centralized location for the parking of air cargo aircraft, which would improve the efficiency of loading, unloading, and maintenance operations.

Figure 5-23 illustrates Alternative 14 that proposes how the air cargo apron could be expanded to provide additional space for aircraft parking. As shown in the figure, an expansion of 27,000 square feet is proposed adjacent to the existing apron, allowing for the simultaneous parking of four Cessna 208 Caravan aircraft.

Figure 5-23: Alternative 14 – Air Cargo Apron Expansion



Source: Mead & Hunt, Inc. (2014)

The primary advantage to consider with Alternative 14 is that sufficient parking area is provided for four Cessna 208 Caravan aircraft that can be parked simultaneously on the air cargo apron. This would eliminate the need for air cargo aircraft to be parked on the GA apron, thus creating additional space for itinerant GA aircraft parking. The primary disadvantage to consider with Alternative 14 is that removal of the air cargo apron (including the expansion), as well as the air cargo facility itself, may be necessary at the time of the construction of a future ultimate commercial airline terminal building area. While construction of a new commercial airline terminal building is not anticipated to be needed during the planning period, it is important to note that removal of any improvements to the air cargo apron and facility may be needed in the future.

Table 5-24 presents the advantage and disadvantage to consider with Alternative 14.

Table 5-24: Summary of Considerations – Alternative 14

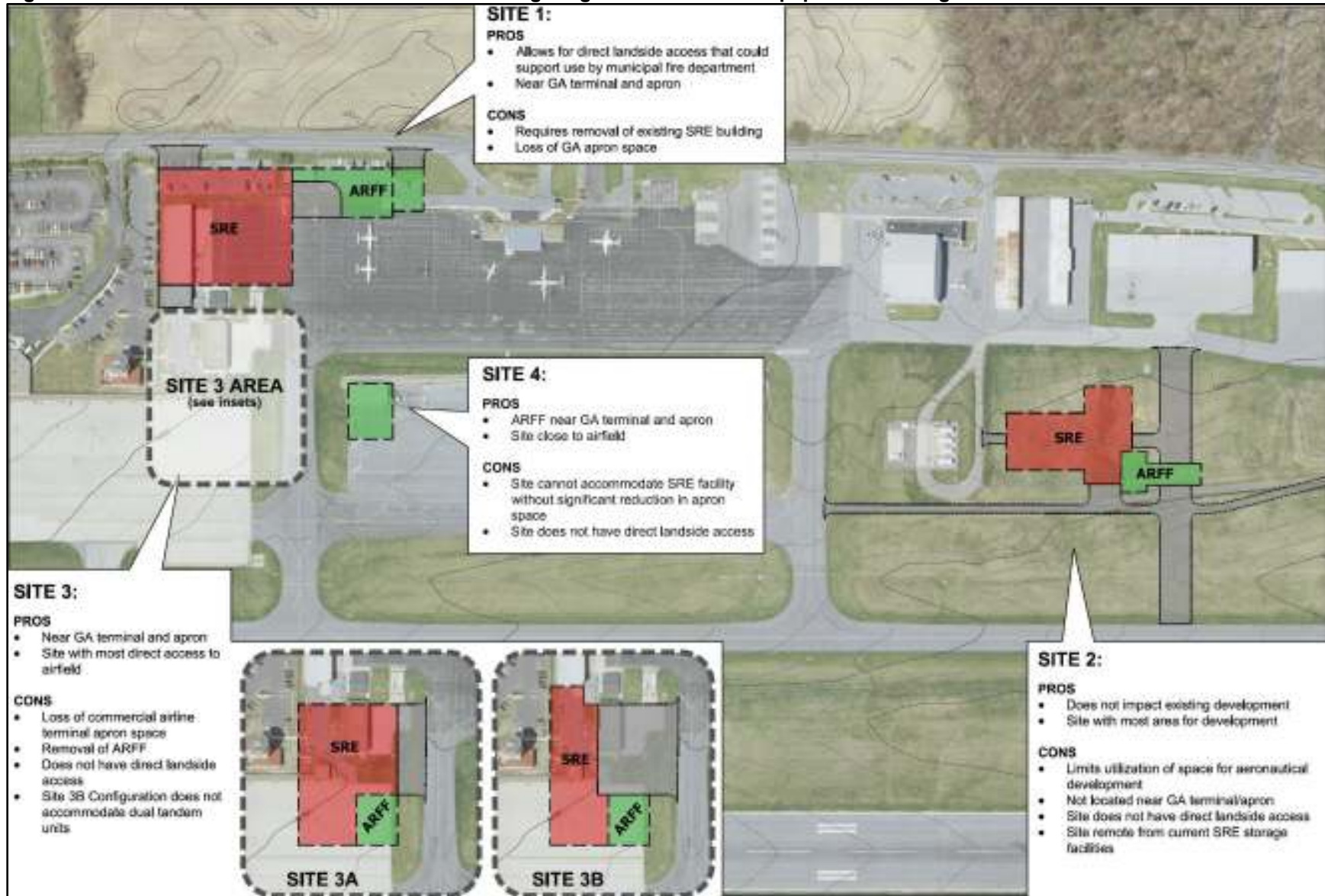
Advantage	Disadvantage
<ul style="list-style-type: none"> • Provides parking for four Cessna 208 aircraft 	<ul style="list-style-type: none"> • Removal of apron expansion and air cargo facility may be needed at time of construction of new commercial airline terminal building

5.11 Aircraft Rescue and Firefighting/Snow Removal Equipment Facility

As noted in the review of facility requirements, improvements are needed to the aircraft rescue and firefighting (ARFF) and snow removal equipment (SRE) buildings at the Airport. Each are undersized and provide inadequate space to meet the vehicle and equipment storage needs of firefighting and snow removal operations at the Airport. Based on a review of the needs and items that should be considered when planning for an ARFF facility (FAA AC 150/5210-15A, *Aircraft Rescue and Firefighting Station Building Design*) and an SRE facility (FAA AC 150/5220-18A, *Buildings for Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials*), four potential sites were identified for the construction of new ARFF and SRE facilities, which are illustrated in **Figure 5-24** (Alternative 15).

The combination of ARFF and SRE equipment storage needs into a single facility offers both construction and operational cost efficiencies as well as the benefits of providing a centralized location for crews to quickly access vehicles when transitioning between the removal of snow and firefighting duties since Airport personnel are responsible for completing both functions. Combining both elements into the same structure also reduces the footprint necessary for each facility since some design elements, such as crew work areas, a training room, locker rooms, bathrooms, and break rooms could be shared. Based on the needs for each facility and the areas available on the Airport for development, a number of ARFF and SRE alternatives were prepared. The following section reviews the development options identified for each site and discusses the advantages and disadvantages that should be considered with each.

Figure 5-24: Alternative 15 – Aircraft Rescue and Firefighting / Snow Removal Equipment Building Alternatives



Source: Mead & Hunt, Inc. (2014)

Site 1 – Site 1 proposes to construct a consolidated ARFF/SRE facility on a site occupied by the existing SRE facility. Removal of the existing SRE facility, as well as a portion of the GA apron, would be necessary to implement this alternative. The ARFF portion of the facility would be positioned so that vehicles could enter the facility from an existing access road leading from the commercial airline terminal apron and exit the facility onto the GA apron. An extension or wing of the facility along Fox Hill Road would house ARFF vehicles and equipment while also allowing for direct landside access should bays in the facility be configured to also house community structural firefighting vehicles.

Site 1 has the advantage to be configured so that a municipal fire department could share space in the ARFF portion of a new facility to improve firefighting response in the surrounding community. This building configuration could also support Airport operations since mutual aid would be readily available in the event of an emergency. Likewise, an advantage to consider with Site 1 is that it is located near the GA terminal building and apron where Airport staff are often located, reducing the time necessary for them to respond to ARFF and SRE vehicles in the event of an emergency. Site 1 also utilizes land that has been currently disturbed for Airport development, reducing the need to build on undisturbed land. Removal of the existing SRE facility and a loss of GA apron space are disadvantages that should be considered with this alternative.

A summary of the advantages and disadvantages to consider with Site 1 are presented in **Table 5-25**.

Table 5-25: Summary of Considerations – ARFF/SRE Alternative Site 1

Advantages	Disadvantages
<ul style="list-style-type: none"> • Allows for direct landside access that could support use by a municipal fire department • In close proximity to GA terminal and apron • Reduces need to build on undisturbed land 	<ul style="list-style-type: none"> • Requires removal of existing SRE building • Loss of GA apron space

Site 2 – Construction of a consolidated ARFF/SRE facility is proposed at Site 2 located adjacent to the fuel farm between the corporate hangar taxiway and Taxiway A. In addition to a facility that could support the vehicle and equipment storage needs of both ARFF and SRE operations, construction of access roads to the airfield and existing airside service road are also proposed with this development option. ARFF and SRE vehicles in this alternative would have the ability to enter and exit the facility in a single direction, eliminating the need for drivers to back into designated parking spaces.

An advantage to consider with Site 2 is that this location offers the most area for development, allowing for an adequately sized facility to be constructed without space limitations. Site 2 also offers the advantage of a new ARFF/SRE facility to be constructed without impacting or removing existing Airport infrastructure such as buildings, access roads, and hangars. A disadvantage with Site 2 is that the location is not near the GA terminal/apron area, which would increase response times for crews to access the facility from this area, and would increase impermeable surfaces at the Airport. Since the existing SRE facility would likely be maintained to store maintenance and SRE equipment, the distance between these sites is another disadvantage to consider if staff members need to transition frequently between the two facilities for vehicles, parts, and equipment. Likewise, the site does not provide direct landside access, which would be

desired if the facility were to be used by a municipal fire department. Finally, construction of a consolidated ARFF/SRE facility at Site 2 would limit the area that would be available for the construction of additional apron space and hangars, as well as limit options for a relocated route of Taxiway D to correct its non-standard longitudinal grade.

Advantages and disadvantages to consider with Site 2 are summarized in **Table 5-26**.

Table 5-26: Summary of Considerations – ARFF/SRE Alternative Site 2

Advantages	Disadvantages
<ul style="list-style-type: none"> • Does not impact existing development • Site with the most area for development 	<ul style="list-style-type: none"> • Limits utilization of space for future aeronautical development • Not located near GA terminal and apron • Increases impermeable surfaces at the Airport • Site does not have direct landside access • Site remote from current SRE storage facilities

Site 3 – Two concepts (Site 3A and Site 3B) are illustrated at Site 3, which is occupied by the existing ARFF facility and a portion of the terminal apron. Site 3A proposes a consolidated ARFF/SRE facility that would permit SRE vehicles to drive through the facility through an entrance on the commercial airline terminal apron and exit the facility onto Taxiway C. The ARFF portion of the facility would occupy a corner section of the building and could be configured so that a dispatch center/snow desk overlooks the airfield on a second story over the ARFF vehicle bays.

Site 3B proposes the construction of a consolidated ARFF/SRE facility that would be connected to the existing SRE facility. Offering slightly less storage capacity than the building proposed by the alternative developed for Site 3A, Site 3B could still be configured so that SRE vehicles could drive-through the facility, entering at the commercial airline terminal apron and exiting onto Taxiway C. This building configuration would also include a wing dedicated to the storage of ARFF equipment that could be designed to incorporate a dispatch center/snow desk to also overlook the airfield on a second story above the ARFF vehicle bays.

Site 3A and Site 3B offer the advantage of being located near the GA terminal building and apron so that Airport staff members can quickly access ARFF and SRE equipment in the event of an emergency if completing other tasks. Site 3A and Site 3B also provide the most direct access to the airfield, decreasing the response time of ARFF vehicles responding to airfield emergency situations. Site 3A and Site 3B also promote sustainable building use since the existing SRE facility could be incorporated into the design of the new SRE facility.

A disadvantage to consider with Site 3A and Site 3B is that a loss of commercial airline terminal apron space would be necessary to implement either of the building configurations. Also, implementation of the building configurations shown for Site 3A and Site 3B would require the removal of the existing ARFF

facility, eliminating the possibility of using this structure for the storage of other Airport equipment and materials. When considering an ARFF facility that could share its use with a municipal fire department, Site 3A and Site 3B do not offer direct landside access, which discourages this shared use of the building. A final disadvantage to consider with Site 3B is that the footprint of the building is not large enough to accommodate dual tandem SRE units, which require additional storage space for single function SRE vehicles.

Site 3 advantages and disadvantages to consider are summarized in **Table 5-27**.

Table 5-27: Summary of Considerations – ARFF/SRE Alternative Site 3

Advantages	Disadvantages
<ul style="list-style-type: none"> • Near GA terminal and apron • Site with most direct access to airfield • Incorporates existing SRE facility in design of new SRE facility 	<ul style="list-style-type: none"> • Loss of commercial airline terminal apron space • Removal of existing ARFF facility • Does not have direct landside access • Site 3B configuration does not accommodate dual tandem SRE vehicles

Site 4 – Site 4 proposes the construction of a dedicated ARFF facility on the deicing apron at a site in the corner occupied by an existing deicing equipment storage structure. It should be noted that this alternative does not include an SRE component at the site and would require that an additional structure be constructed to meet these vehicle and equipment storage needs. Site 4 offers the advantage of being close to the GA terminal and apron so that Airport staff can quickly mobilize ARFF vehicles when conducting other Airport tasks in the event of an emergency. The site is also close to the airfield, which reduces the travel time of ARFF vehicles responding to emergencies. The most significant disadvantage to consider with Site 4 is that the site does not accommodate SRE vehicles without significantly reducing apron space. Since an SRE facility would also need to be constructed if this alternative were implemented, staffing and operation efficiencies that are gained with a consolidated ARFF/SRE facility would not be realized. Finally, Site 4 does not provide direct landside access, which would not be desirable if the Airport were to consider operating an ARFF facility shared by a municipal fire department.

The advantages and disadvantages to consider with Site 4 are summarized in **Table 5-28**.

Table 5-28: Summary of Considerations – ARFF/SRE Alternative Site 4

Advantages	Disadvantages
<ul style="list-style-type: none"> • ARFF near GA terminal and apron • Site close to airfield 	<ul style="list-style-type: none"> • Site cannot accommodate SRE facility without significant reduction in apron space • Site does not have direct landside access

It is interesting to note that each of the four sites has its own unique advantage and disadvantage to consider; as such, there is not an ideal site that accommodates all of the firefighting and snow removal

equipment needs at the Airport. With that taken into consideration, it appears that Site 3 is best location for the construction of a new ARFF/SRE facility. The site's centralized location in close proximity to existing Airport facilities while allowing for an adequately sized facility to be constructed to meet firefighting and SRE storage needs are the primary advantages to consider with this alternative. Site 3 also proposes the reuse of the existing SRE facility in the design of the new facility, which promotes the sustainable use of existing Airport buildings. Other advantages to consider include:

- **Continued Use of Existing SRE Facility** – While removal of the existing ARFF building would be necessary to implement construction of an ARFF/SRE facility at Site 3, the existing SRE facility could continue to be used for storage of other Airport maintenance equipment. Construction of a building as proposed by the alternative prepared for Site 3B that connects to the existing SRE facility could be implemented so that staff could easily access all firefighting, snow removal, and maintenance equipment.
- **Most Direct Airfield Access** – Site 3 offers the most direct access to the airfield, which is an important advantage to consider given that ARFF vehicles responding to an aircraft emergency are required to begin application of extinguishing agent within three minutes from the time of alarm. Direct airfield access is also an important consideration for snow removal operations as it allows vehicles quick and efficient access to the airfield for the timely removal of snow and ice contamination from pavement surfaces.

While Site 3 appears to be the preferred location for the construction of a new ARFF/SRE facility, it does not provide direct landside access and thus would not be a favorable location to share the function of the building with a municipal fire department so that fire services could be provided to the surrounding area. Likewise, the possible loss of commercial airline terminal apron space to implement this alternative is another disadvantage to consider. Although these disadvantages are important to consider, it is recommended that Site 3 be considered as the preferred location to construct a new ARFF/SRE facility to meet the Airport's firefighting and SRE storage needs. A concept budget report (CBR) should be conducted prior to the design and construction of a consolidated ARFF/SRE facility to further evaluate the feasibility of this site and to conceptualize potential building layouts as well as to prepare detailed cost estimates. In addition, opportunities to incorporate sustainable building practices, such as the installation of water-saving features as well as the use of renewable and/or alternative energy sources should also be evaluated.

5.12 Summary of Recommended Alternatives

Overall, the Airport is well positioned to be able to expand and improve its infrastructure so that the demands of its users are met throughout the next 20 years. The following summarizes the recommended alternatives that should be considered to address these needs. Again, it should be noted that the selection of the recommended alternatives are based on the most logical option to address a facility need, or what was considered to be the best option in comparison with operational, economic, environmental, sustainable, and implementation factors of other alternatives prepared for a facility need.

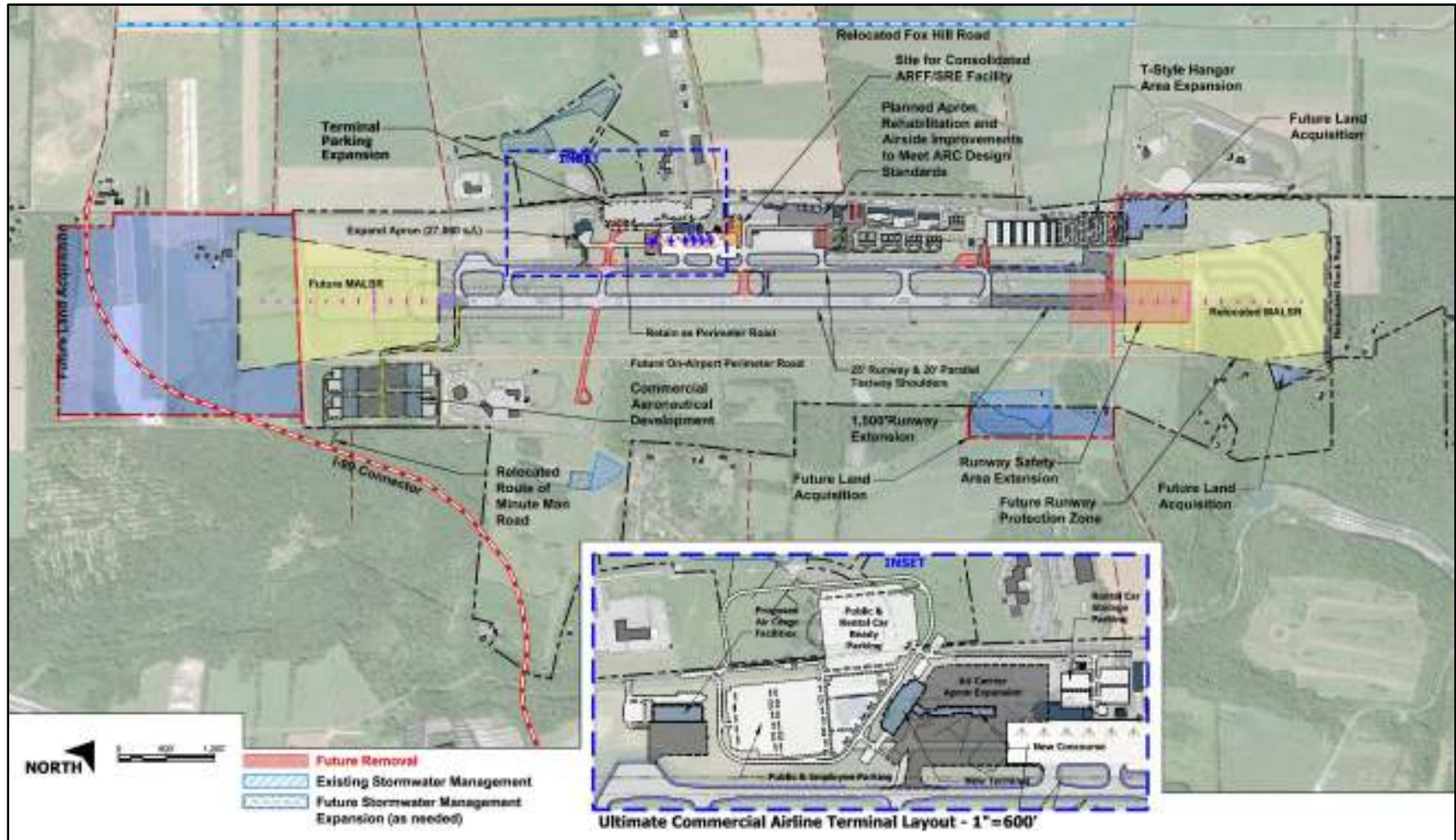
A graphic summary of the recommended alternatives to address the Airport's facility needs is presented in **Figure 5-25** on Page 66.

- **Runway 6/24** – It is recommended that Runway 6/24 be extended 1,500 feet at the approach end of Runway 24 to meet the runway length demands of aircraft that could potentially operate on the surface over the next 20 years.
- **Crosswind Runway** – Due to a number of environmental and financial challenges, in addition to other Airport development plans and infrastructure needs, it is not recommended that the former crosswind runway, Runway 16/34, be reopened.
- **Taxiway System** – The following improvements are recommended for the taxiway system:
 - Construction of 20-foot-wide paved shoulders on Taxiway A and associated connector taxiways that could receive operations from TDG-4 aircraft.
 - Changes in the geometry of fillets at taxiway intersections to be utilized by TDG-4 aircraft to meet FAA design standards.
 - The closure and relocation of Taxiway C between Runway 6/24 and parallel taxiway A to remove direct access to Runway 6/24 in accordance with FAA design standards.
 - The closure and relocation of Taxiway H between the T-style hangar area and parallel Taxiway A to remove direct access to Runway 6/24 in accordance with FAA design standards.
 - The removal of pavement surfaces associated with the former crosswind runway (Runway 16/34) to the north of parallel Taxiway A and to the south of Runway 6/24.
 - Construction of a new connector taxiway between the air cargo apron and parallel Taxiway A so that direct access is not provided to Runway 6/24.
 - The closure and relocation of Taxiway D to improve the longitudinal grade of this surface to meet airfield design standards.
- **Ultimate Commercial Airline Terminal Building** – While it does not appear construction of a new commercial airline terminal building will be needed to meet the demand that is anticipated for the planning period, it is recommended that the terminal area layout be carried forward for long-term planning purposes.
- **Commercial Airline Terminal Apron** – It is recommended that existing aircraft parking positions on the commercial airline terminal apron be reconfigured to accommodate the demand for the types of commercial airline aircraft that can be anticipated for the planning period. In addition, it is recommended that parking positions be configured so that commercial airline boarding bridges can be installed. It should be noted that an expansion of the apron may be necessary to accommodate the construction of a new ARFF/SRE facility.
- **Landside Access** – It is recommended that planning be initiated for a connector roadway between the Innovation Park exit on Interstate 99 and the intersection of Bernel Road/Fox Hill Road to

improve landside access to the Airport. In addition, planning should be initiated for the relocation of Fox Hill Road to accommodate the ultimate commercial airline terminal building for when demand is realized for this facility.

- **Commercial Airline Terminal Vehicle Parking** – It is recommended that the Airport plan for the expansion of the existing long-term vehicle parking lot to the south of Fox Hill Road to accommodate the increase in demand for parking that is anticipated for the planning period.
- **GA Development** – Additional box-style hangars, an expansion of apron area, and a reconfiguration of Taxiway D to meet longitudinal grading standards are needed within the GA development area; to accommodate these improvements, it is recommended that the layout proposed by GA Development Alternative 2 be implemented. GA Development Alternative 7, which proposes to increase T-style hangar units at the Airport, and GA Development Alternative 8, which proposes to establish an area for future aeronautical-related development, are also recommended to be implemented.
- **Air Cargo Apron** – An expansion of the air cargo apron to the southwest so that two additional Cessna 208 aircraft parking positions can be accommodated is recommended to meet the demand that is projected for the planning period.
- **ARFF/SRE Facility** – A site occupied by the existing ARFF facility and extending onto the commercial airline terminal apron is recommended as the location for the construction of a consolidated ARFF/SRE facility.

Figure 5-25: Summary of Recommended Alternatives



Source: Mead & Hunt, Inc.