

Appendix B

Long-Term Concept Sketch Plan

Missoula International Airport
Master Plan Update & Other Services

Long-Term Concept Sketch Plan
An early and separate analysis of the airport Master Plan
to support time-sensitive airport decisions

Prepared for:
Missoula County Airport Authority
January 2008

Prepared by:
CH2M HILL

in association with
HIRSH Associates

Introduction

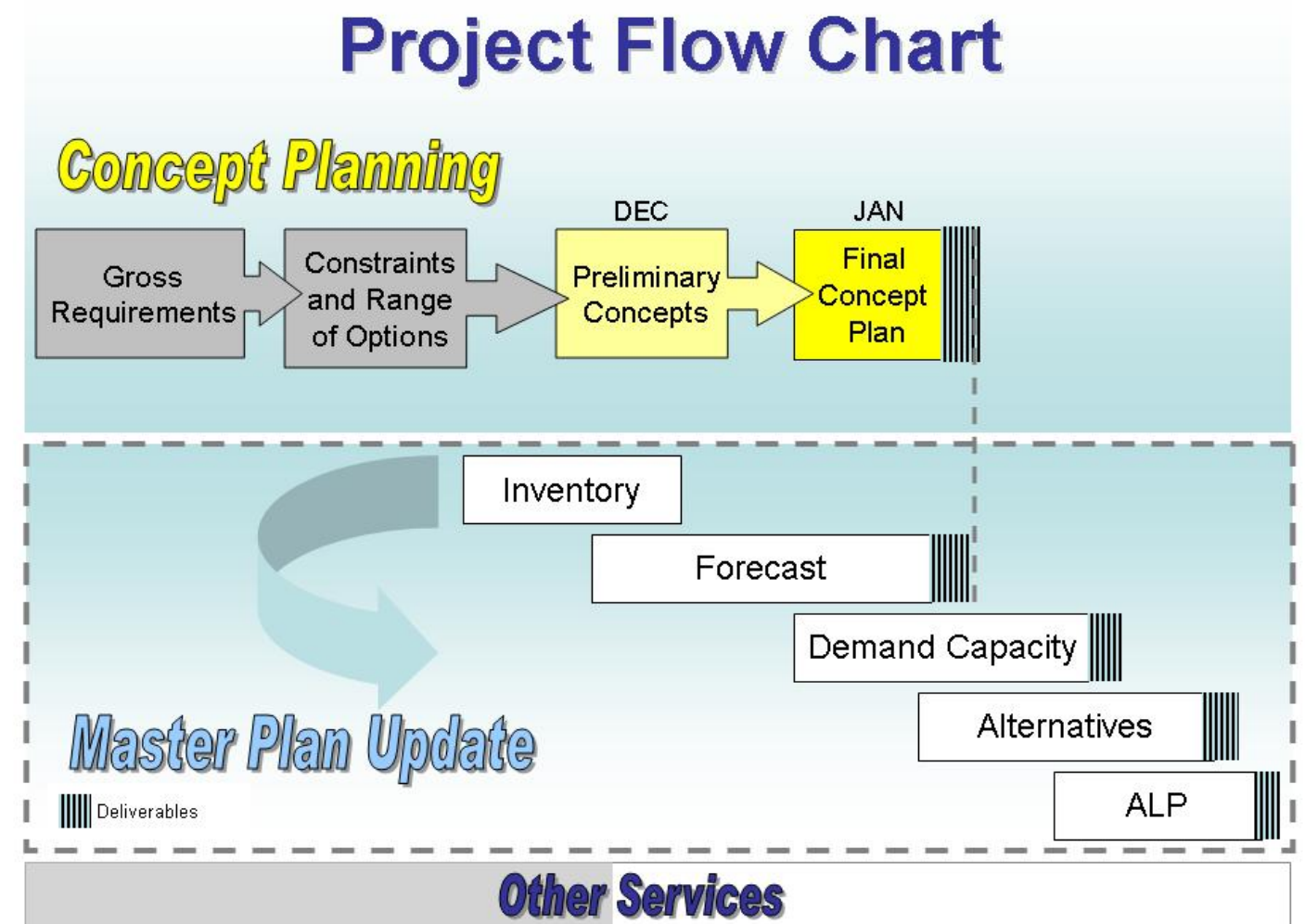
The consultant team and key airport staff participated in two workshop sessions to develop preliminary long-term airfield concepts. Following these workshop sessions, long-term general aviation (GA) and terminal concepts were developed. The sketches included in this document represent a general range of long-term options reflecting input from Missoula County Airport Authority (MCAA) staff and the Master Plan Study Resource Committee (SRC). The consultant team also met with several representatives from the GA community. These concepts are general in nature and do not necessarily represent the alternatives to be refined and analyzed as part of the ongoing Master Plan Update (MPU). The sketch planning process is a fast-track effort, allowing early MCAA decision making, and considers an unspecified "long-run" horizon, without the benefit of an updated forecast. The Long-term Concept Sketch Plan is a parallel effort with the Missoula International Airport (MSO) MPU, as shown in Figure 1. The Master Plan Update will entail detailed projections, capacity analysis, and will confirm and refine the sketch planning findings. A risk of the fast-track sketch planning process is that subsequent detailed analysis will result in changes, possibly significant changes.

In this sketch plan, airfield layouts are presented and refined first, followed by the refinement of multiple terminal layouts. Finally, a range of GA layouts are presented and refined, and those layouts selected for further evaluation are then detailed with short-term and long-term development.

Purpose of this Sketch Plan

The purpose of this document is to identify a viable range of long-term airfield, terminal, and GA land uses for MSO, in order to allow informed decision making regarding short-term and intermediate growth opportunities.

Figure 1 - Project Flow Chart



What's Changed Since the 1996 Master Plan:

- Missoula County population has grown from 87,130 (1995) to over 101,417 (2005)¹
- Operations by regional jets such as the Canadair Regional Jet and the Embraer 175 have increased and currently make up the majority of operations at MSO, while operations by larger narrow-body jets such as the Boeing 757 have decreased significantly
- Due to changing FAA guidance, Runway Safety Area (RSA) compliance is more critical than ever
- The MSO terminal security enhancement and expansion was completed
- The FAA and other organizations continue to project growth in overall passenger volumes
- GPS-based approach technology is being implemented nationwide

MCAA's Role/ Objectives

1. To maintain overall passenger convenience and the small, local airport feel.
2. Maintain a competitive cost per enplanement.
3. To meet the needs of commercial airlines, USFS contractors, corporate, and general aviation.

¹ <http://quickfacts.census.gov/qfd/states/30/300631k.html>

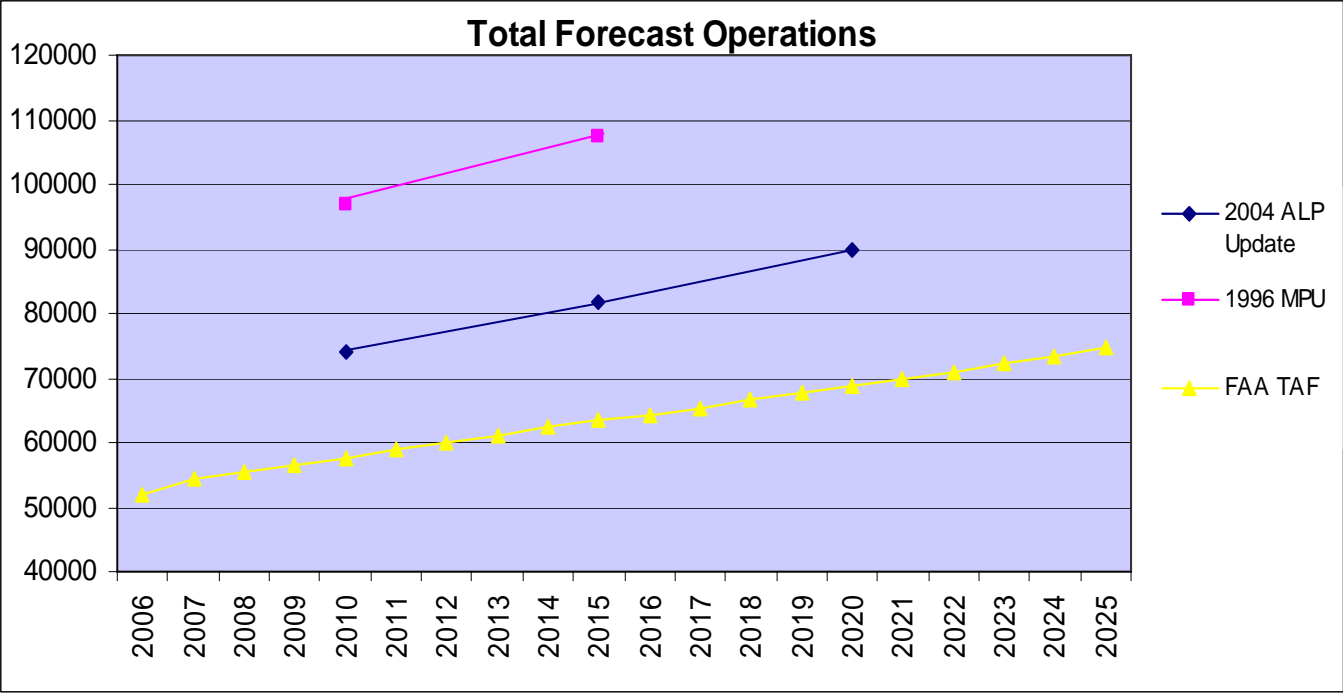
4. To develop a solid long-range plan that reserves space to allow MSO to meet future aviation demand.

5. To consider environmental and community issues, and to avoid, minimize, and mitigate any impacts.

Potential Future Demand

The following two graphs show enplanement and operation levels at MSO, forecast in the:

- 1996 Master Plan Update
 - 2015 Enplanements - 404,000
 - 2015 Operations - 107,000
- 2004 ALP Update
 - 2020 Enplanements - 449,000
 - 2020 Operations - 90,000
- FAA Terminal Area Forecast (TAF)
 - 2025 Enplanements - 460,000
 - 2025 Operations - 75,000



Existing enplanement levels put MSO in this league of airports:

- Daytona Beach International - 277,000 in 2006
- Jackson Hole - 264,000 in 2006
- Lansing Capital City - 304,000 in 2006

Future enplanement levels put MSO in this league of airports:

- Newport News/Williamsburg International - 513,000 in 2006
- Baton Rouge Metropolitan - 527,000 in 2006
- White Plains - 510,000 in 2006

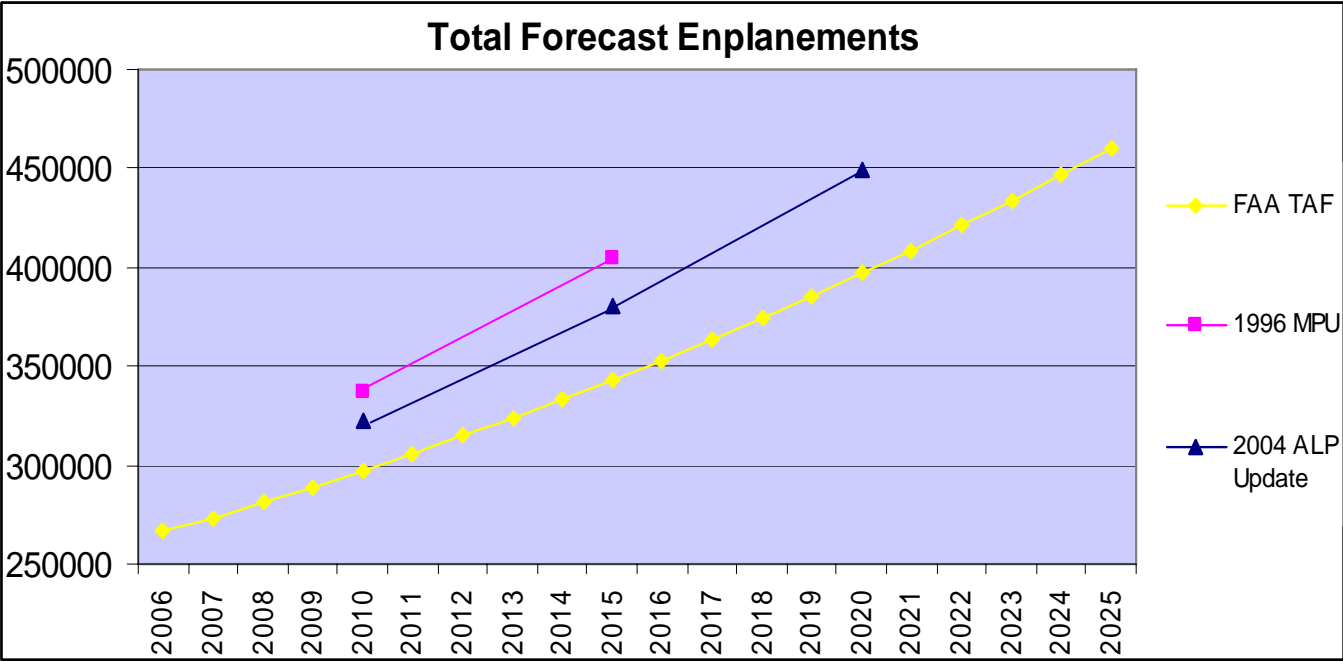
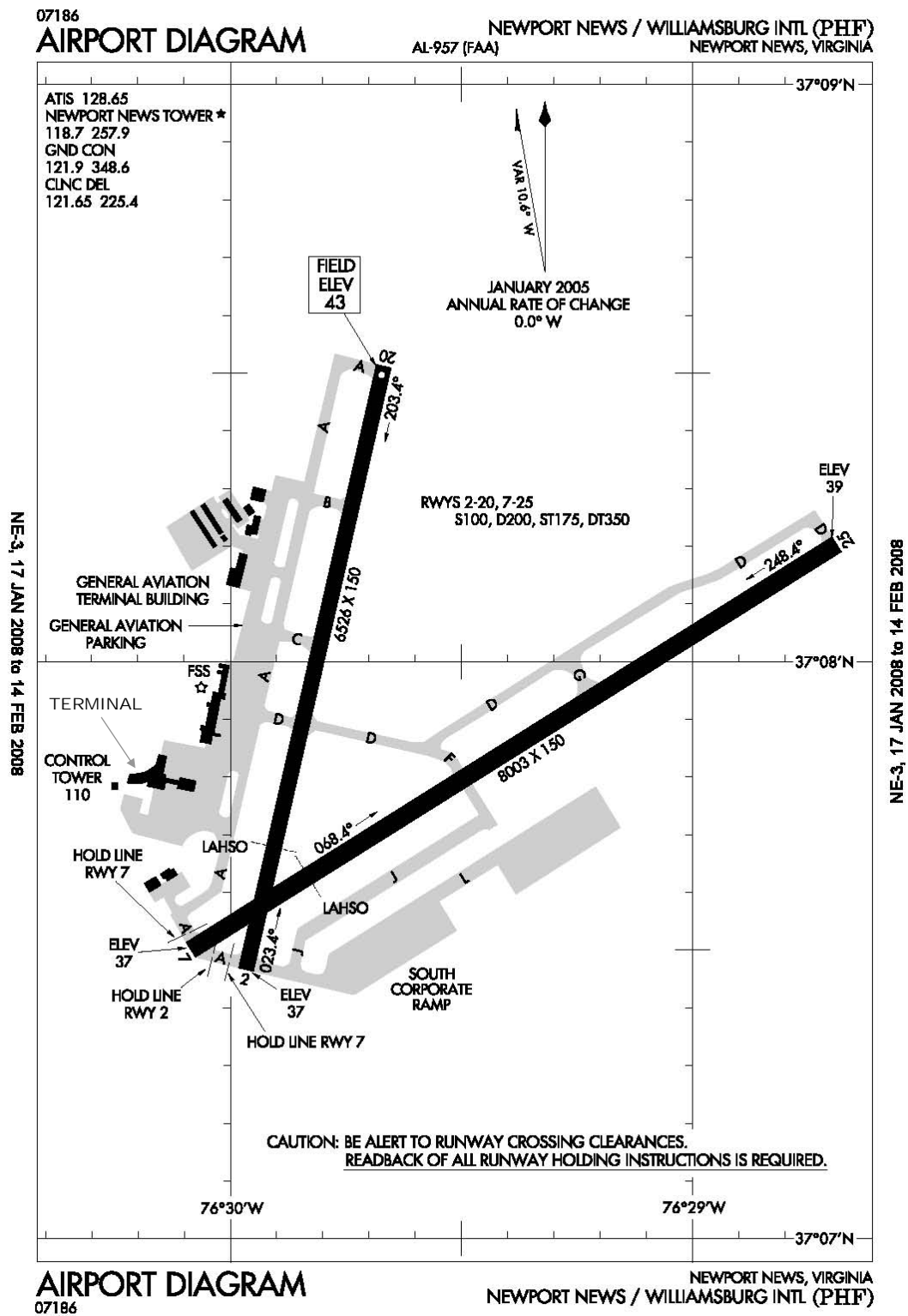
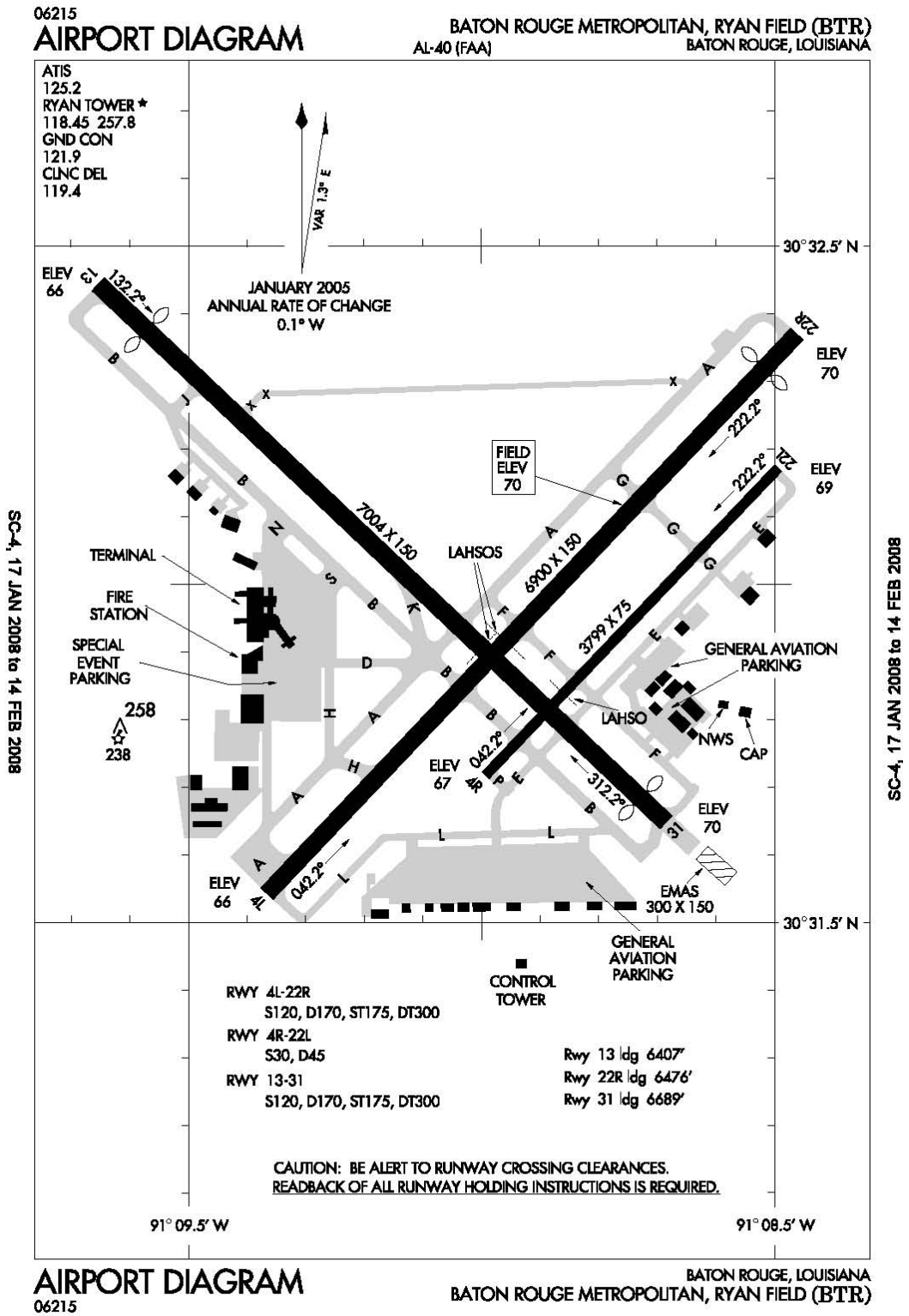


Figure 2 provides basic layouts of these airfields which represent MSO forecast enplanement levels.

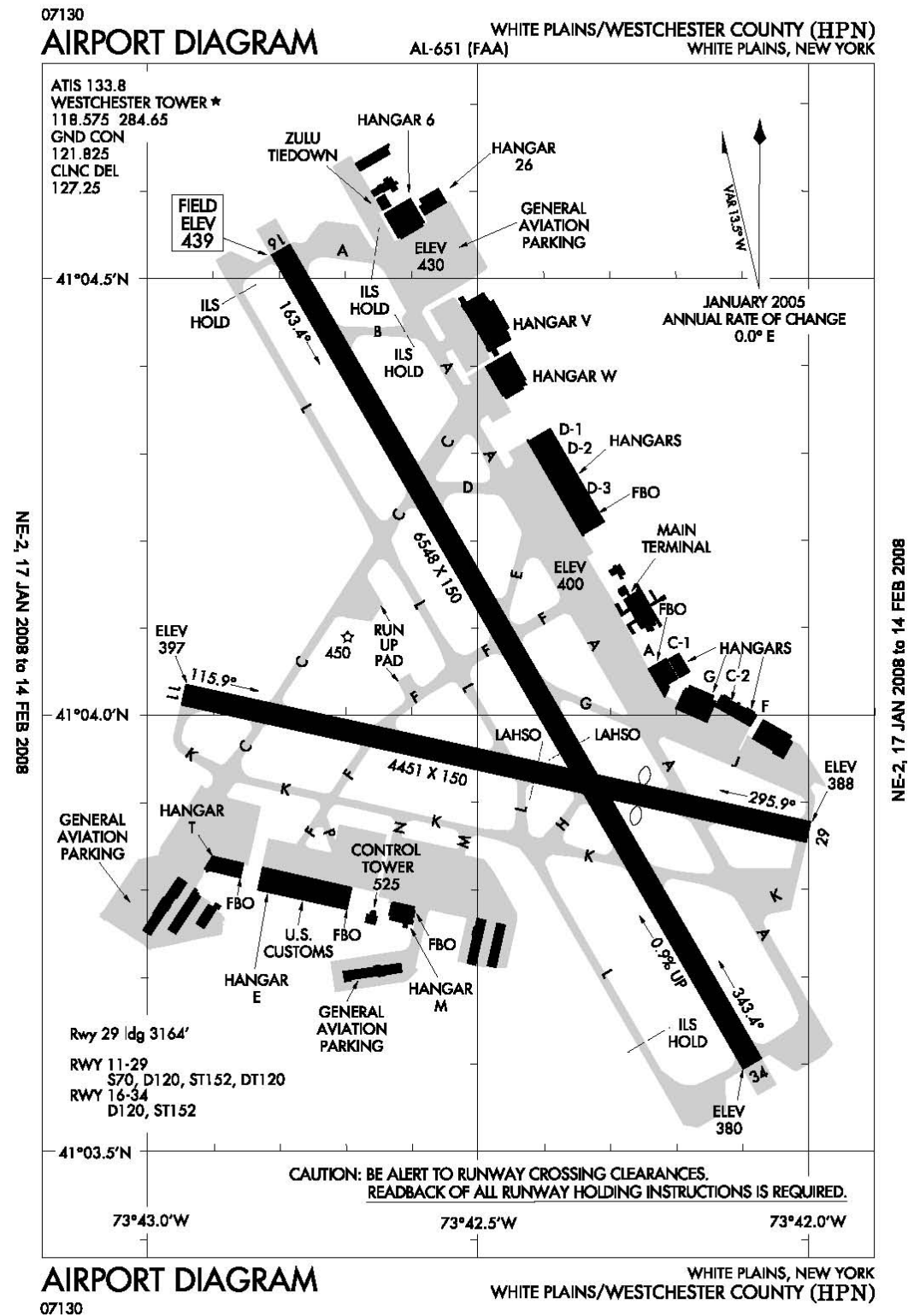
Figure 2 - Airport Diagrams with Similar Enplanement Levels as MSO



Newport News - 513,000 Enplanements (2006)



Baton Rouge - 527,000 Enplanements (2006)



White Plains - 510,000 Enplanements (2006)

What Would it Take to Accommodate Such Growth?

- Roughly double the terminal size
- Roughly double the number of air carrier gates from 5 to 8-10
- Examine runway length needs for the existing runways and any future runways
- Provide capacity enhancements, including additional runway capacity

Separations between parallel runways:

— Good Capacity Enhancement: 700 to 1,200 feet – Minimum separation between parallel runway centerlines for simultaneous landings and departures under VFR (includes parallel TWY)

Better Capacity Enhancement: 2,500 to 3,000 feet – Minimum separation between parallel runway centerlines for simultaneous radar arrivals and departures

Best Capacity Enhancement: 3,400 to 4,300 feet - Provides the airport with simultaneous precision instrument radar approaches, and departures

How Does This Compare to the 2004 Airport Layout Plan Update?

Recommendations from 2004 Airport Layout Plan Update:

- Maintain primary Runway 11/ 29 at 9,501 feet
- Construct 6,000 foot parallel Runway 11R/ 29L with 3,800 foot separation
- Decommission crosswind Runway 7/ 25
- Expand terminal building at existing location

Hard Site Constraints

- Existing site location - planning will not explore new airport location concept
- I-90 and Highway 10 represent significant boundaries to the north
- High terrain in the vicinity limits the number of new instrument approaches
- Community east of the airport is growing toward the airport, western development is expected long-term

Additional Considerations

- Utilities do not exist on the southwest side of the airfield, but will be brought there with construction of the new ATCT (approximately 2010)
- GA is located in three separate areas
- Proposed County road (Wye Mullan West Comprehensive Area Plan, adopted November 16, 2005) around the Airport could require airport property and also open up new access to the airport
- Terminal frontal enhancement road will provide access to the newest portion of the airport terminal building and require the demolition and replacement of GA T-hangars
- Demand for additional GA facilities exists today
- Parking requirements (with parking expansion in 2009) meet or exceed maximum capacity during peak periods
- Aircraft apron space near terminal is becoming constrained due to expansion of rental car facilities

- The VOR will be decommissioned within the planning period
- Terminal building consists of many additions, creating more than usual maintenance and upkeep, and limiting building reconfiguration options

AIRFIELD DEVELOPMENT

Airfield Development Concepts

Eleven airfield development concepts, along with key pros and cons for each are shown in Figures 3 through 13:

- 1. No Build Concept
- Crosswind Runway Concepts
 - 2. Shift crosswind, maintain intersection
 - 3. Shift crosswind, remove runway intersection
 - 4. Widen and extend crosswind runway
 - 5. Relocate and extend crosswind, Runway 29 end
 - 6. Relocate and extend crosswind, Runway 11 end
 - 7. Reestablish old crosswind
- Parallel Concepts
 - 8. Dependent (700'-1,200' separation)
 - 9. Less dependent (2,500'-3,000' separation)
 - 10. Independent (3,400'-4,300' separation)
- Eliminate Crosswind
 - 11. Reverse runway roles (2,500'-3,000' separation)

Figure 3 - No Build Concept

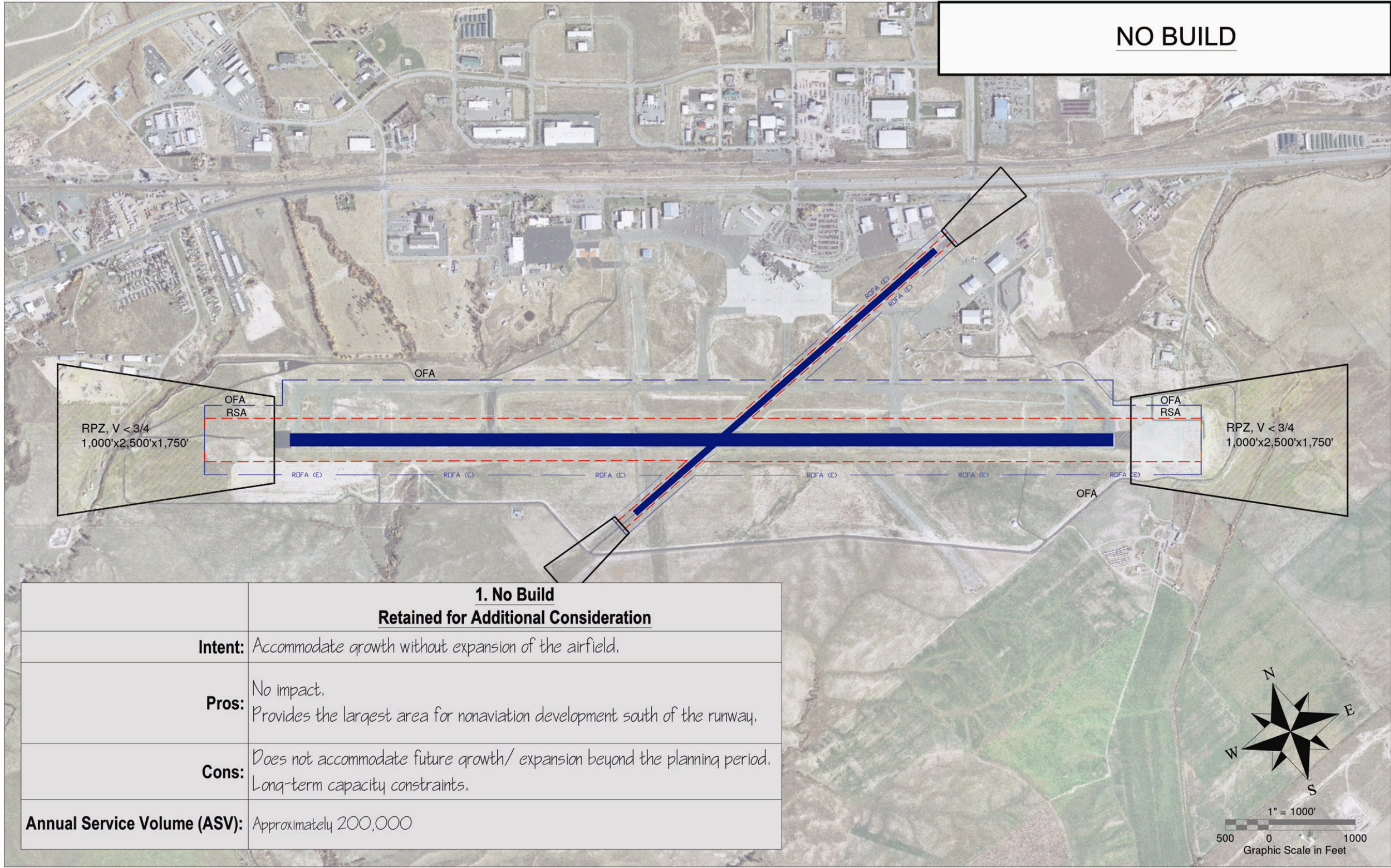


Figure 4 - Shift crosswind, maintain intersection

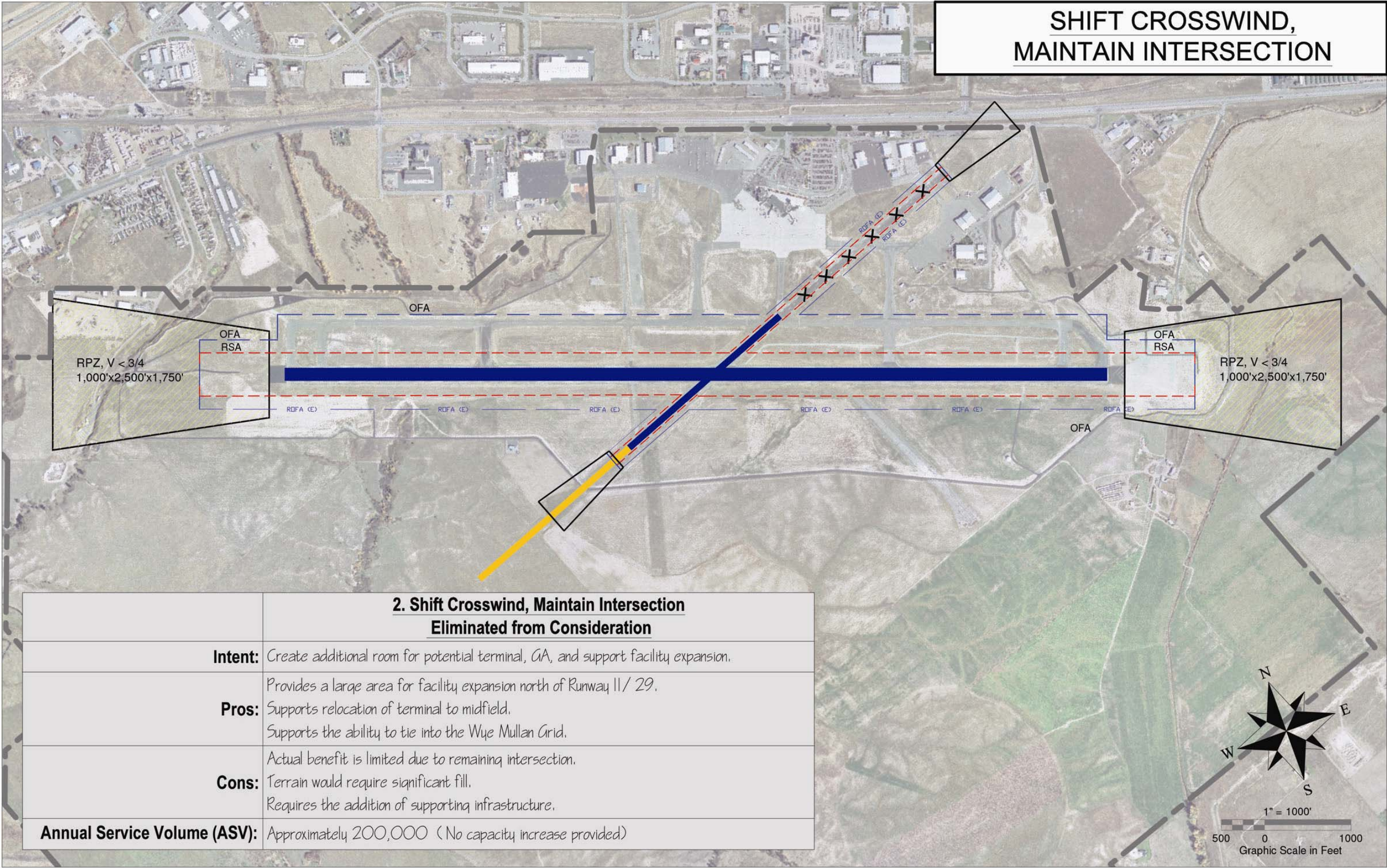


Figure 5 - Shift crosswind, eliminating intersection

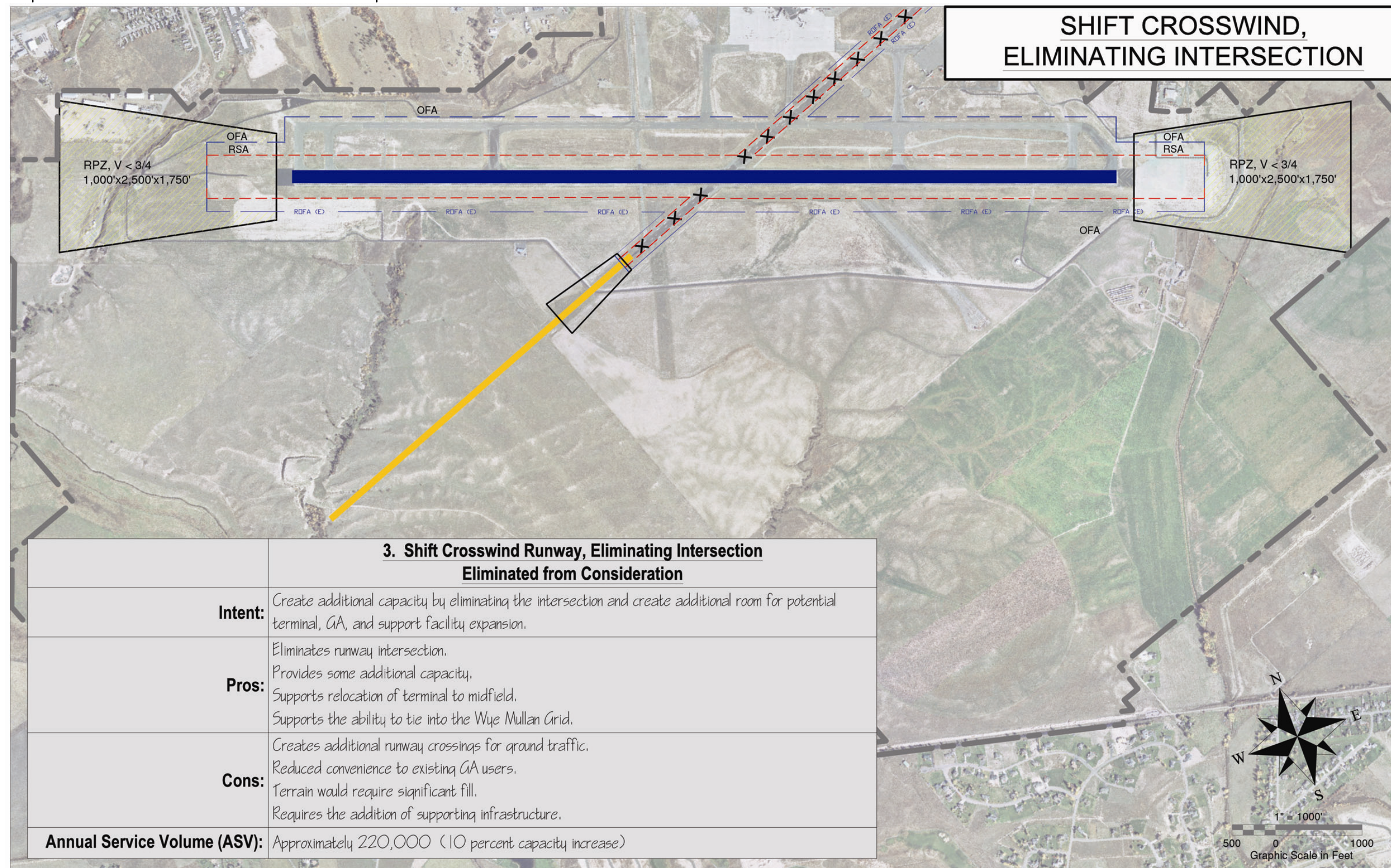


Figure 6 - Widen and extend crosswind

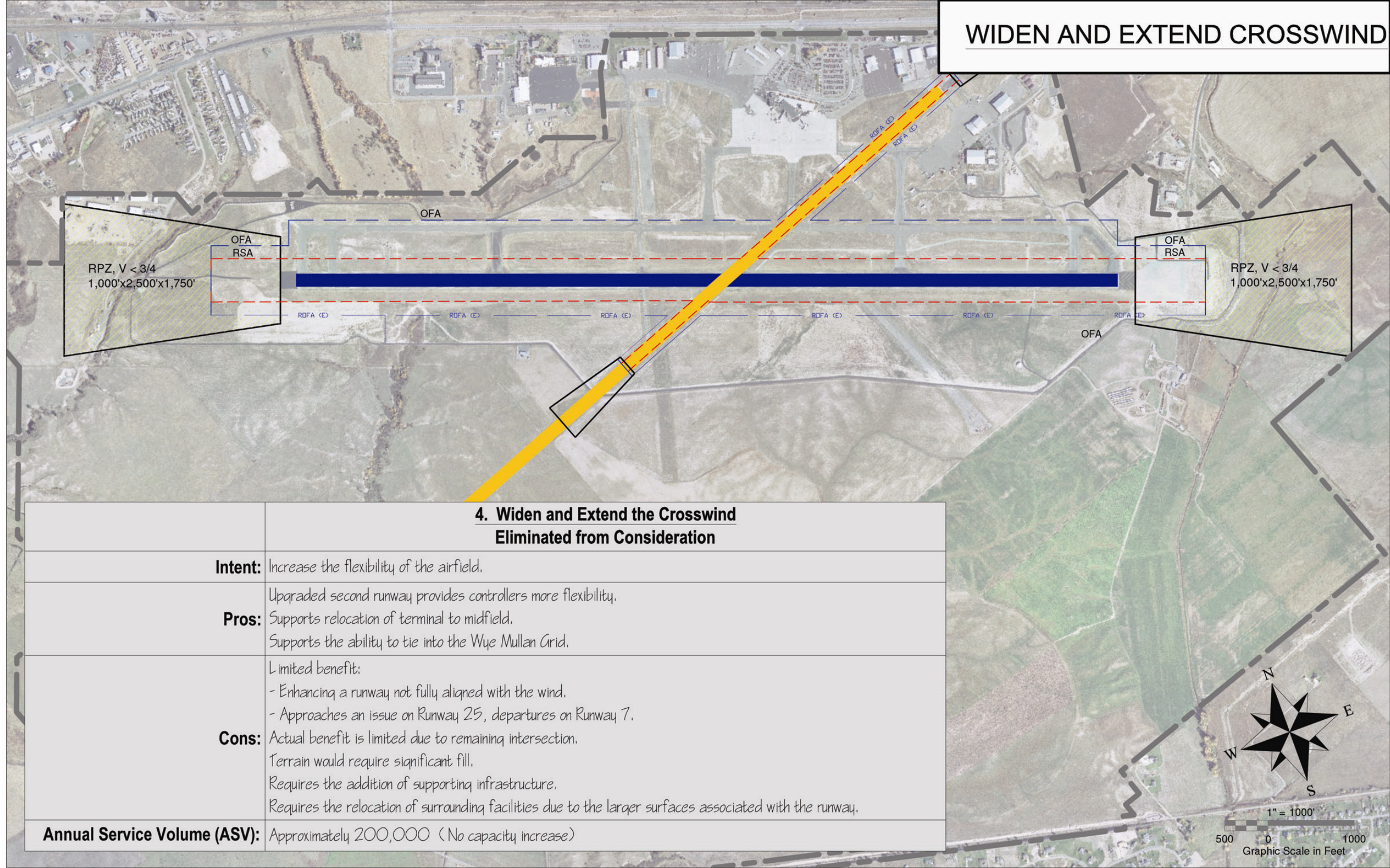


Figure 7 - Relocate and extend crosswind, Runway 29 end

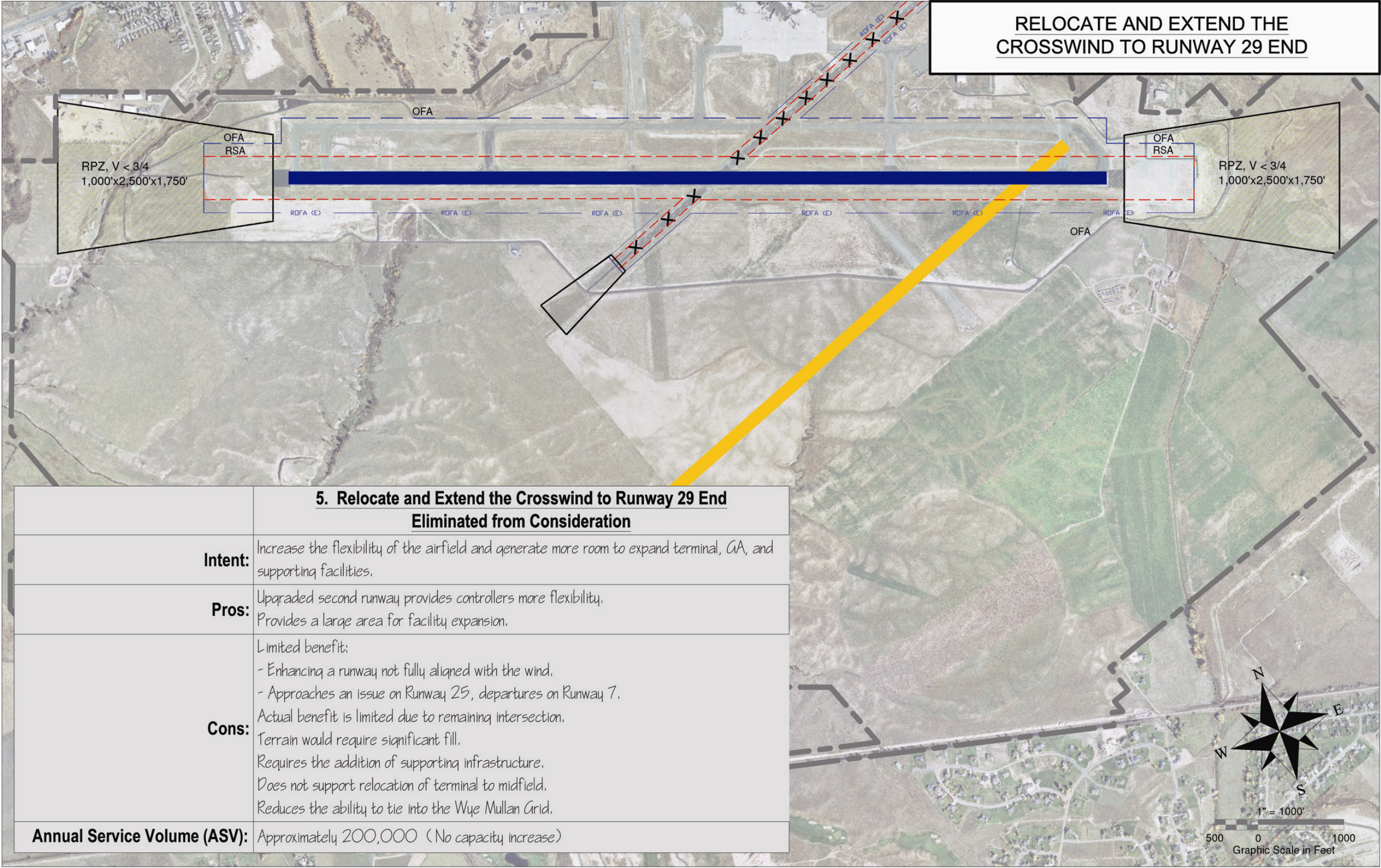


Figure 8 - Relocate and extend crosswind, Runway 11 end

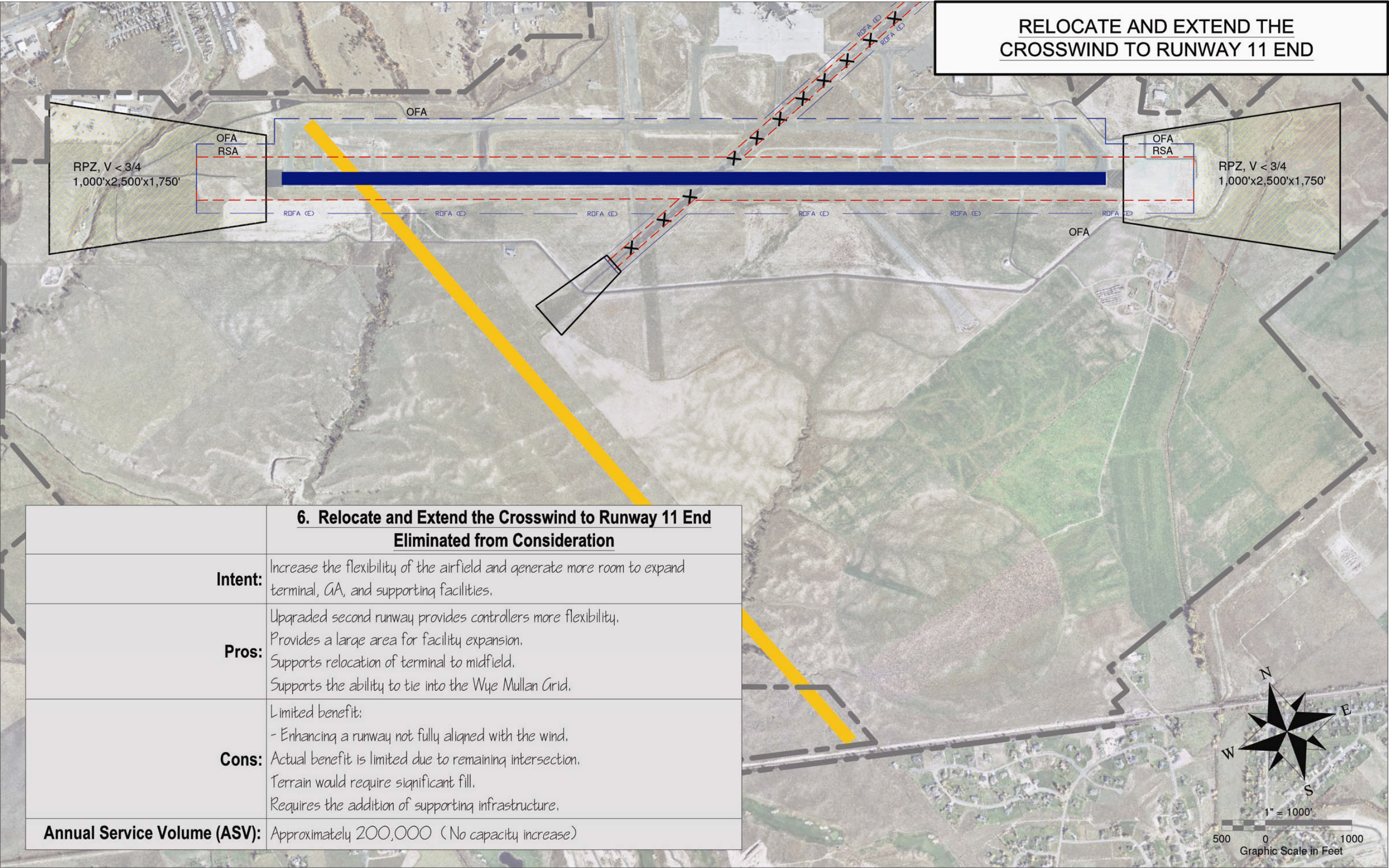


Figure 9 - Commission old crosswind

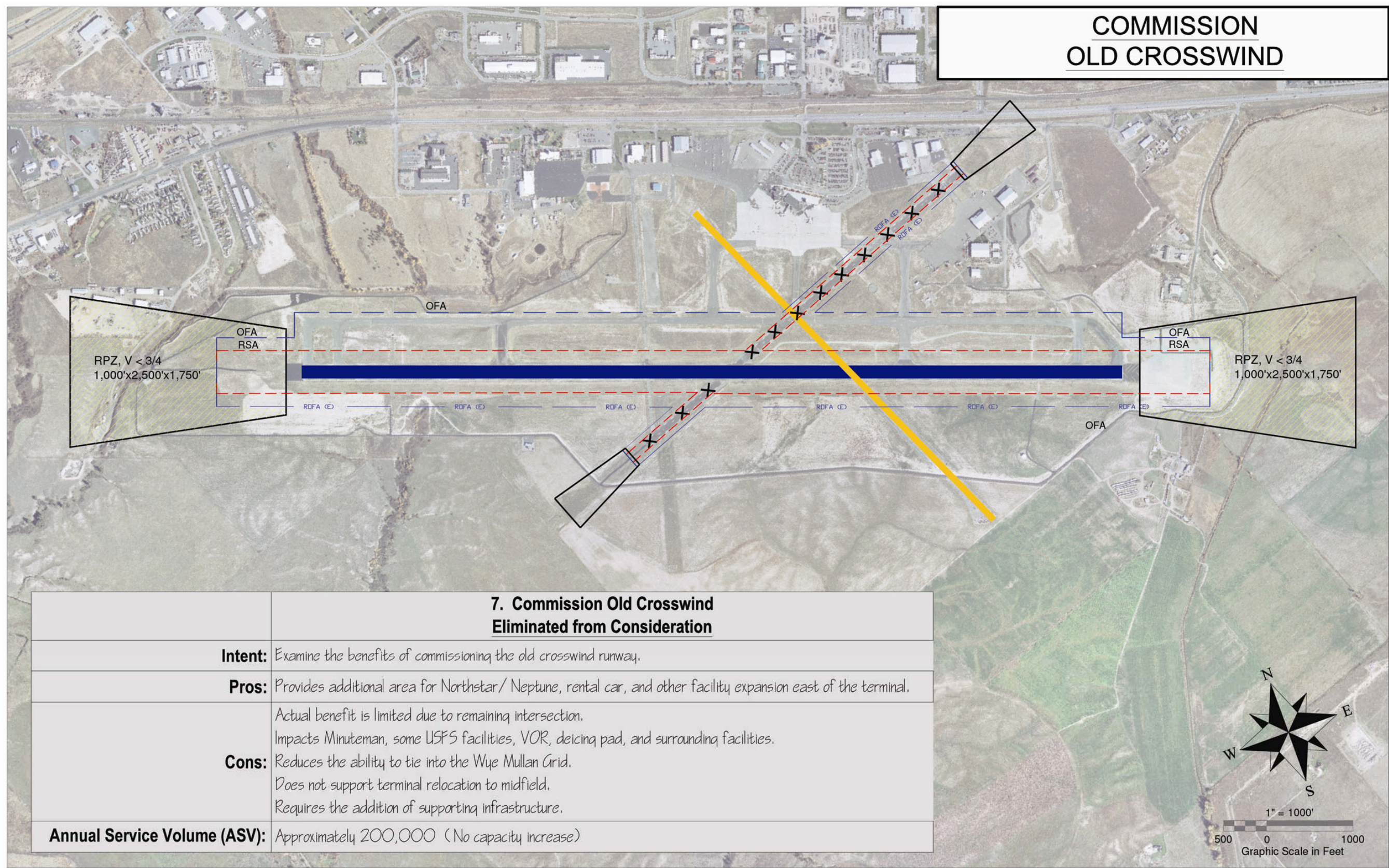


Figure 10 - Dependent (700'-1,200')

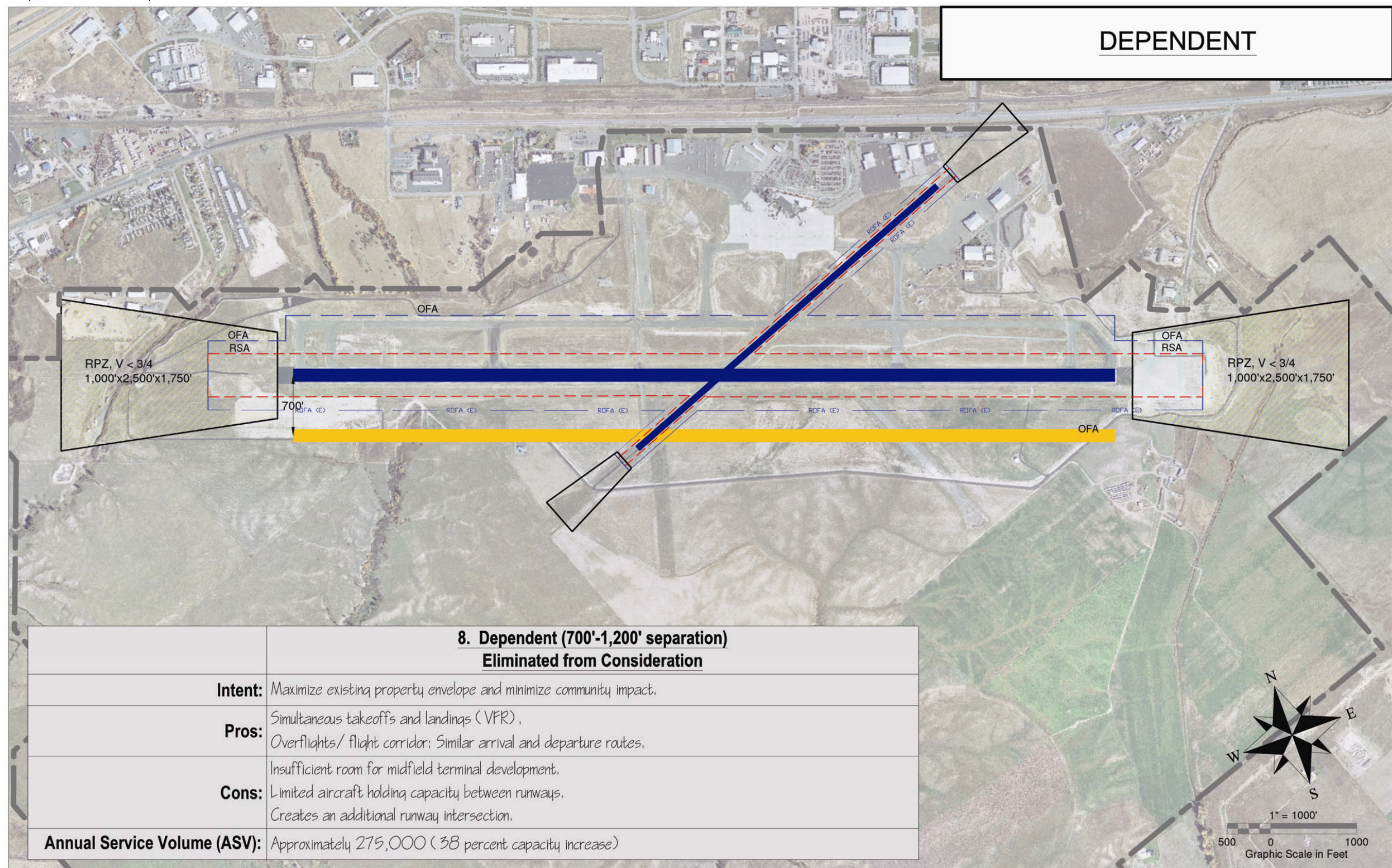


Figure 11 - Less dependent (2,500'-3,000')

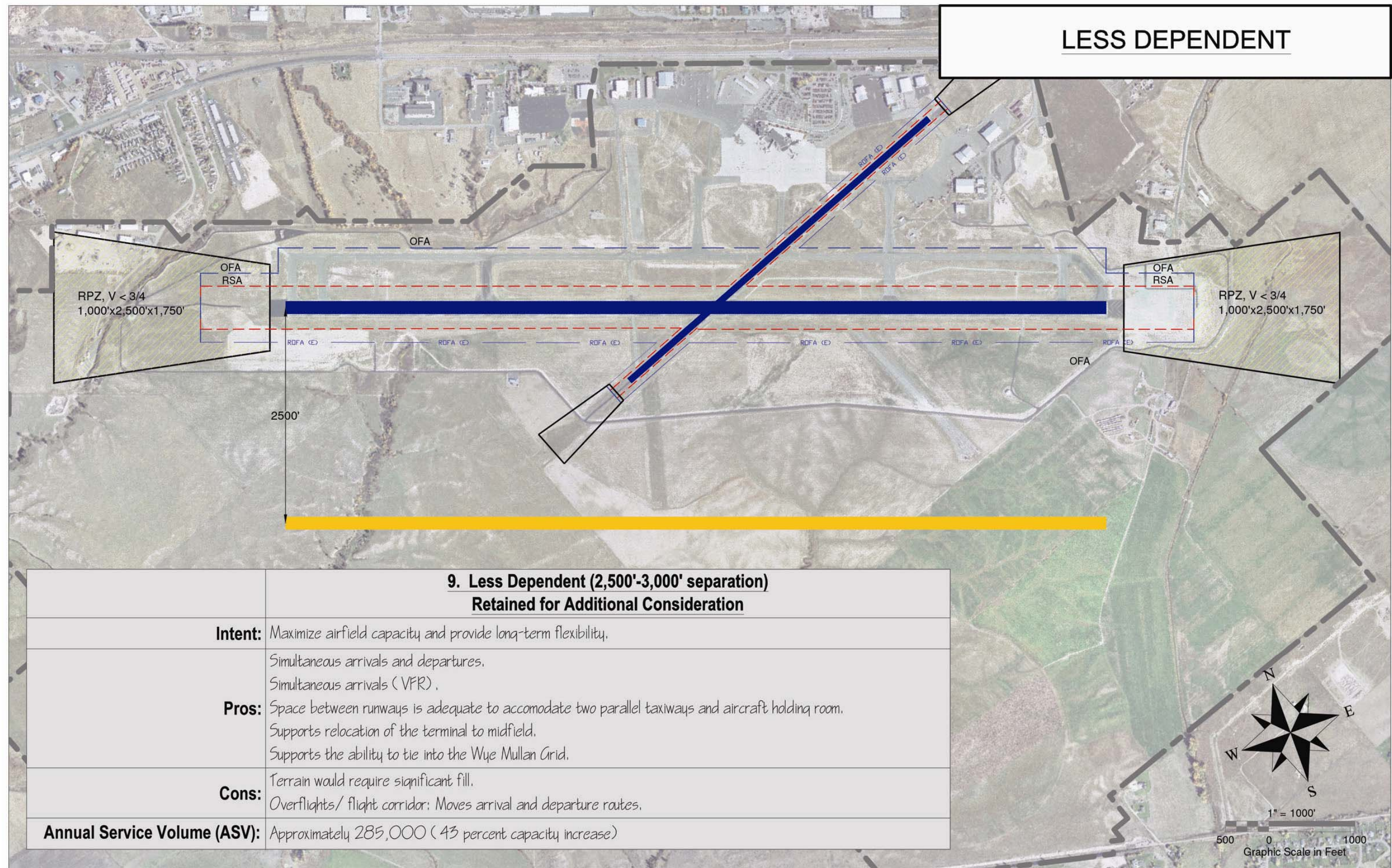


Figure 12 - Fully independent (3,400'-4,300')

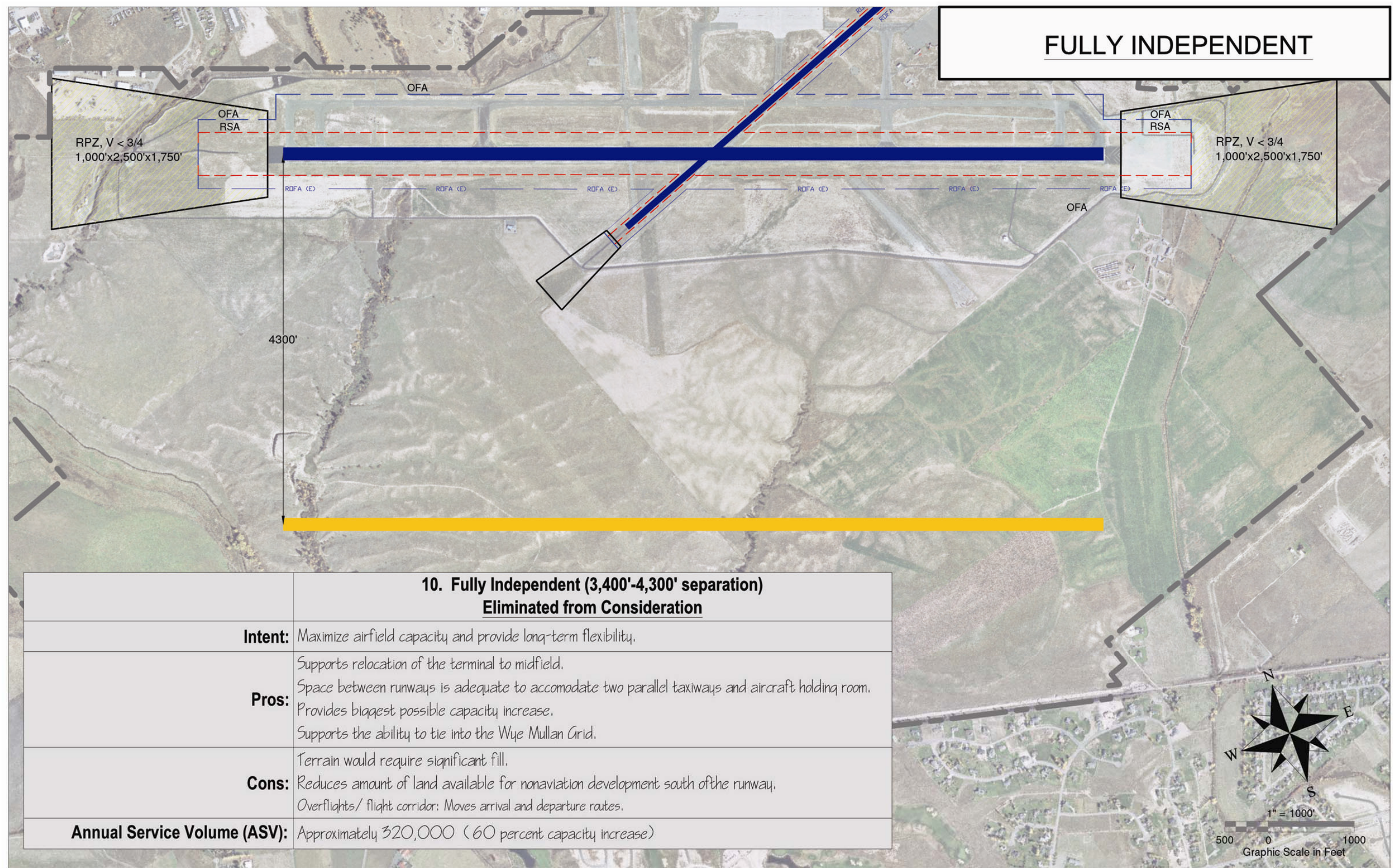
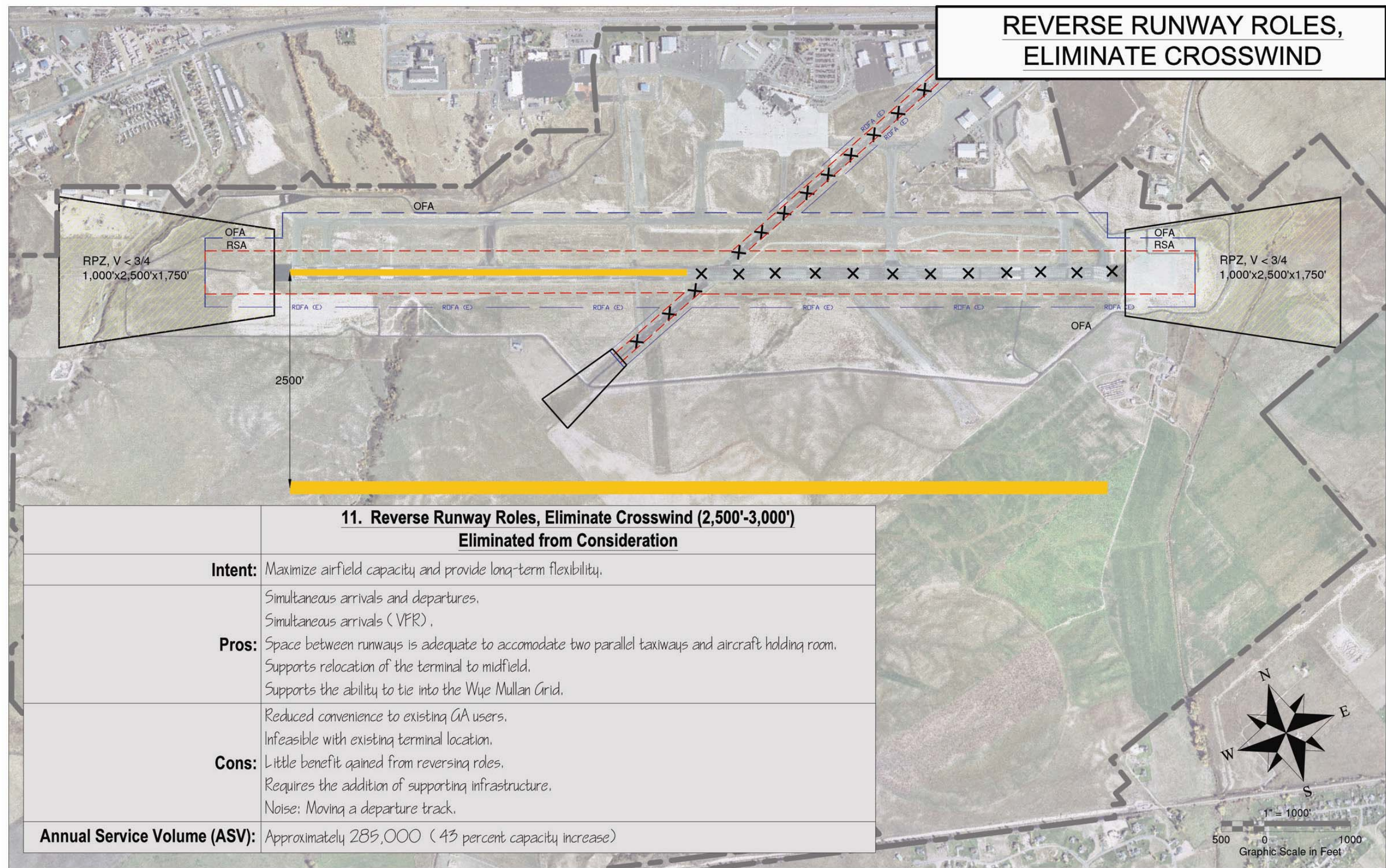


Figure 13 - Reverse runway roles (2,500'-3,000')



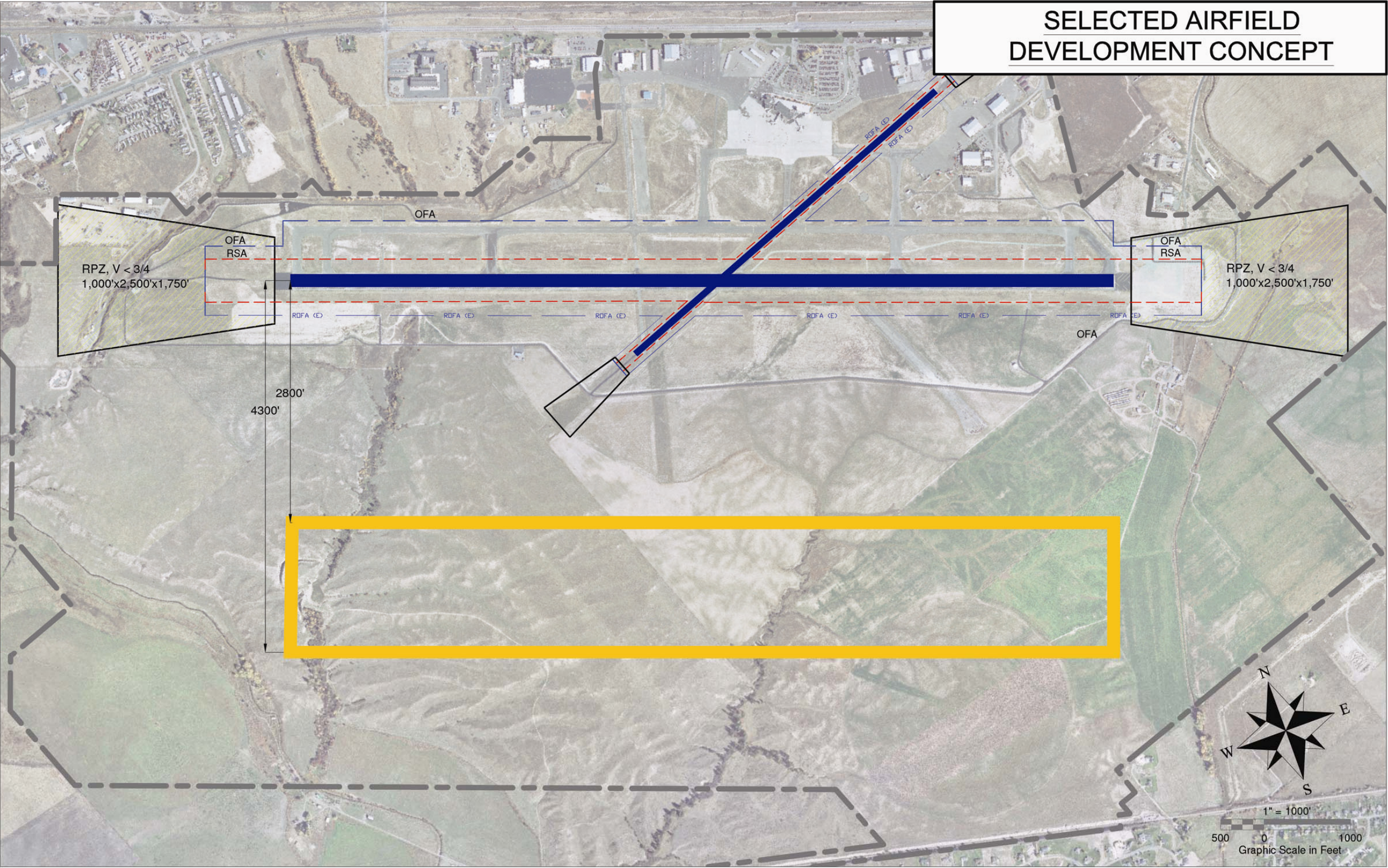
Summary of Airfield Concepts Evaluation

- Crosswind Runway
 - Not a lot of opportunity to improve existing runway by shifting or relocating it
 - Plays a small but important role to the GA community
 - Other crosswind configurations are possible, but all yield little benefit
- Conclusion: maintain crosswind as-is
- Future parallel runway needed to address post-2026 capacity needs
- Closely-spaced/ dependent would be adequate for post-2026 capacity needs:
 - Semi-dependent (2,500-3,000) is better because it provides better long-term flexibility: more capacity, and sufficient space for development between runways, including terminal development
 - No justification exists for independent/ wide layout, which would double capacity

SELECTED AIRFIELD DEVELOPMENT CONCEPT

Available areas for terminal development concepts.

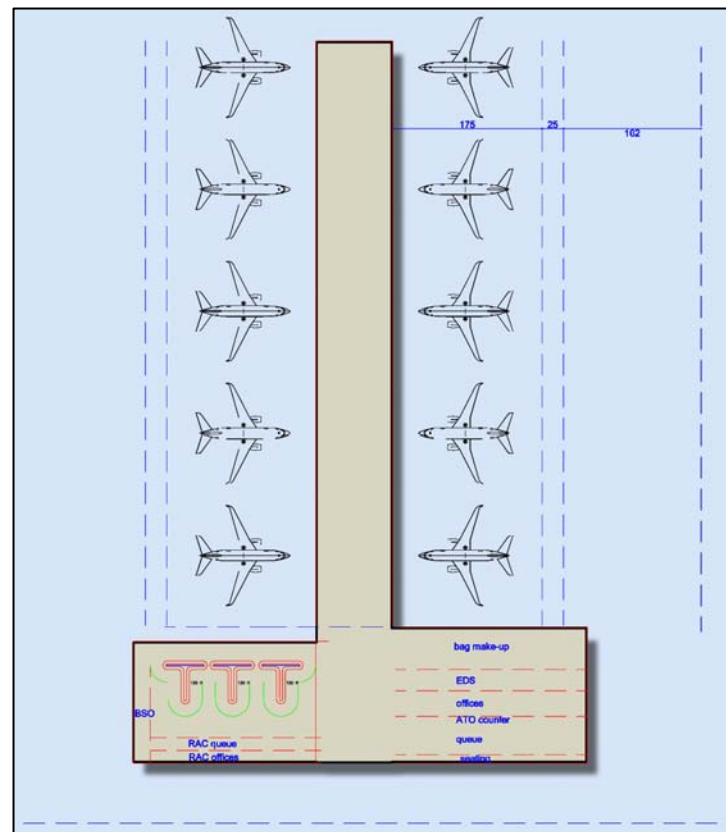
Figure 14 - Selected Airfield Development Concept



TERMINAL DEVELOPMENT OPTIONS

Single Pier Configuration

- Double-loaded pier with holdrooms and concessions on both sides
- Two flight lines each with half of the gates



Possible pros:

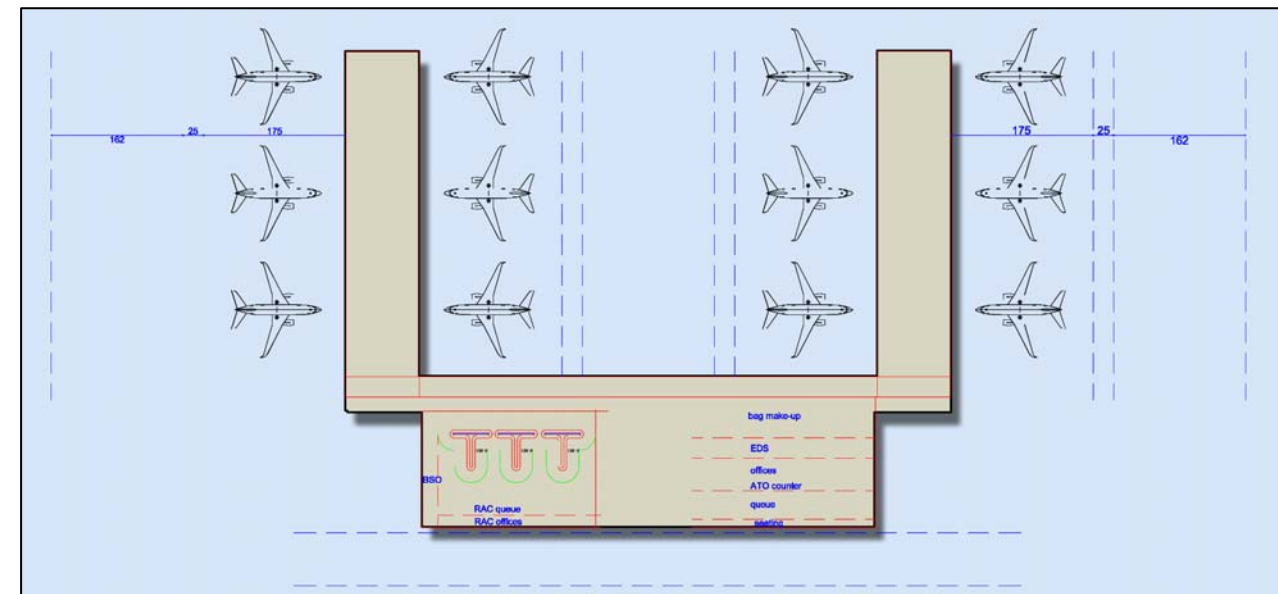
- Good for deep sites and/ or limited width
- Aircraft pushbacks are independent on each side
- Opportunity for concessions close to most gates in the pier

Possible cons:

- Expansion potential limited to 12-14 gates before walking distances and aircraft flow on each taxilane become an issue

Double Pier Configuration

- Two double-loaded piers with holdrooms and concessions on both sides
- Four flight lines each with 1/4 of the gates
- Single taxilane between piers



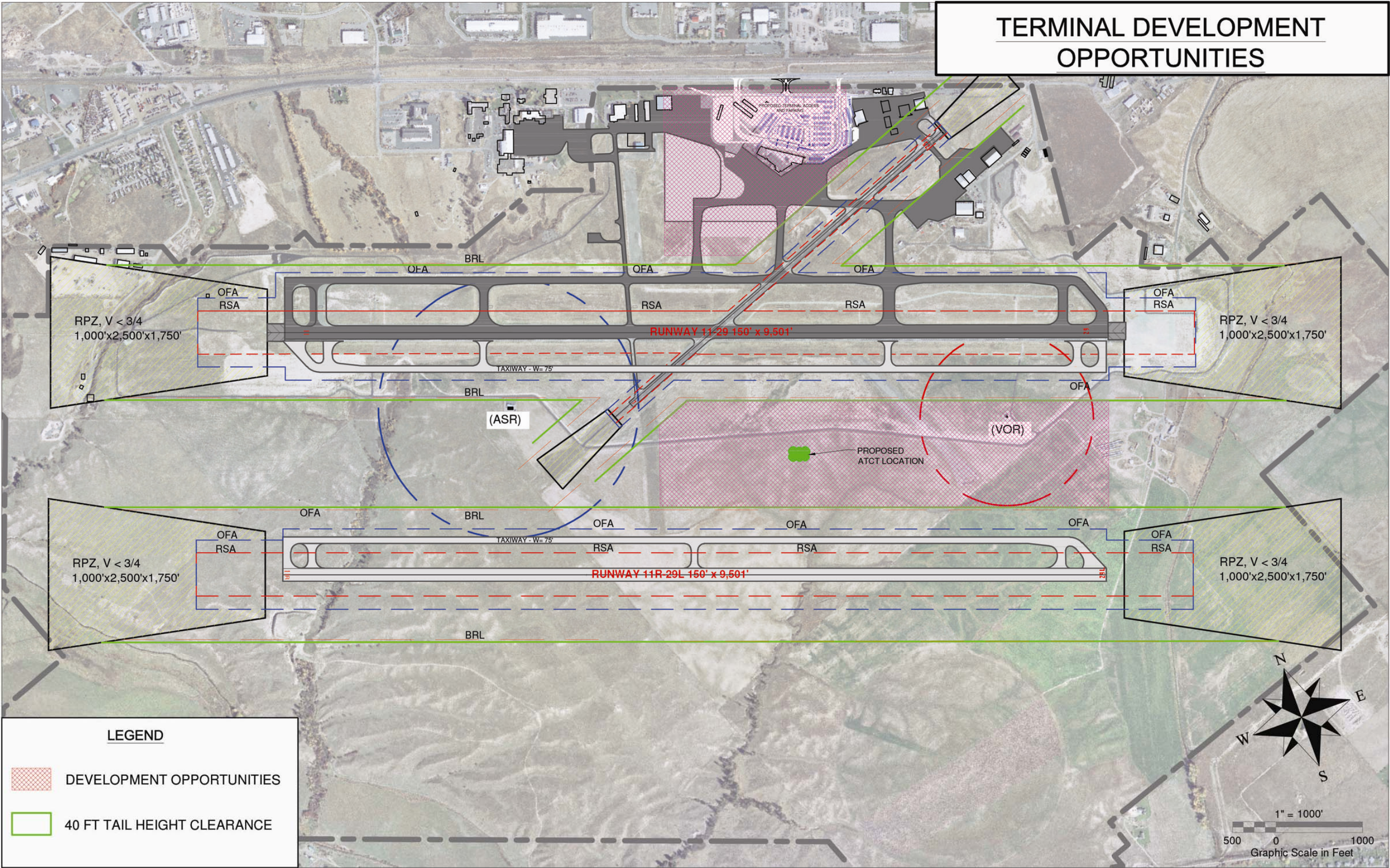
Possible pros:

- Good for sites with few constraints
- Most expansion potential while limiting maximum walking distances
- Taxilane depths short; half of gates have minimal taxi flow issues

Possible cons:

- Internal gates have dependent push-backs against those on opposite pier
- Requires duplication of concessions and restrooms near gates

Figure 15 - Terminal Development Opportunities



Terminal Development Concepts

Existing Site

Existing site, single pier

- Location west of existing terminal
- Phasing- single phase of new terminal construction and "overnight" move to new facilities

Existing site, double Pier

- Location to west and overlapping existing terminal
- Phasing- three major phases:
 - 1 - Build new ticketing wing, security, and 6 gate west pier. Operate while maintaining existing bag claim.
 - 2 - Demolish most of existing terminal, but keep bag claim in operation. Build new bag claim and east pier.
 - 3 - Open new bag claim and east pier. Demolish remainder of existing terminal.

Midfield site

- Assume ATCT will be built and have direct roadway access
- All concepts can be built in a single phase with an "overnight" move to new facilities

Midfield site, double pier

- Location west of ATCT

Midfield, single pier A

- Location north of ATCT

Midfield, single pier B

- Location west of ATCT

Figure 16 - Existing site, single pier

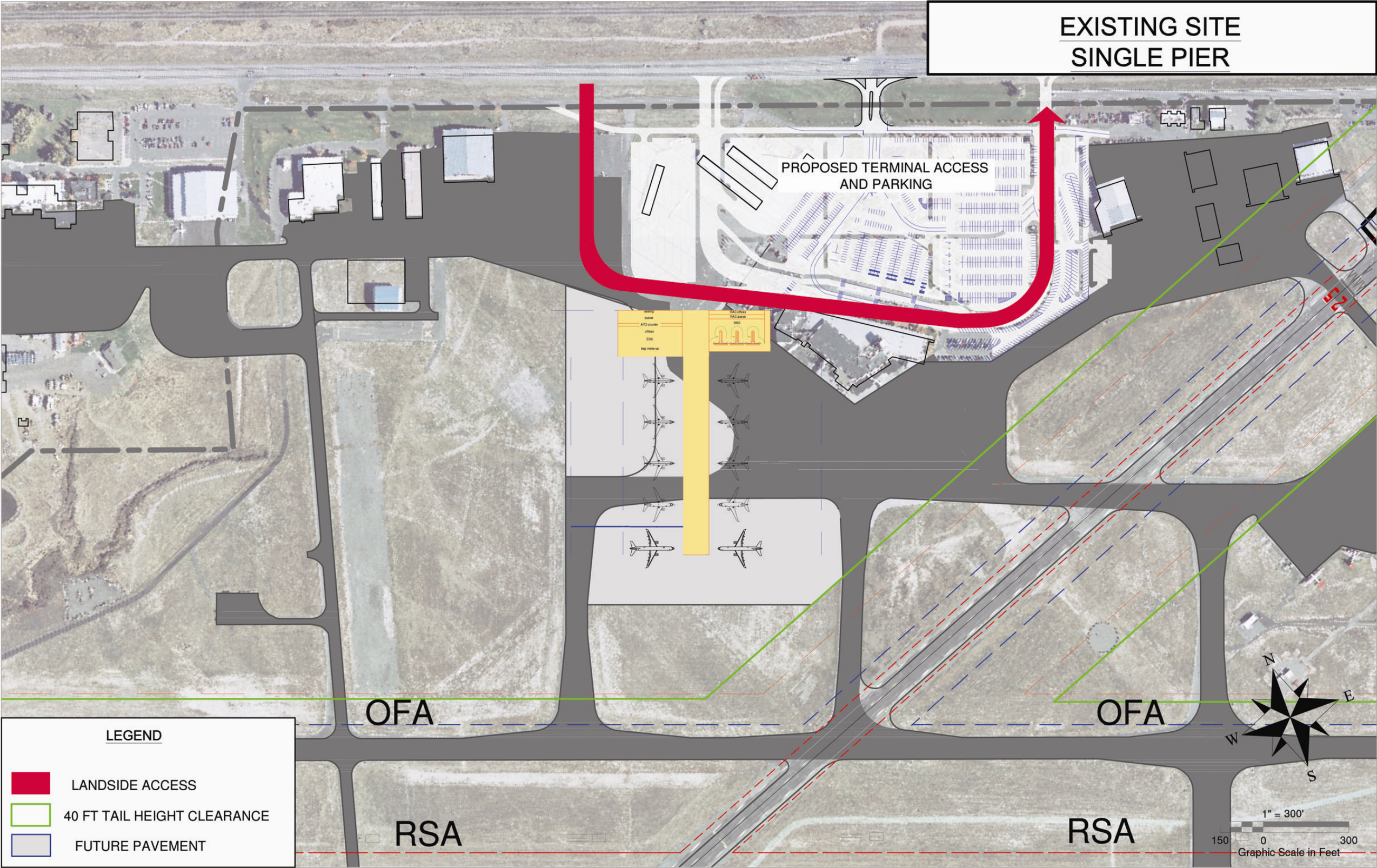


Figure 17 - Existing site, double pier

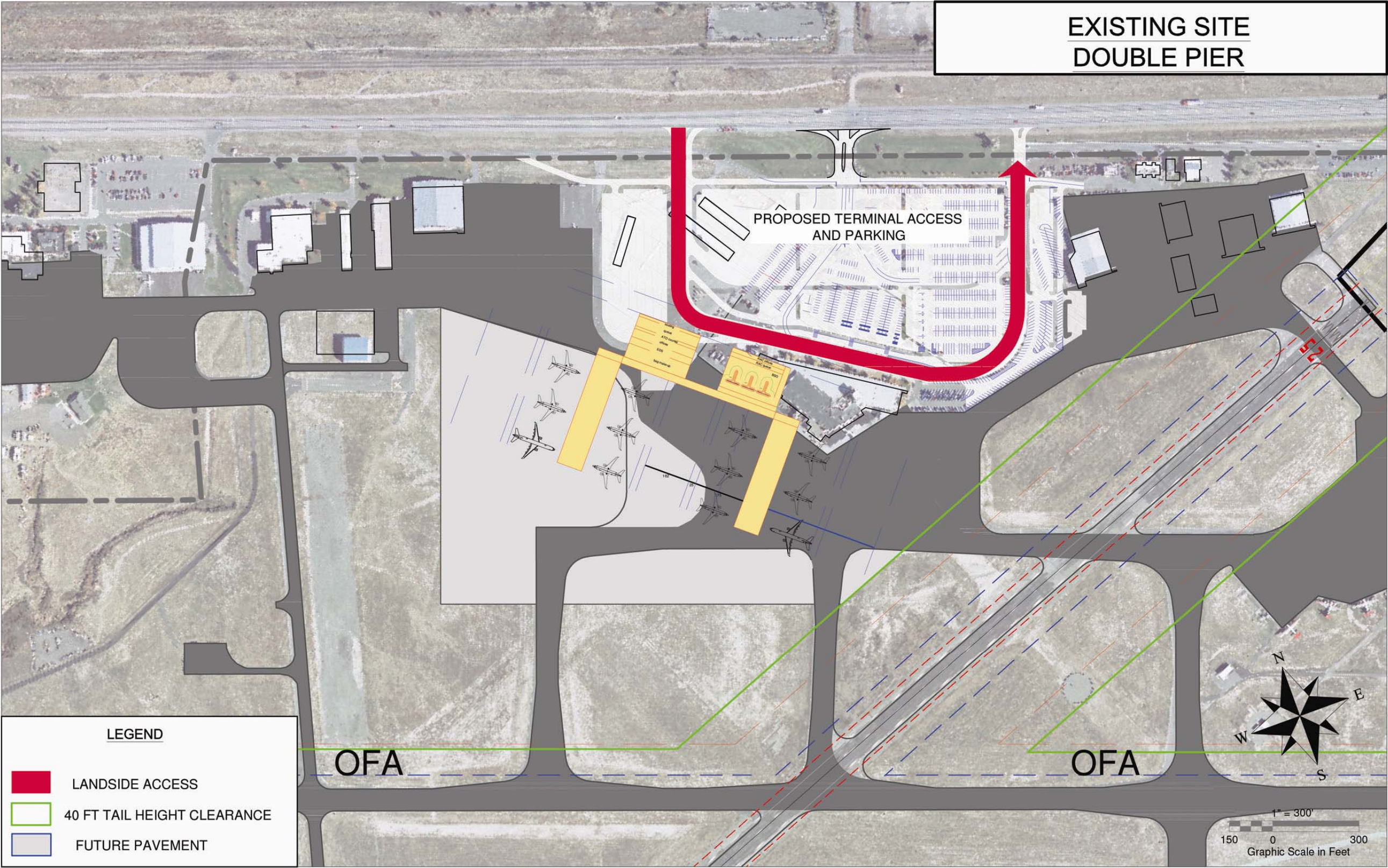


Figure 18 - Midfield site, double pier

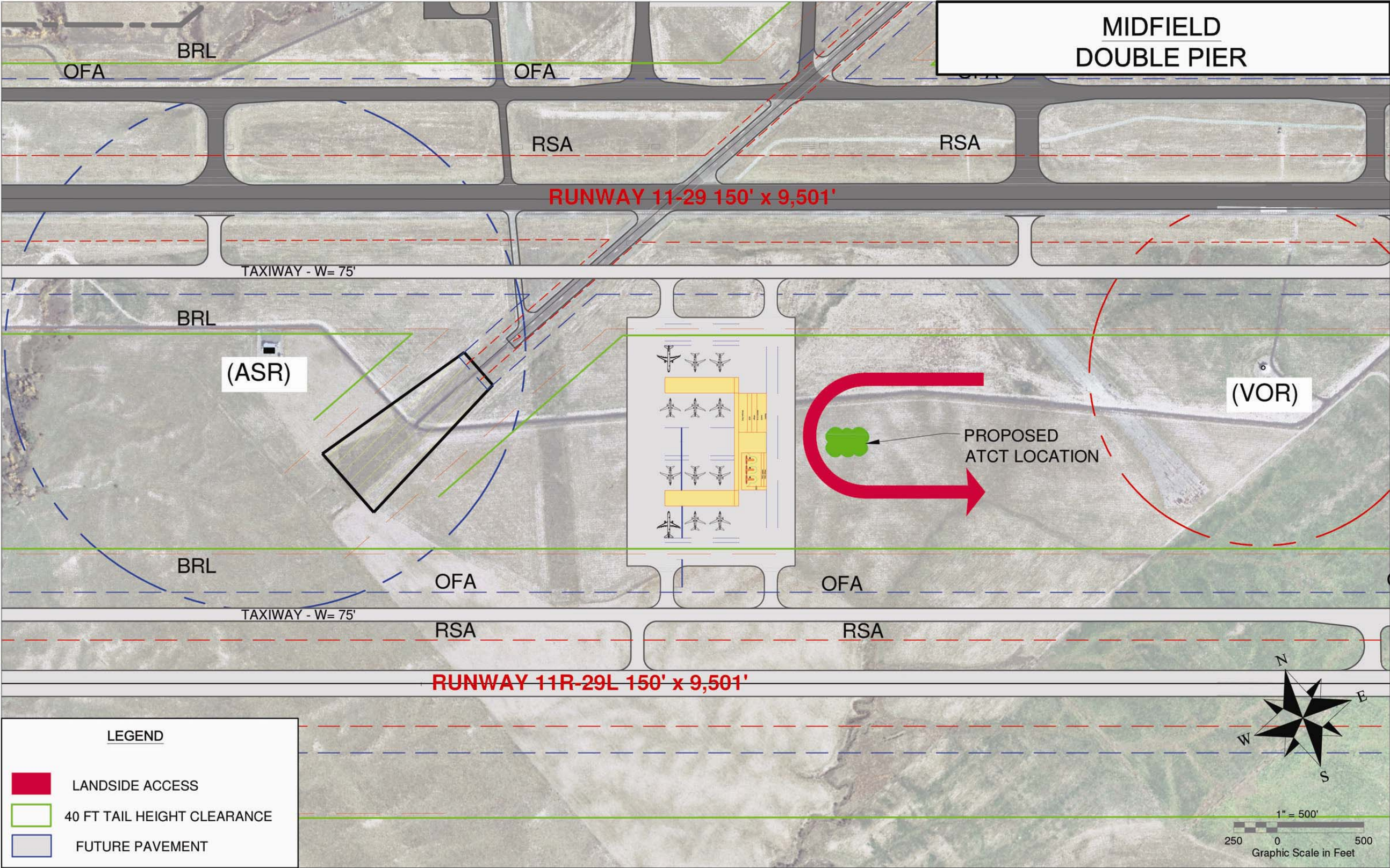


Figure 19 - Midfield site, single pier A

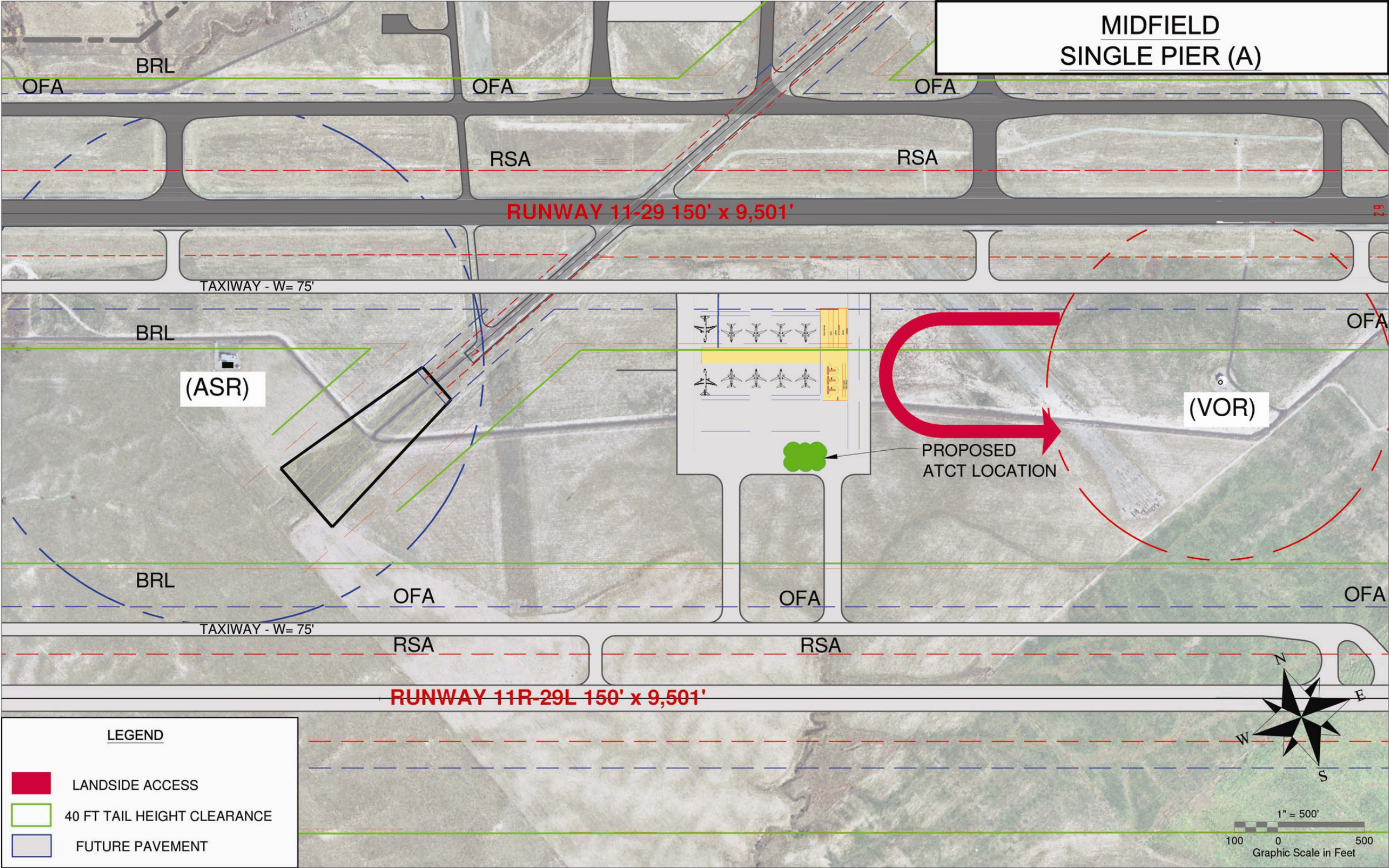
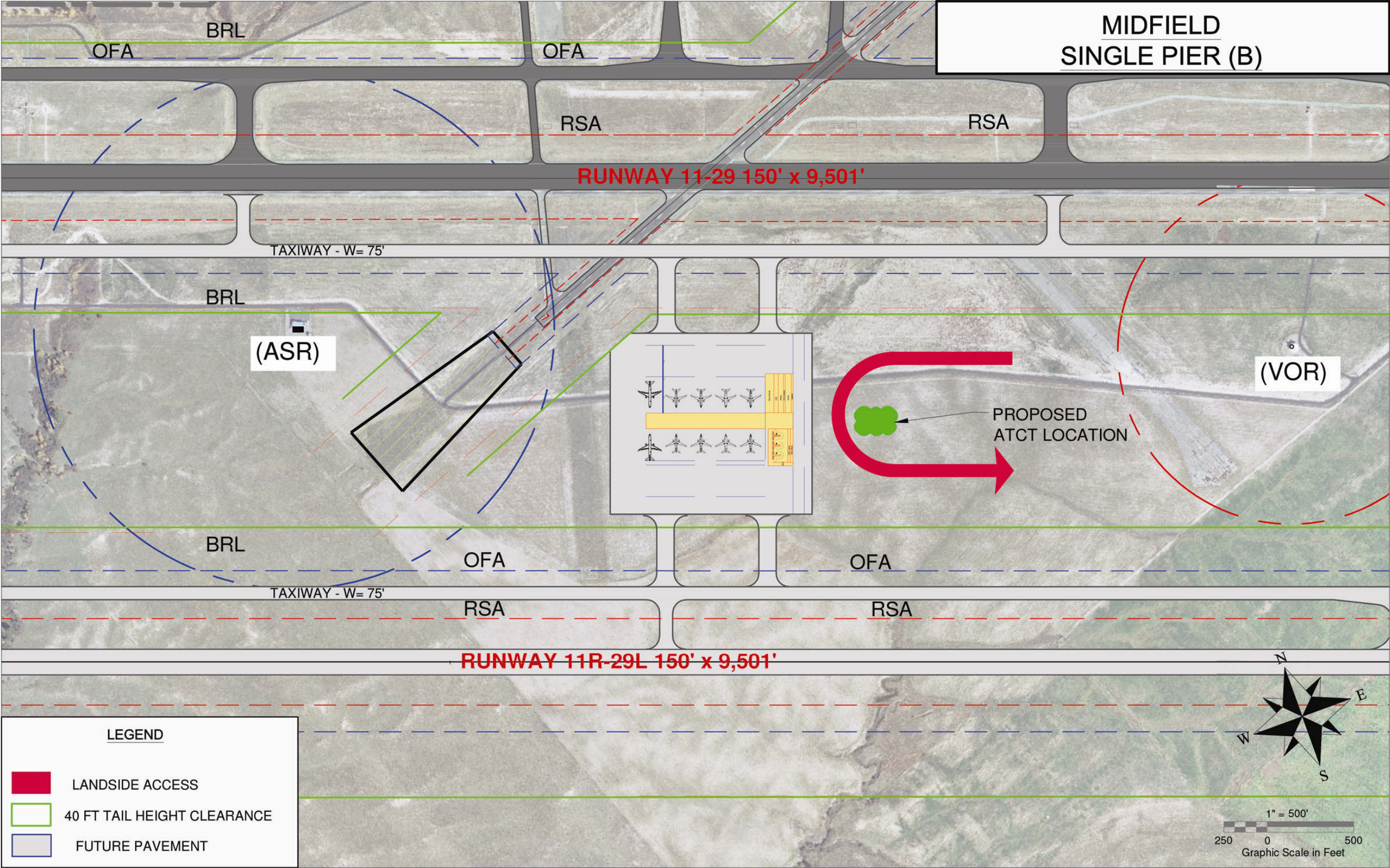


Figure 20 - Midfield site, single pier B



Terminal Concepts Evaluation

Existing Site

Existing site, single pier

✓ Carried forward for further evaluation

Pros:

- Allows construction to occur while keeping existing terminal in operation
- Could allow existing terminal to remain for other functions as needed

Cons:

- Some encroachment of GA area for landside access and possible ticketing expansion
- Possible expansion of bag claim would require some demolition of existing building

Existing site, double Pier

X Not carried forward

Pros:

- Most expansion potential for existing site

Cons:

- Complex phasing to maintain operations in existing terminal
- Impact on GA area for west pier aircraft parking and taxi lane

Midfield site

Midfield site, double pier

✓ Carried forward for further evaluation

Pros:

- Most expansion potential in excess of 20 gates

Cons:

- ATCT in parking lot reduces highest value spaces or convenience. Further shift of terminal west would reduce gate expansion potential.

Midfield, single pier A

X Not carried forward

Pros:

- Public parking not affected by ATCT or its employee parking

Cons:

- Expansion potential limited by Runways 7 / 25 and 11 / 29
- Concept not most optimal building layout for midfield

Midfield, single pier B

X Not carried forward

Pros:

- Gate expansion potential greater than single pier A, depending on distance of terminal from ATCT

Cons:

- ATCT in parking lot reduces highest value spaces. Further shift of terminal west would reduce gate expansion potential.

GA DEVELOPMENT

GA Development Concepts

Gross GA Requirements

Near-term

- T-hangar - replacement
- T-hangar - existing demand

Long-term

1. T-hangar growth
2. FBO Expansion (current FBOs)
 - Hangars
 - Apron area
3. Potential 3rd FBO

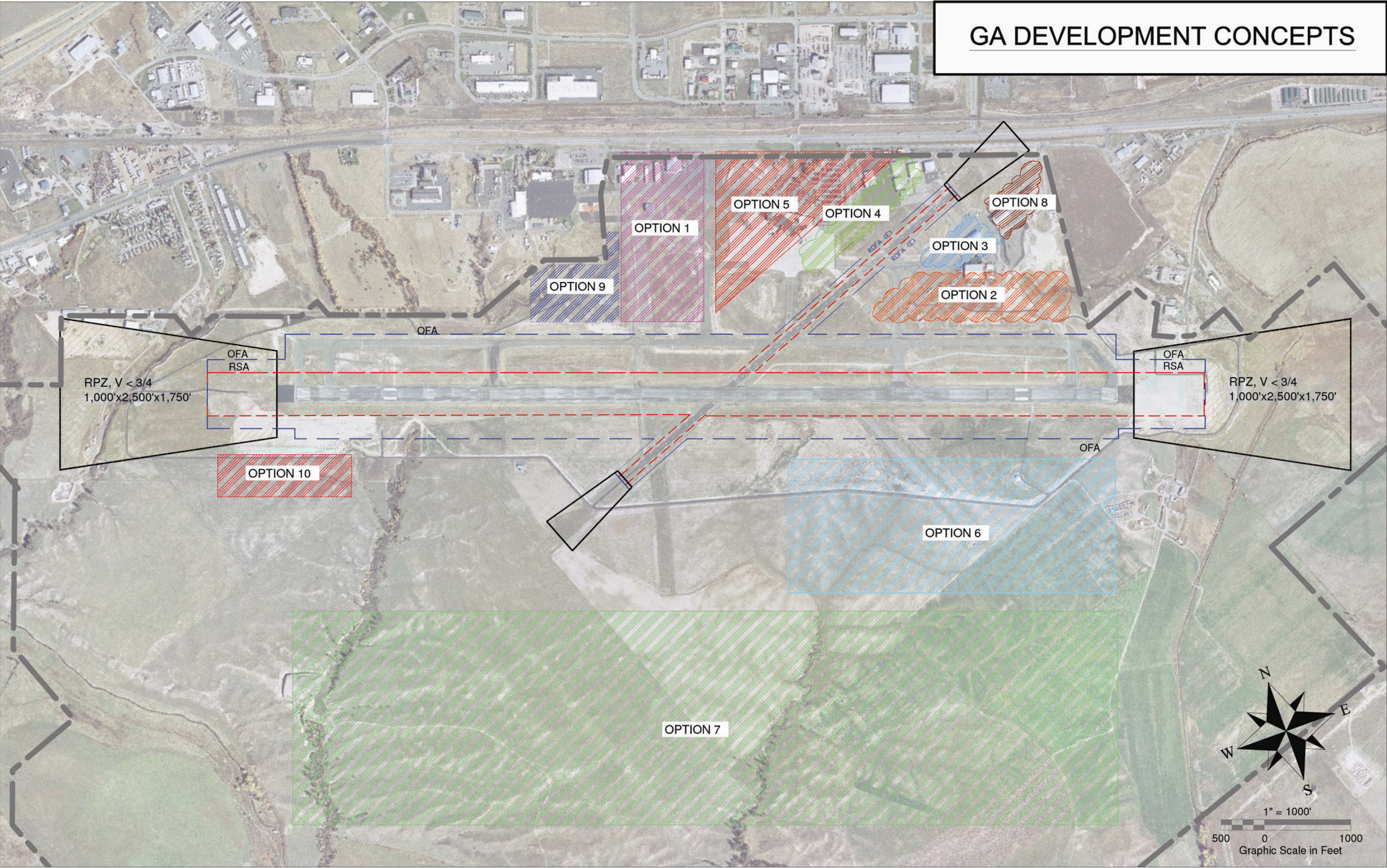
GA Sites Considered

Ten areas on airport were considered as potential GA development sites. The following areas are shown in Figure 21:

1. Near Minuteman, east of Taxiway G
2. Near Northstar/ Neptune
3. Existing terminal location
4. East of the existing terminal
5. Near Runway 25 end
6. Midfield
7. South airfield
8. Runway 25 end, near car condos
9. Near Minuteman, west of Taxiway G
10. Near Runway 11 end

Existing Air Traffic Controller eye level used for the LOS analysis is 62 feet, based on survey data taken January 2008.

Figure 21 - GA Development Concepts



GA Site Evaluation

1. Near Minuteman, east of Taxiway G

✓ Carried forward for further evaluation

- Highest value - continued FBO use
- Allows for Minuteman expansion
- Large enough for near-term and long-term development
- Utilities need upgrading
- Landside access needed

2. Near Neptune/ Northstar

✓ Carried forward for further evaluation

- Highest value - continued FBO use
- Allow for Northstar/ Neptune expansion
- Not large enough to meet all long-term GA requirements
- LOS and Part 77 restrictions preclude large hangar development
- Utilities need upgrading

3. Near Runway 25 end

X Not carried forward

- Landside access needed

- Development will infringe on potential NAVAID installation
- Part 77 height restrictions preclude large hangar development

4. East of existing terminal

X Not carried forward

- Small area available which will not support immediate short-term needs
- Probable LOS and Part 77 issues

5. Existing terminal location

X Not carried forward

- Assumes relocation of terminal
- Area is not available for short-term solution

6. Midfield

X Not carried forward

- Less suitable for near-term development
- Requires a security fence
- Access road and taxiways needed
- Terrain is an issue

7. South Airfield

X Not carried forward

- Less suitable for near-term development (too remote)
- Terrain is an issue
- Requires a security fence
- Requires an access road
- Area is not served by taxiways
- Utilities are not available

8. Runway 25 end, near car condos

✓ Carried forward for further evaluation

- Suitable for near-term development
- Area not adequate to serve long-term development
- Landside access served by existing "fuel farm" road
- Part 77 and LOS not an issue
- Could limit future nonprecision approach on Runway 25
- Not an optimal building layout
- Accommodates only 18 units

9. Near Minuteman, west of Taxiway G

✓ Carried forward for further evaluation

- Part 77 suitable for near- or long-term development
- Hangar development closest to Taxiway A not suitable for near-term development due to LOS issues
- Small area available for development
- Utilities need upgrading
- Served by taxiways
- Landside access needed
- Additional room for overflow is limited by public access

10. Near Runway 11 end

X Not carried forward

- Less suitable for near-term development
- Requires a security fence
- Requires an access road and taxiways
- Utilities need upgrading

GA Concepts Detailed Layouts

Concepts 3, 4, 5, 6, 7, and 10 have been eliminated from consideration for the abovementioned reasons. However, the following four layouts have been identified as suitable for GA development:

1. Near Minuteman, east of Taxiway G

- Three options exist for future landside access. These three areas are shown in Figure 22 (each would work well).
- Figure 23 shows a short-term layout which is large enough to replace hangars that will be demolished, and construct hangars needed to satisfy known existing demand.
- Figure 24 shows a long-term layout for the Minuteman area.

2. Near Neptune

- Figure 25 shows a short-term layout which is large enough to replace hangars that will be demolished, and construct hangars needed to satisfy known existing demand.
- Figure 26 shows a long-term development option.

8. Runway 25 end, near car condos

- Figure 27 shows a short-term development option.

9. Near Minuteman, west of Taxiway G

- Figure 28 shows a long-term development option.

T-hangar dimensions used for the design of the GA layouts are shown in Figure 29.

Figure 22 - Minuteman Development Access Road Options

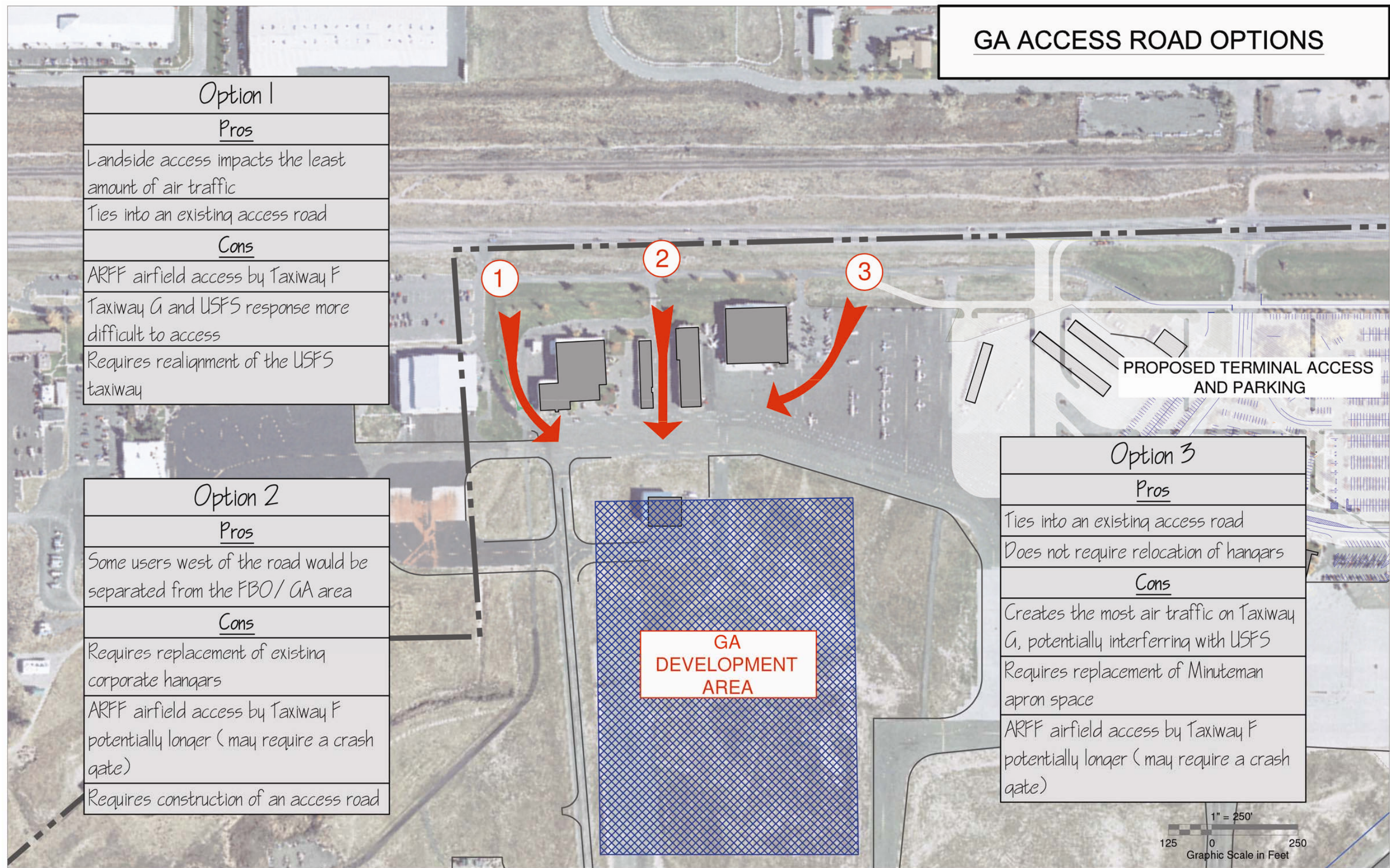


Figure 23 - Minuteman Short-term GA Development

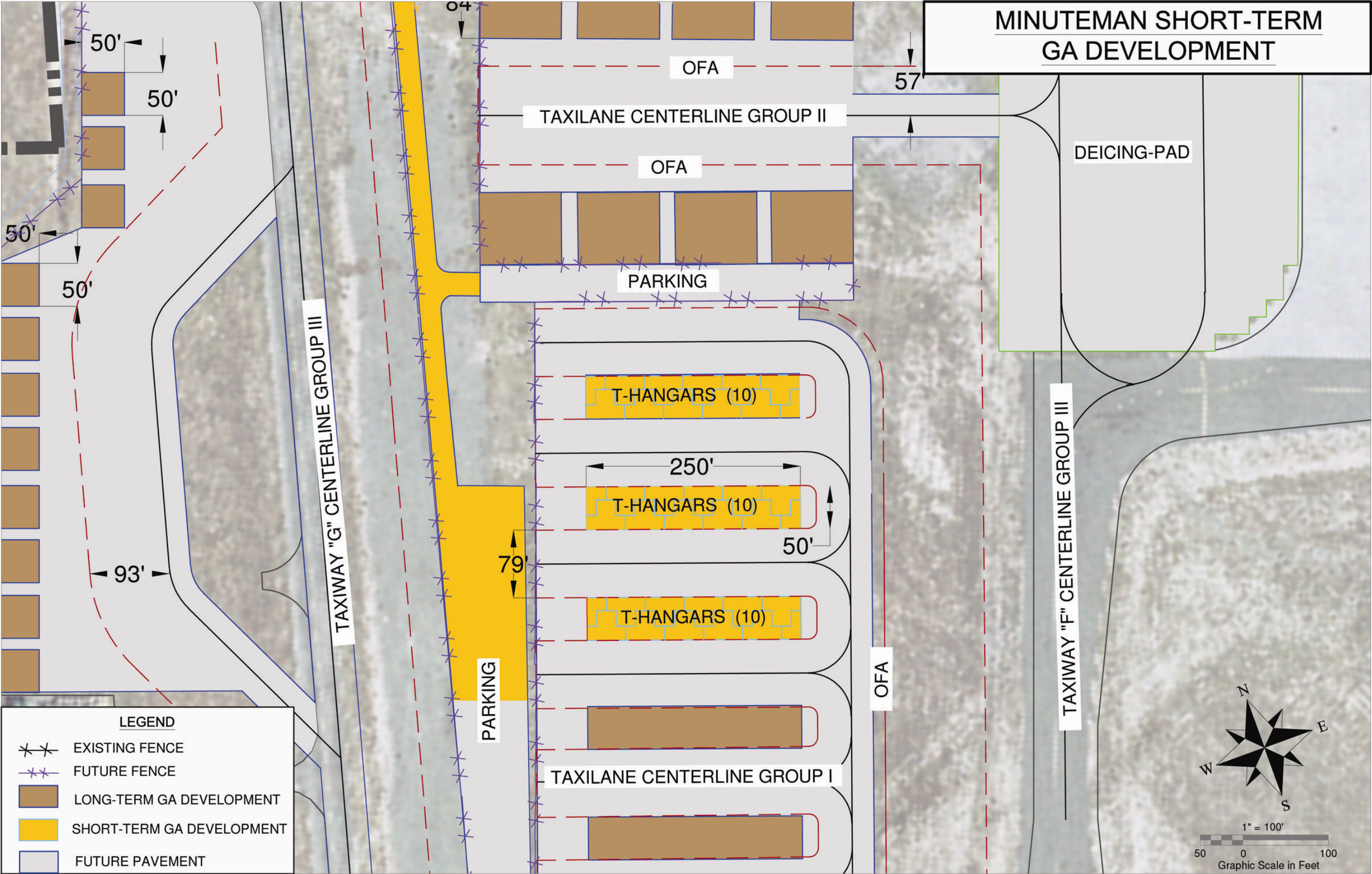


Figure 24 - Minuteman Long-term GA Development

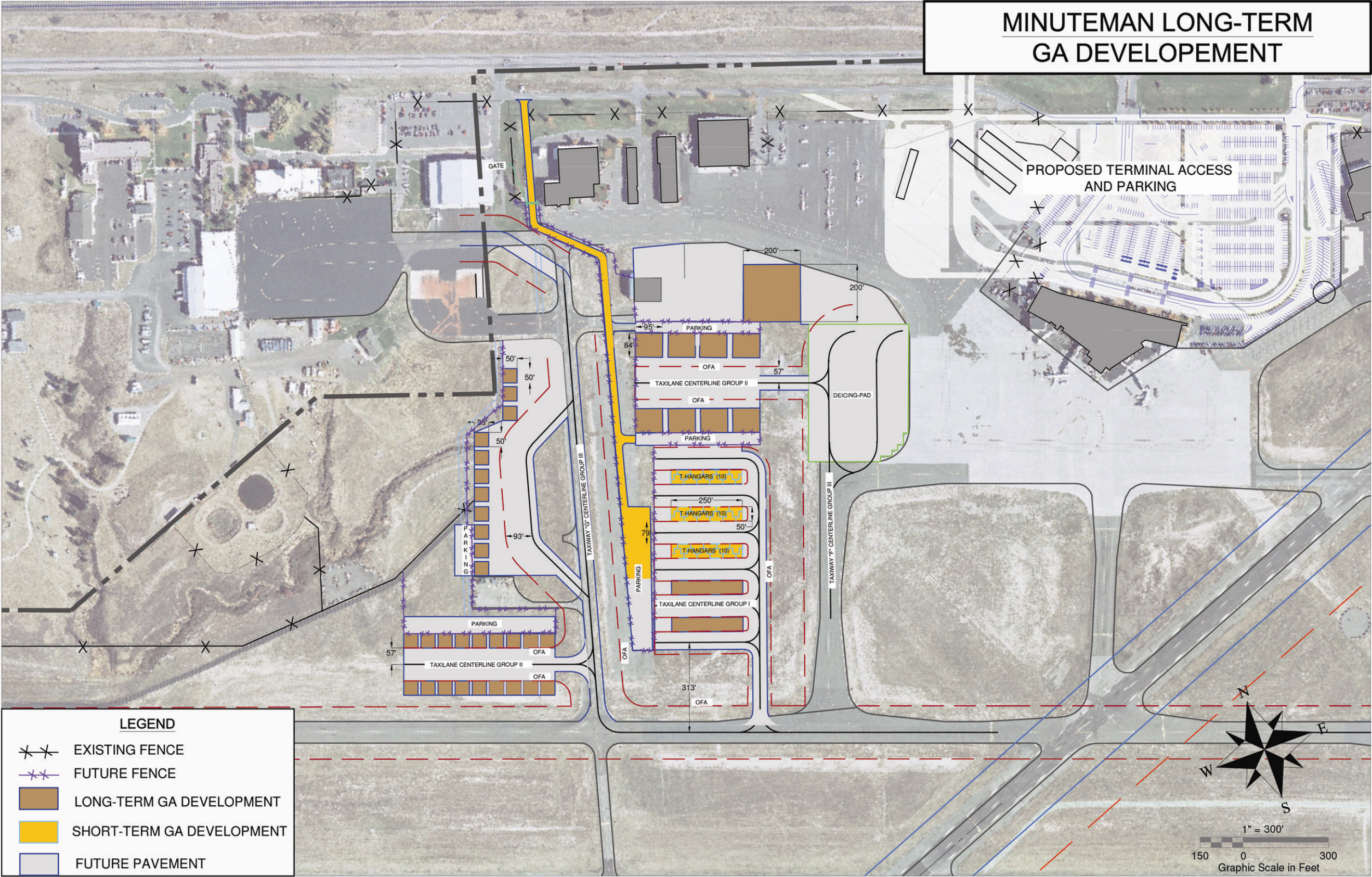


Figure 25 - Neptune/ Northstar Short-term GA Development

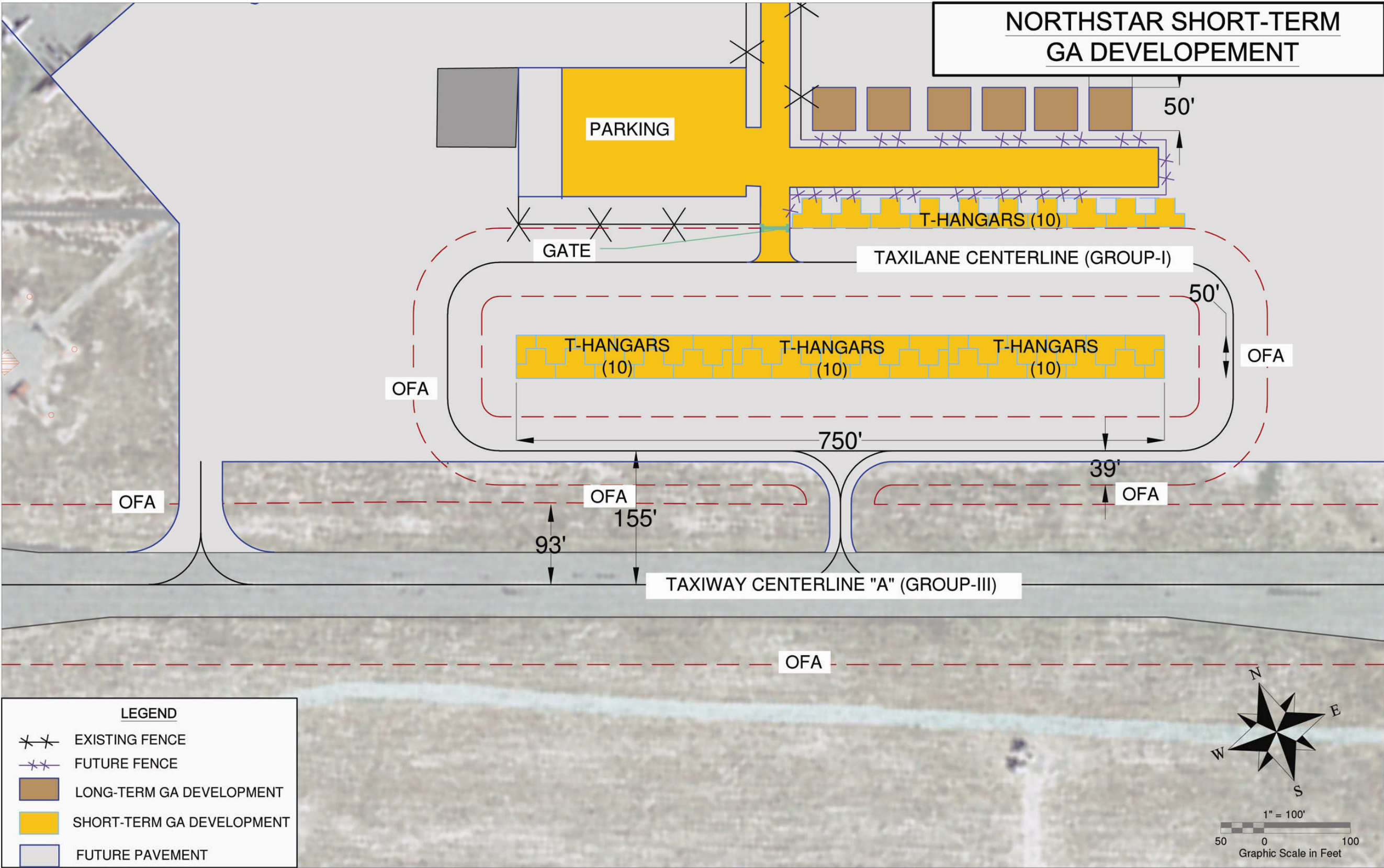


Figure 26 - Neptune/ Northstar Long-term GA Development

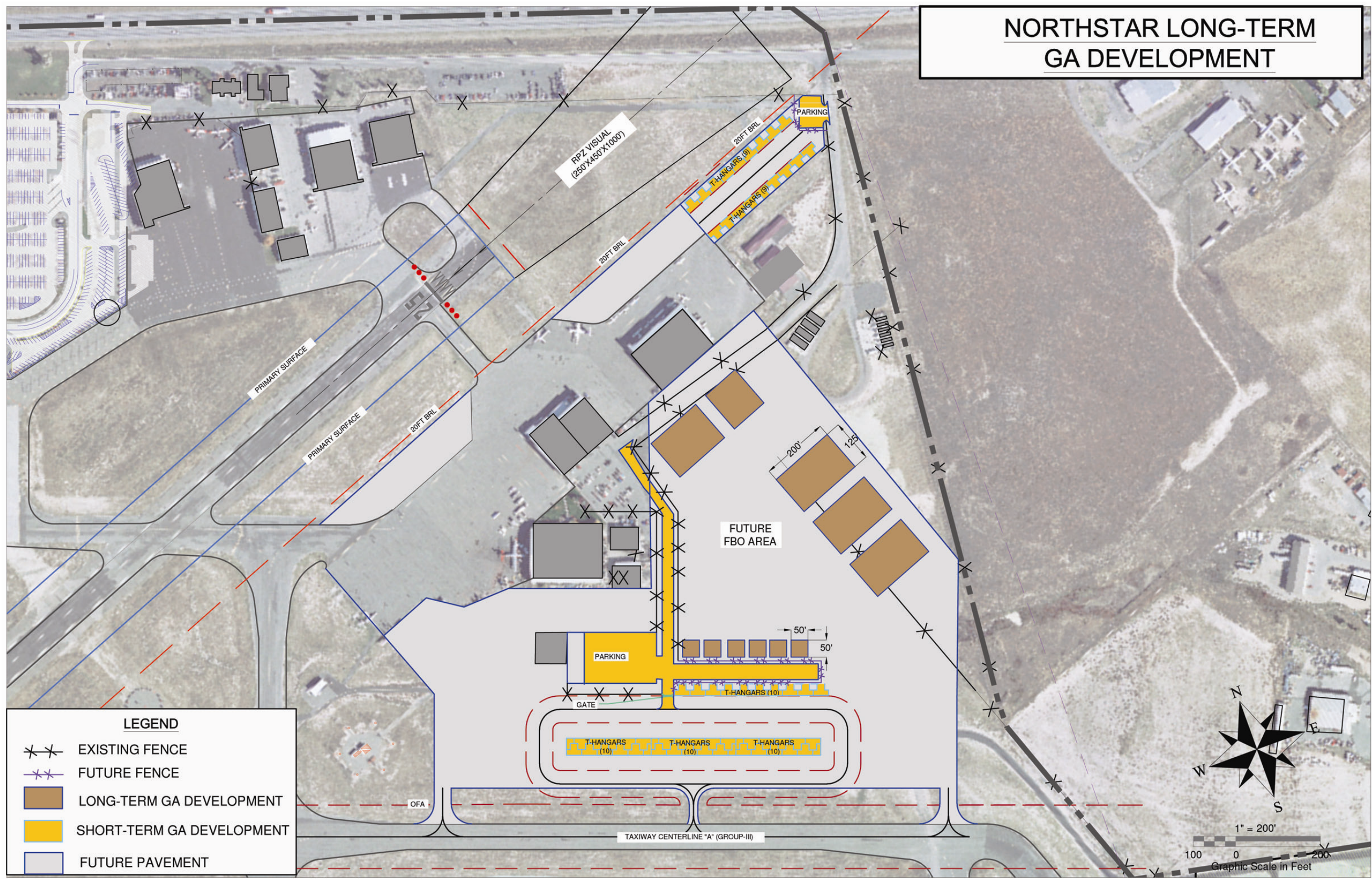


Figure 27 - Runway 25 end, near car condos

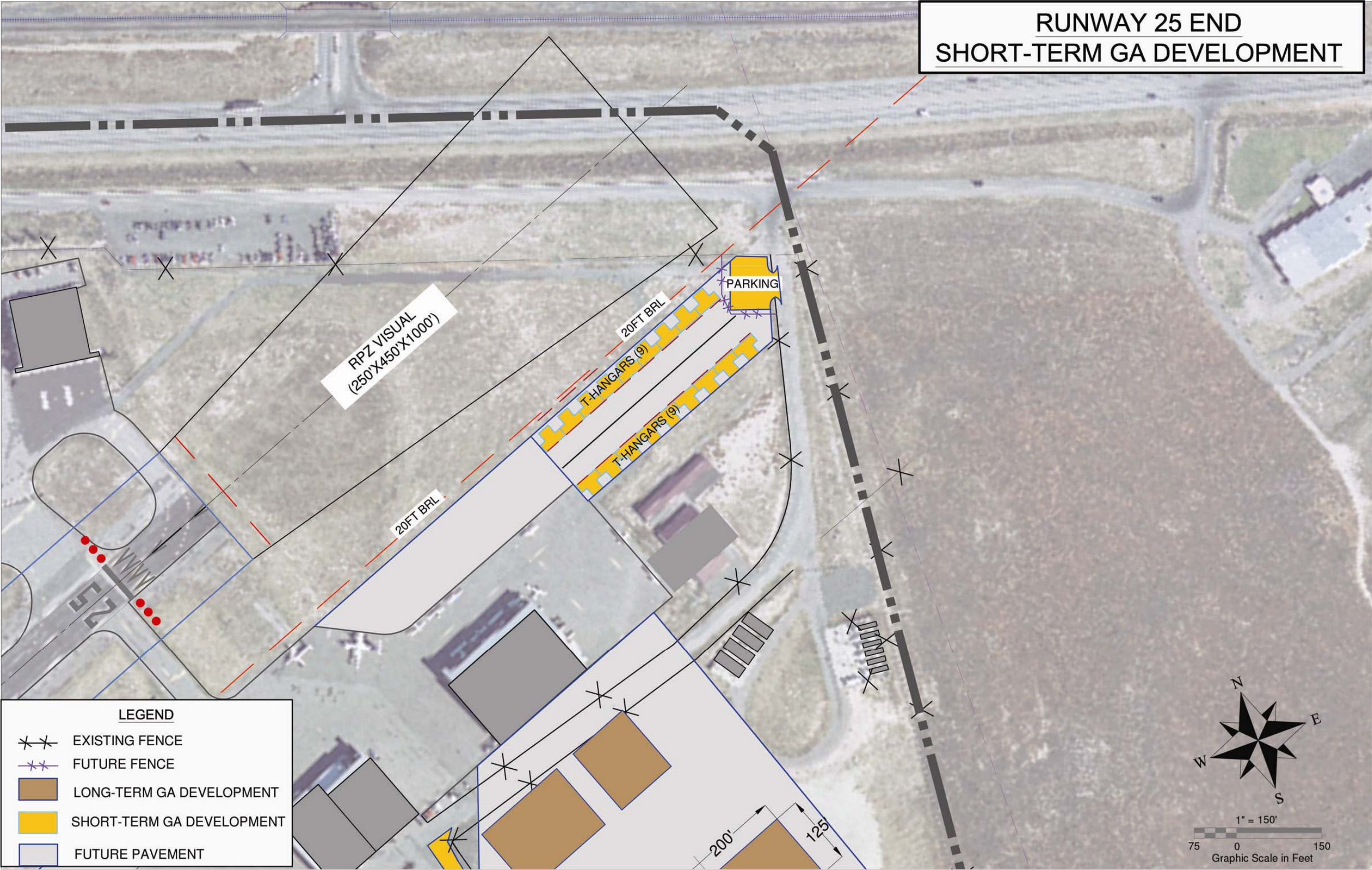
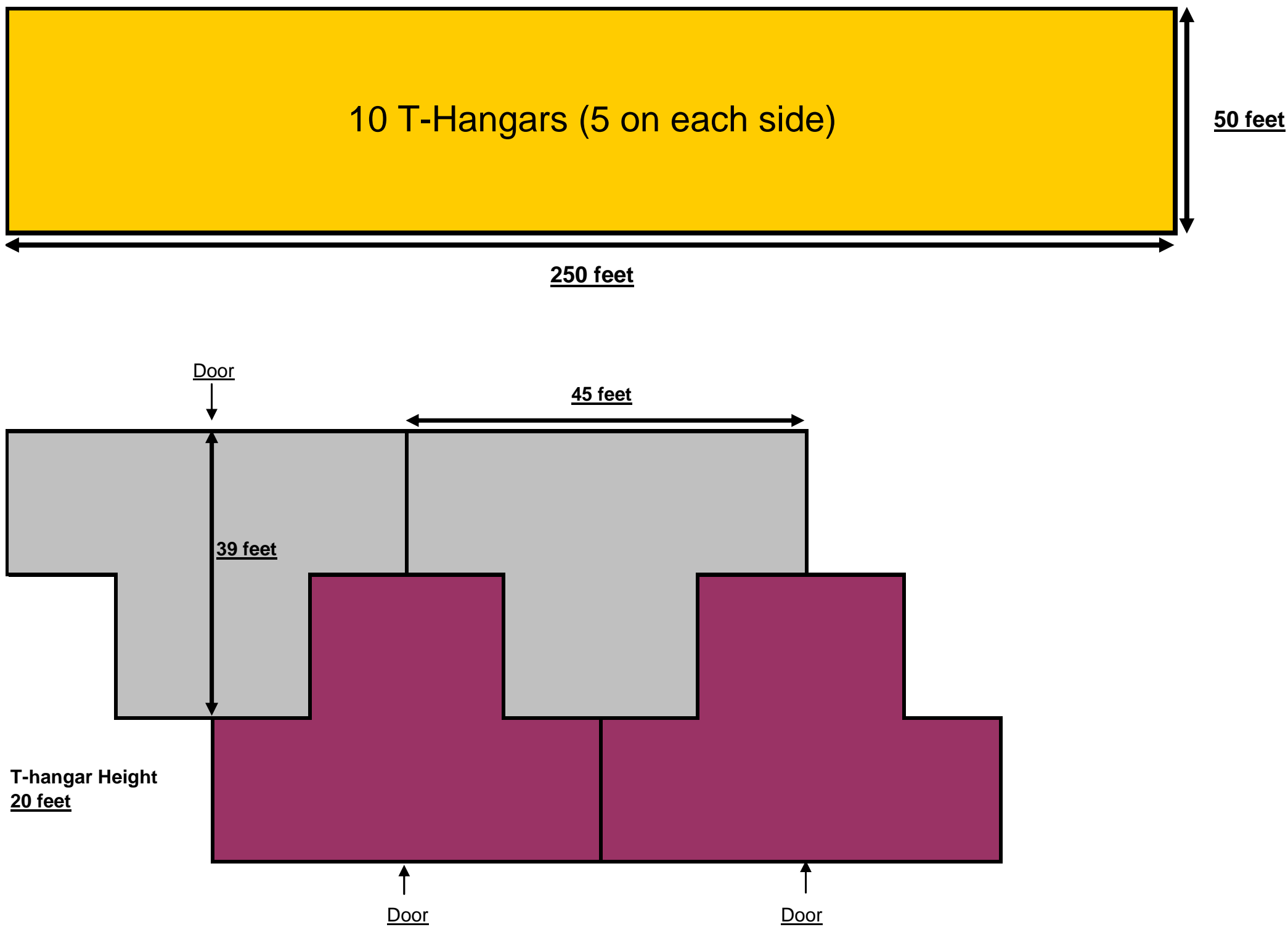


Figure 28 - Near Minuteman, West of Taxiway G GA Development



Figure 29 - T-Hangar dimensions used for development of detailed layouts



Summary and Next Steps

Summary

- Future airfield options
 - Conclusion: Maintain Crosswind as-is
 - Semi-dependent (2,500-3,000) is adequate for long-term
- Future terminal options
 - Single pier new building at existing site
 - Double pier new building at midfield site (requires approximately 2,800-foot minimum separation)
- Future GA options
 - Multiple GA locations adequate for short-term development
 - LOS issues in the short-term are alleviated in the long-term by the new ATCT location

Next Steps in the MPU Process

- Submit the detailed Master Plan Forecast for FAA approval
- Initiate GA development final design
- Next steps for the Master Plan Update process will include:
 - Verify long-term requirements and needs
 - Develop overall/ composite airport development alternatives
 - Evaluation/ refinement of detailed alternatives
 - Determine ultimate land envelope needed for aviation development
 - Airport Layout Plan Set
 - Nonaviation Landuse Plan