

**SECTION 6**

**ALTERNATIVE  
DEVELOPMENT CONCEPTS**



## SECTION 6 ALTERNATIVE DEVELOPMENT CONCEPTS

### INTRODUCTION

This section describes alternative airside and landside concepts for long-range development at Fullerton Municipal Airport. The development concepts address the needs identified in Section 5, showing locations and possible layouts for needed facilities. Alternative concepts have been evaluated according to criteria based on the City's goals for operating the airport and the master planning objectives, which are described in Section 1.

Airside alternatives address the issue of the FAA standard Runway Safety Areas (RSAs), Runway Object Free Areas (ROFAs), and Obstacle Free Zones (OFZs) described in Section 5. Landside alternatives address the need for additional hangars for based aircraft, tiedown needs, and FBO space. Access, vehicle parking, security fencing, and entry gate locations are also considered.

### Evaluation Criteria

The goal of the concept alternatives analysis was to identify the appropriate airport development that best satisfies the following criteria:

- Long Term Aviation Needs. Conceptual plans must address the 20-year facility requirements identified in Section 5. Additionally, the plans must consider aviation needs beyond the year 2023. The airport should be a user-friendly aviation facility for personal and business travel and aviation public safety operations.
- Safety of Aircraft Operations. The future development should meet current FAA planning and design criteria if feasible, particularly those that enhance the safety of air operations.
- Community and Environmental Compatibility. The future development and operation of the airport must be sensitive to the environment and compatible with the surrounding community.
- Flexibility to Accommodate Change. The plans for future airport development must be flexible enough to accommodate changing needs that cannot be anticipated now.



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**Table 6-1  
Overrun and Short Landing Accidents and Incidents at  
Fullerton Municipal Airport, January 1, 1983 to April 30, 2002**

Date	Type [a]	Aircraft Type	Run- way	Oper- ation [b]	Objects Struck	Injuries [c]			
						F	S	M	N
5/17/84	I	Piper PA 28-161	[d]	LA-O	Fence				1
1/14/85	A	Cessna 177	[d]	LA-O	Fence			2	
2/16/85	A	Cessna T210L	24	LA-O	Fence, Dale St.			3	
10/26/85	A	Cessna 172P	[d]	LA-O	Fence			1	1
4/21/86	A	Cessna 310N	[d]	TO-O	[d]				2
9/4/88	I	Cessna 172N	[d]	LA-O	Taxiway light, sign				1
9/6/88	I	Piper PA24-260	[d]	LA-S	Threshold light				2
5/5/89	I	Piper PA28-181	[d]	LA-O	Fence				2
3/5/89	A	Bellanca 17-31ATC	[d]	LA-O	Fence				1
7/3/90	A	Beech 95-C55	24	LA-O	Fence, Dale St.			3	
12/7/90	I	Mooney 20K	[d]	LA-O	Ditch				2
12/22/90	I	Cessna 210T	[d]	TO-O	[d]				3
5/5/91	A	Cessna T337D	[d]	LA-O	Fence				2
7/7/91	I	Beech 35S	24	LA-S	Approach light				1
2/22/92	A	Beech C23	24	LA-O	Fence				2
12/22/92	A	Cessna 180K	[d]	LA-O	Fence				2
9/16/94	I	Cessna 182P	[d]	LA-O	Earthen embankment				1
8/10/96	A	Cessna 172N	24	LA-O	Fence				1
11/1/96	A	Aerostar SA YAK52	[d]	TO-O	Building, fence			1	
9/2/98	I	Marchetti F260	24	LA-O	Fence				2
8/26/01	A	Piper PA32-301T	[d]	TO-O	Fence				4

[a] A = accident, I = incident

[b] LA-O = landing overrun, LA-S = landing short, TO-O = aborted takeoff overrun

[c] F = fatal, S = serious, M = minor, N = none

[d] Not identified

Sources: National Transportation Safety Board, Aviation Accident Database; Federal Aviation Administration, Incident Data System.

None of the overruns or short landings resulted in serious injury to the aircraft occupants. Although two aircraft came to rest off-airport, both on Dale Street, there were no persons on the ground affected by any of these accidents or incidents. The data bases give little information on aircraft damage. However, under the definition of an accident all accidents in which there is no serious injury resulted in substantial damage to the aircraft. This is supported by the fact that in nearly all case the aircraft struck the airport's perimeter fence or another object.





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The landing distances for Runways 6 and 24, calculated to allow for the standard RSA, ROFA and OFZ, under both of the above options would be less than currently published in the approach plates for the airport,<sup>1</sup> which are:

- Runway 6 landing distance: 2,694 feet.
- Runway 24 landing distance: 2,868 feet.

The resulting takeoff distances under both options would be less than the existing runway length of 3,121 feet.

**Airside Alternative B: Continue To Operate With a Non-Standard RSA, ROFA and OFZ, Under a Waiver From FAA Standards**

The airport is currently operating under a waiver from the FAA due to conditions that pre-dated the standards. Under this alternative, the waiver would be continued. However, pilots could be alerted to the non-standard condition by a notation in the FAA's Airport/Facility Directory<sup>2</sup> under "Airport Remarks." This would alert pilots to the fact that standard RSAs, ROFAs and OFZs are not provided, and would allow pilots to make a takeoff or landing decision on the basis of the runway length that would be available if it had the standard RSA. A suggested notation is provided in Section 7.

This alternative could also include runway "distance remaining" signs that would indicate the runway distance remaining if the standard RSAs were provided.

**Airside Alternative C: Install Aircraft Restraint Material at the Ends of the Runway in Lieu of the Standard RSA, ROFA and OFZ.**

A system developed by the FAA and in use at some commercial airports, called Engineered Materials Arresting System (EMAS), consists of aerated Portland cement. This material, known by the trade name Foamcrete, is designed to collapse and crumble under the weight of an airplane and thus slow or stop the airplane in the event of an overrun when landing or aborting a takeoff.

EMAS material can be applied at the end of a runway when a standard safety area is not practical due to pre-existing objects. EMAS has been installed at several commercial air carrier airports following design criteria contained in FAA Advisory Circular 150/5220-22, Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns.

Research is being conducted by Engineered Arresting Systems Corporation (EASC) under the direction of the FAA to apply EMAS to small airplanes (12,500 pounds and under). Although the research is not complete, EASC estimates an EMAS designed for small airplanes would have the following stopping capability:

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<sup>1</sup> U.S. Department of Commerce, National Oceanic and Atmospheric Administration, U.S. Terminal Procedures.

<sup>2</sup> The Airport/Facility Directory is a guide that provides airport facility and flight information to pilots.





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**Table 6-2  
Summary of Evaluation of Airside Alternatives**

<b>Criterion</b>	<b>Alternative A</b>	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D1</b>	<b>Alternative D2</b>
Long Term Aviation Needs	<u>Poor</u> – Runway takeoff length of about 2,565 feet accommodates only 75% of small aircraft.	<u>Excellent</u> – Runway takeoff length of 3,121 feet accommodates 95% of small aircraft.	<u>Excellent</u> – Runway takeoff length of 3,121 feet accommodates 95% of small aircraft.	<u>Excellent</u> – Runway takeoff length of about 3,100 feet accommodates 95% of small aircraft.	<u>Fair</u> – Runway takeoff length of 2,920 feet accommodates less than 95% of small aircraft.
Safety of Aircraft Operations	<u>Excellent</u> - Satisfies FAA airport design standards for RSA, ROFA and OFZ.	<u>Good</u> – Provides for pilots to make decisions as if a standard RSA were present.	<u>Good</u> – Provides good stopping capability in the event of an overrun.	<u>Good</u> – Provides good stopping capability in the event of an overrun.	<u>Good</u> - Satisfies FAA airport design standards for Runway 6 RSA.
Community and Environmental Compatibility	<u>Good</u> – Slightly greater noise exposure west of airport.	<u>Excellent</u> - No new non-compatible airside development.	<u>Excellent</u> - No new non-compatible airside development.	<u>Excellent</u> - No new non-compatible airside development.	<u>Excellent</u> - No new non-compatible airside development.
Flexibility to Accommodate Change	<u>Excellent</u> – Would not compromise flexibility for airfield changes.	<u>Excellent</u> – Would not compromise flexibility for airfield changes.	<u>Fair</u> – EMAS could constrain future runway improvements.	<u>Fair</u> – EMAS could constrain future runway improvements.	<u>Excellent</u> – Would not compromise flexibility for airfield changes.
Efficiency of Construction Phasing	<u>Excellent</u> – Only minor runway disturbances due to runway re-striping.	<u>Excellent</u> – No construction required.	<u>Fair</u> – Some runway closures could result from the installation or repair of EMAS.	<u>Fair</u> – Some runway closures could result from the installation or repair of EMAS.	<u>Excellent</u> – Only minor runway disturbances due to runway re-striping.
Operational Efficiency	<u>Excellent</u> – No impact on operational efficiency.	<u>Excellent</u> – No impact on operational efficiency.	<u>Excellent</u> – No impact on operational efficiency.	<u>Excellent</u> – No impact on operational efficiency.	<u>Excellent</u> – No impact on operational efficiency.
Relative Cost	<u>Excellent</u> – No significant costs.	<u>Excellent</u> – No significant costs.	<u>Poor</u> – High construction and maintenance costs.	<u>Poor</u> – High construction and maintenance costs.	<u>Excellent</u> – No significant costs.

Source: Analysis by P&D Aviation.



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- The FAA standards for RSA, ROFA and OFZ would be met.
- To meet the RSA standard, there would be relatively minor costs for pavement marking and modifying runway lighting at the ends of the runways.

Disadvantages of this alternative are:

- Under existing conditions (with the RSA, ROFA and OFZ standards unmet), the Runway 6 and 24 takeoff lengths of 3,121 feet satisfy the requirements for over 95 percent of aircraft with a maximum gross weight of no more than 12,500 pounds, the category of aircraft predominantly using the airport now and expected to use it in the future. If the FAA standards for the RSA, ROFA and OFZ were met by shortening the runway, the resulting Runway 6 and 24 takeoff lengths of about 2,565 feet would satisfy the requirements for only about 75 percent of these aircraft. To meet the FAA standards for only the RSA, the runway would need to be shortened by about 400 feet. The resulting Runway 6 and 24 takeoff lengths of about 2,720 feet would satisfy the requirements for more than 75 percent but less than 95 percent of these aircraft.
- Shortening the runway might not significantly reduce the hazard of aircraft overruns. The runway overruns over the last 20 years have generally been by single engine aircraft that could have landed on a runway shortened to meet RSA standards. Thus it is likely that most or all of the accidents would have occurred with a shorter runway having the appropriate RSA.
- If the FAA standards for the RSA, ROFA and OFZ were met, the Runway 24 end would be shifted to the west about 100 feet, resulting in an increase in noise exposure west of the airport.

### **Airside Alternative B**

Advantages of this alternative are:

- The Airport/Facility Directory notice would alert pilots to effective landing and takeoff lengths as if full RSAs were available. They would be able to make their landing and takeoff decisions on that basis.
- Runway distance remaining signs would further alert pilots to the effective takeoff and landing distances if full RSAs were available.
- Pilots familiar with the airport would not experience a change in runway length.
- The cost to implement this alternative would be relatively small.





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Disadvantages of this alternative are:

- FAA standards for RSA, ROFA, and OFZ would not be met.
- This alternative does not address the safety areas in a physical way, but instead relies on pilot judgment.

**Airside Alternative C**

Advantages of this alternative are:

- EMAS provides good aircraft stopping ability. It is believed that many of the aircraft involved in overrun accidents in the past would have been stopped by EMAS material if it were present.
- The existing runway takeoff and landing lengths would not be reduced.

Disadvantages of this alternative are:

- FAA standard distances for RSA, ROFA, and OFZ would not be met.
- A preliminary estimate of the costs to install 80-foot wide EMAS beds from the existing ends of the runway to the blast fence at Runway 6 and perimeter fence at Runway 24 is: Runway 6: \$300,000 and Runway 24: \$900,000.
- The EMAS bed must be repaired once an aircraft travels through it. The estimated cost to repair the EMAS after an overrun occurrence is \$24,000 to \$40,000.
- There would probably be damage to aircraft traveling through an EMAS bed.
- EMAS is subject to accidental damage by vehicles inadvertently traveling through it.

**Airside Alternative D1**

Advantages of this alternative are:

- The Runway 6 end would need to be shortened by about 20 feet. The Runway 24 end would not need to be shortened. The resulting runway length of approximately 3,100 would accommodate 95 percent of small airplanes.
- EMAS provides good aircraft stopping ability. It is believed that many of the aircraft involved in overrun accidents in the past would have been stopped by EMAS material if it were present. It is estimated that 50 feet of EMAS would stop a small airplane exiting the runway at 20 to 30 knots.





Disadvantages of this alternative are:

- FAA standard distances for RSA, ROFA, and OFZ would not be met.
- A preliminary estimate of the costs to install the 50-foot long and 80-foot wide EMAS beds is \$300,000 for each runway end.
- The EMAS bed must be repaired once an aircraft travels through it. The estimated cost to repair the EMAS after an overrun occurrence is \$24,000 to \$40,000.
- There would probably be damage to aircraft traveling through an EMAS bed.
- EMAS is subject to accidental damage by vehicles inadvertently traveling through it.

### **Airside Alternative D2**

Advantages of this alternative are:

- The FAA standard for RSA at the end of Runway 6 would be met.
- To meet the RSA standard, there would be relatively minor costs for pavement marking and modifying runway lighting at the end of the runway.

Disadvantages of this alternative are:

- To meet the FAA standards for the Runway 6 RSA, the runway would need to be shortened by about 200 feet. The resulting Runway 6 and 24 takeoff lengths of about 2,920 feet would satisfy the requirements for less than 95 percent of these aircraft.
- Shortening the runway might not significantly reduce the hazard of aircraft overruns. The runway overruns over the last 20 years have generally been by single engine aircraft that could have landed on a runway shortened to meet RSA standards. Thus it is likely that most or all of the accidents would have occurred with a shorter runway having the appropriate RSA.

The airside concepts were presented to the Planning Advisory Committee (PAC) on December 18, 2002 for further review and evaluation. As a result of this evaluation and review by the FAA, Airside Alternative B is recommended. Under this alternative, the airport will continue to operate with non-standard RSAs, but will install “runway distance remaining” signs for each end and provide notices of non-standard RSAs to pilots in appropriate publications. This solution: (1) retains the existing runway takeoff and landing distances needed for general aviation operations, (2) allows pilots to make aircraft operating decisions on the basis of knowing what the runway lengths would be if standard RSAs were available, and (3) does not require extraordinary costs.



## **ALTERNATIVE LANDSIDE DEVELOPMENT CONCEPTS**

Four alternative landside improvement concepts were prepared. The concepts differ primarily in the extent to which future airport development would accommodate (1) individual storage hangars for based aircraft, (2) tiedowns for based and transient aircraft, and (3) FBO acreage. The alternative concepts were structured to emphasize one or more of the elements or a balance between the three, and to illustrate alternative locations for some facilities. All new development of these elements to 2023 would need to be on the north side of the field due to the build-out of essentially all of the available south side areas with newer facilities and the long-term leases there. Although there has been a proposal by an FBO to use space west of the terminal building, the limited available space on the south side of the airport near the terminal building should be reserved for possible future expansion of the airport administrative and support functions.

Due to the limited space available for future development at the airport, none of the alternatives is able to meet the 2023 needs of all three elements. Table 6-3 summarizes the facilities provided by each concept and compares those facilities with existing facilities and 2023 needs. The hangar and tiedown requirements shown in Table 6-3 are described in Section 5. The FBO requirements are based on two FBOs having an average of five acres each, which is representative of the minimum size of an FBO facility that services mainly small piston and turbo-prop aircraft (under 12,500 pounds), the size of aircraft normally serviced at Fullerton Municipal. The space needs expressed by the FBOs, described in Section 5, total somewhat more than 10 acres.

The landside concepts are illustrated in Figures 6-1 through 6-4 and described below. For purposes of illustration in the concept plans, hangars and taxilanes have the following dimensions:

- T-hangar buildings are 54 feet wide and contain multiple units in a “nested” configuration. Taxilanes serving T-hangars are 64 feet wide (meeting FAA standards for aircraft with 36-foot wingspans). T-hangar units have a clear door opening of 41.5 feet by 12 feet and are 33 feet deep.
- Junior executive hangar units are rectangular, have a clear door opening of 44.5 feet by 14 feet, and are 41 feet deep. Taxilanes serving junior executive hangars are 70 feet wide (meeting FAA standards for aircraft with 42-foot wingspans).
- Executive hangar units are rectangular, have a clear door opening of 55.5 feet by 16 feet, and are 52 feet deep. Taxilanes serving executive hangars are 79 feet wide (meeting FAA standards for aircraft with 49-foot wingspans).
- Corporate hangars are rectangular, have a clear door opening of 64.5 feet by 18 feet, and are 62 feet deep. Taxilanes serving corporate hangars are 79 feet wide. Corporate hangars could provide hangar and office space for any corporate user, or be used by a business providing general aviation services at the airport such as Ray’s Flying Club.





**Table 6-3  
Ability of Alternative Landside  
Development Concepts to Meet Future Needs**

Facility	Existing	Estimated Needs 2023	Concept A	Concept B	Concept C	Concept D
FBO Area (Acres)	9.1 [a]	10 [b]	8.2 [c]	8.2 [c]	9.7	11.1
Individual Hangar Units						
T-hangars	78	--	86	97	97	102
Jr. Executive	59	--	96	85	89	81
Executive	19	--	23	19	23	19
Corp./FBO	0	--	2	2	0	0
Total Units	156	229	207	203	209	202
Based and Transient Tiedowns	255	134 [d]	152 [e]	170 [e]	150 [f]	163 [g]

[a] Includes Aviation Facilities, Inc., General Aviation Company, and Ray's Flying Club.

[b] Based on two FBOs with 5 acres each. The needs expressed by the existing FBOs total more than 10 acres.

[c] Excludes Corporate/FBO hangar and vehicle parking area (1.5 acres), which could be used for FBO space.

[d] Excludes contingency of 50 tiedowns.

[e] Includes an estimated 15 tiedowns in the future Air Combat area.

[f] Includes an estimated 15 tiedowns in the future Air Combat area and 15 tiedowns in the future FBO area.

[g] Includes an estimated 15 tiedowns in the future Air Combat area and 30 tiedowns in the future FBO areas.

Source: P&D Aviation analysis.

The plans show development in three phases: Phase 1A (2003 to 2005), Phase 1B (2006 to 2008), and Phase 2 (2009 to 2013). No hangar or FBO tenants would be displaced during construction because each alternative provides for the development of replacement hangars and tenant areas in the phase preceding the phase in which an existing area would be converted to other uses.

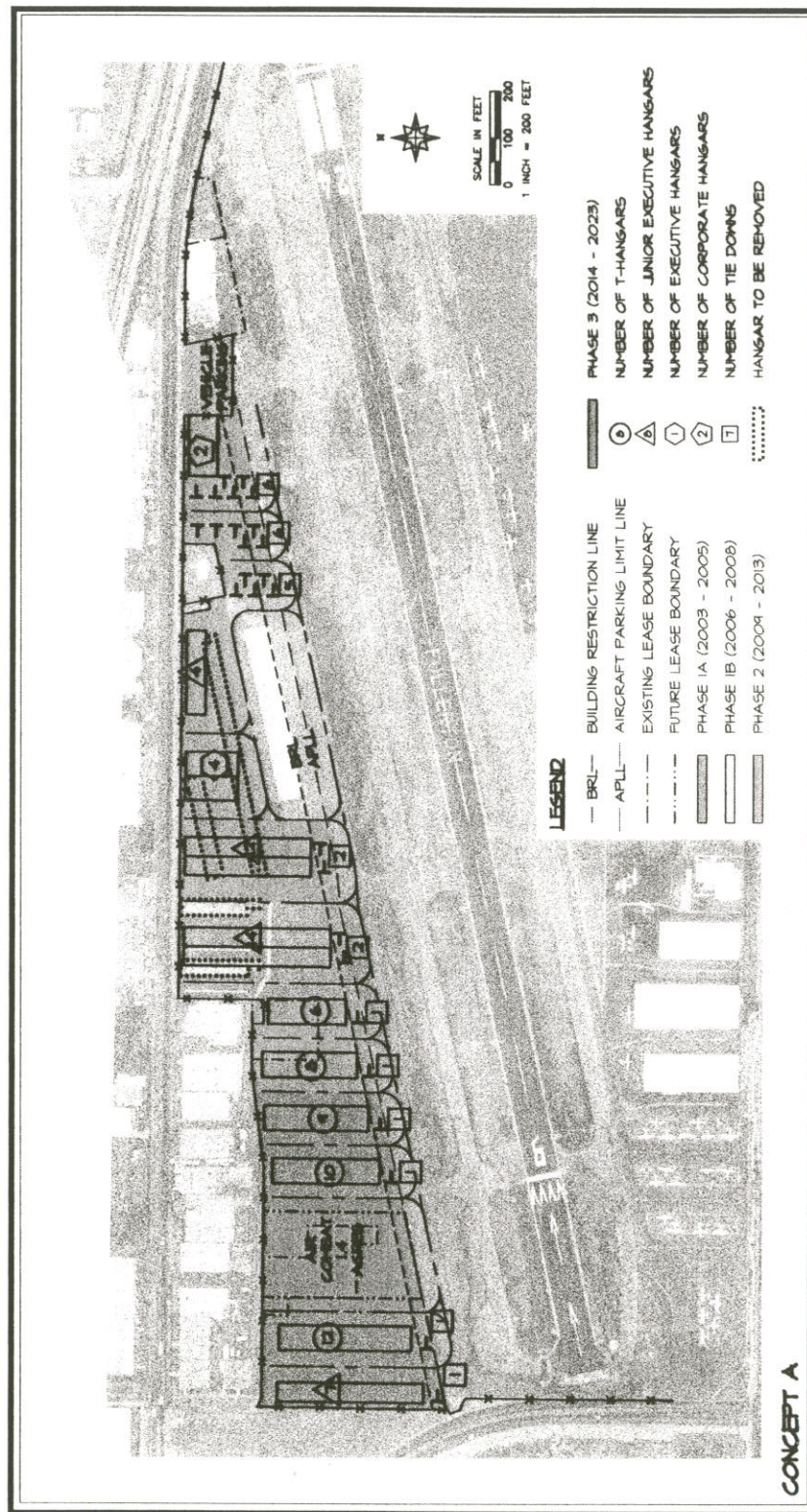
Development features common to all four concepts are:

- Establishing the aircraft parking limit line on the north side of the field 39.5 feet from the taxilane centerline in accordance with FAA standards for Airport Reference Code B-I.
- Establishing the building restriction line on the north side of the field along the south edge of the newer mid-field hangar, approximately 337 feet from the runway centerline. Buildings with this setback would comply with FAR Part 77 standards and would not affect landing minima for the non-precision approaches to Runway 24.





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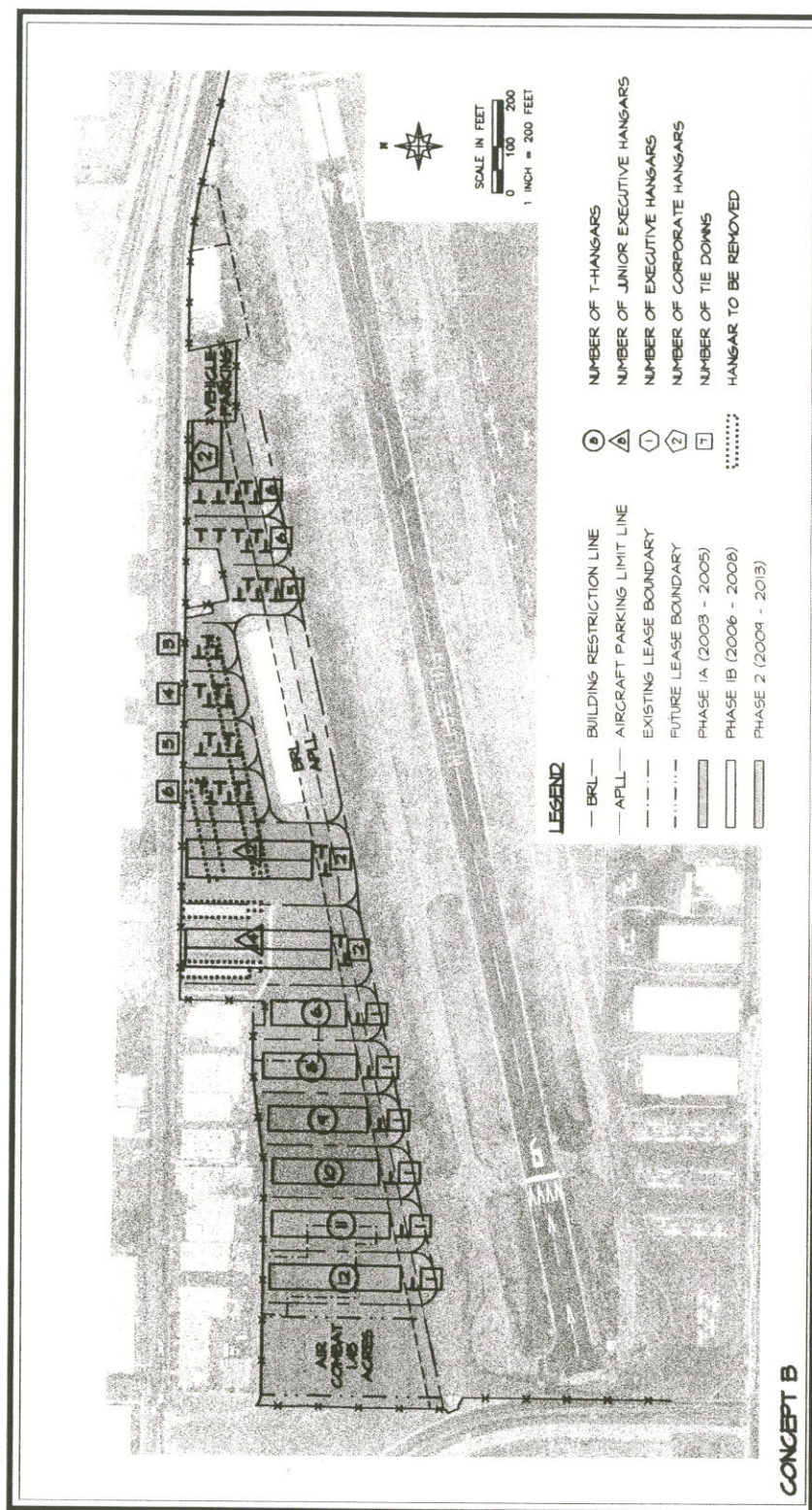


**Figure 6-1  
Landside Concept A**





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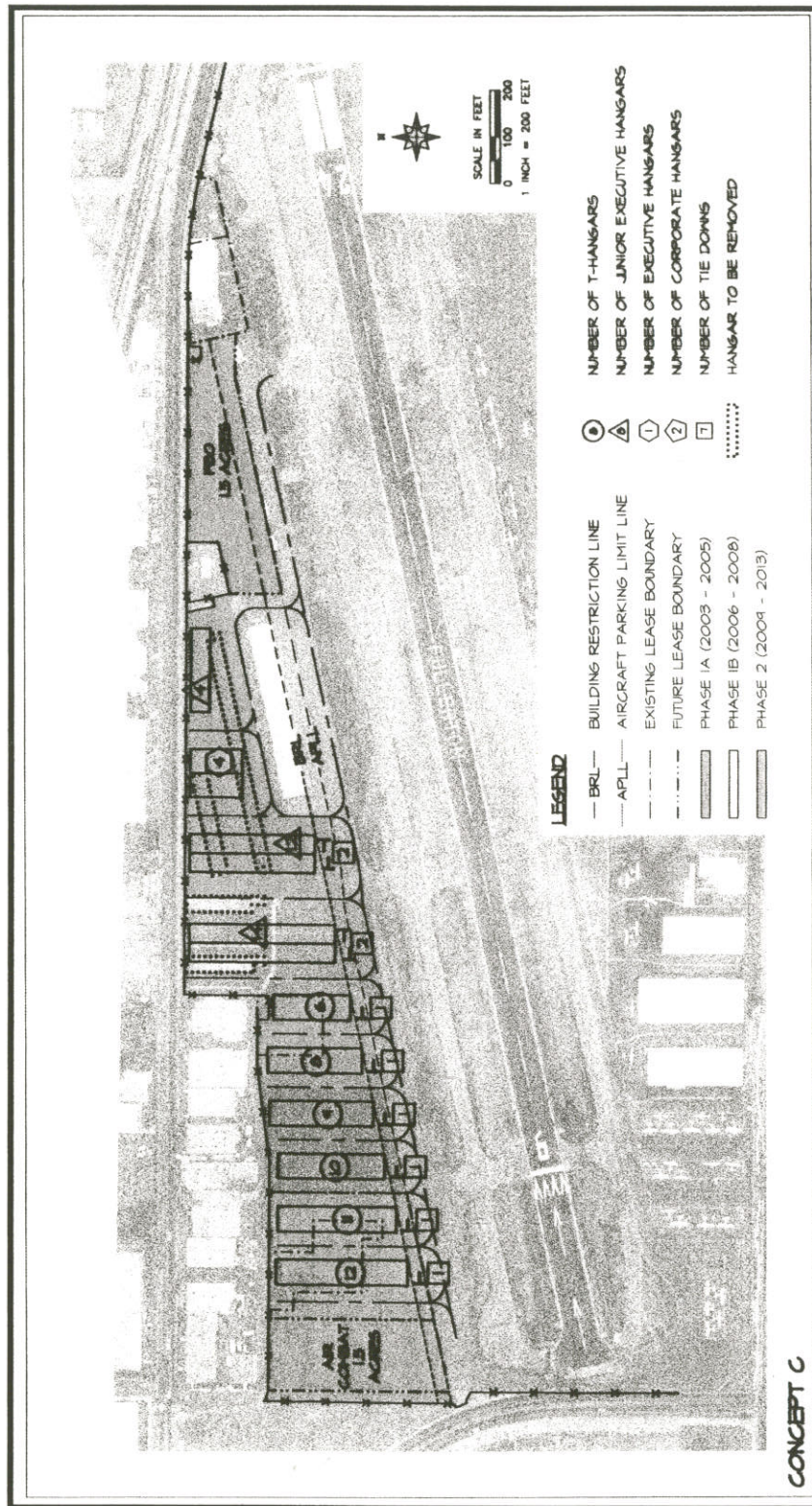


**Figure 6-2  
Landside Concept B**





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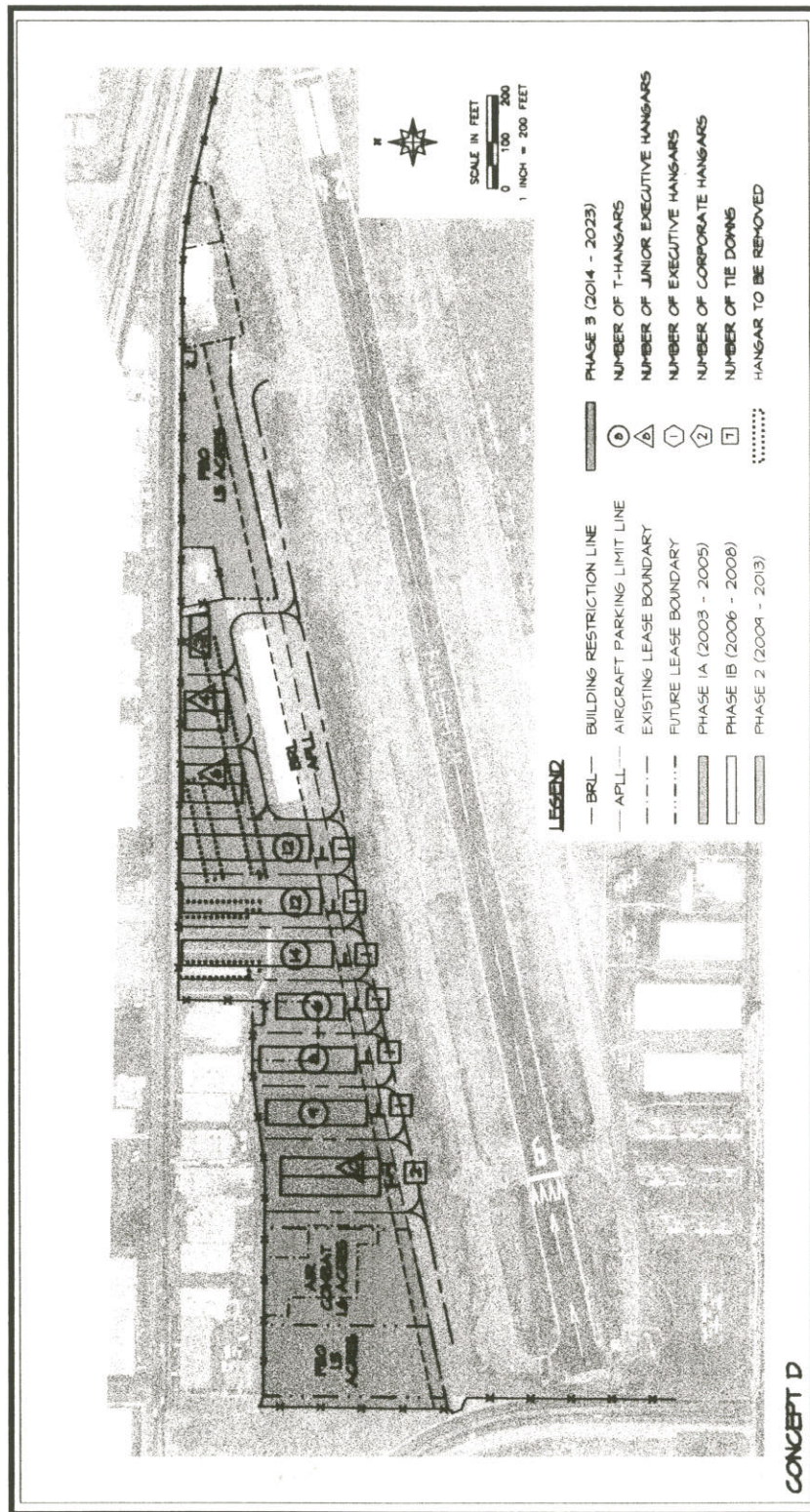


**Figure 6-3  
Landside Concept C**





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**Figure 6-4  
Landside Concept D**



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- Repaving of the northside alleyway, and providing a gate and turn-around area at the end of the alleyway.
- Removing 37 old wooden T-hangars (4 buildings) on the north side due to their deteriorating condition and high maintenance cost.

**Landside Concept A**

Landside Concept A (Figure 6-1) emphasizes hangar development, particularly junior executive hangars. This concept provides a total of 207 hangar units, exceeding the 2008 requirement of 195 but short of the 2013 needs (217 units). Under this concept, development would occur as follows.

**Phase 1A (2003 to 2005).** Nineteen hangar units (7 junior executive and 12 T-hangars) would be constructed in the former northwest tiedown area, which was recently used for pavement crushing during the south apron project. Nineteen T-hangars would be built in the area between Air Combat and Ray's Flying Club. Occupants of the two older north-south hangar buildings would have the opportunity to relocate their aircraft to the new hangars once they are finished.

**Phase 1B (2006 to 2008).** Fourteen junior executive hangars would replace the two north-south rows of older wooden T-hangars.

**Phase 2 (2009 to 2013).** The Ray's Flying Club facility would be relocated to the northeast corner of the airport, offering good street visibility and a larger area. This area could contain two corporate/FBO hangars (with office area), tiedowns, and a vehicle parking lot. The new vehicle parking lot would be located outside the area contained within the airport's security fence.

Fourteen T-hangars would be constructed in the area now occupied by Ray's Flying Club. Groundwater monitoring wells are being placed on the Ray's Flying Club site. It is expected that monitoring will occur for the next five years or longer. No new buildings can be located on the site until monitoring is completed. The remaining two rows of older T-hangars would be replaced with 16 junior executive hangars and four executive hangars.

**Phase 3 (2014 to 2023).** The existing Air Combat lease area would be expanded from 0.8 acres to about 1.4 acres.

This concept would provide a total of 207 individual hangar units, compared to an estimated 2023 requirement of 229. Based and transient tiedowns would total 152, compared with a 2023 requirement of 134. If necessary in the long-term, about 50 additional tiedowns could be obtained by extending the north ramp toward the runway, eliminating the north-side parallel taxiway. This could accommodate additional aircraft relocated from John Wayne Airport and/or satisfy potential demand beyond 2023.





### **Landside Concept B**

In Landside Concept B (Figure 6-2), the eastern portion of the older T-hangar building area would be replaced with tiedowns rather than with junior executive and executive hangars. Thus, this concept emphasizes a balance between hangar and tiedown development. Air Combat would be provided a new site at the northwest corner of the airport. This site is now undeveloped and would offer better street visibility than the present Air Combat location. The new site would also allow Air Combat to operate in its present location until a new facility is built. Vehicle parking for the Air Combat area would be outside the airport's security fence. Under this concept, development would be phased as follows.

**Phase 1A (2003 to 2005).** Nineteen T-hangars would be built in the area between Air Combat and Ray's Flying Club. Occupants of the two older north-south hangar buildings would have the opportunity to relocate their aircraft to the new hangars once they are finished.

**Phase 1B (2006 to 2008).** Fourteen junior executive hangars would replace the two north-south rows of older wooden T-hangars.

**Phase 2 (2009 to 2013).** The Ray's Flying Club facility would be relocated to the northeast corner of the airport. This area could contain two corporate/FBO hangars (with office area), tiedowns, and a vehicle parking lot. The new vehicle parking lot would be located outside the area contained within the airport's security fence. Fourteen T-hangars would be constructed in the area now occupied by Ray's Flying Club once groundwater monitoring is completed.

Air Combat area would have the opportunity to relocate to the northwest corner, a site of about 1.45 acres, compared to its present 0.8 acres. The new Air Combat area would be configured to locate all vehicle parking outside the airport's security fence. Twenty-three T-hangars would be built on the existing Air Combat site. The remaining two rows of older T-hangars would be replaced with 12 junior executive hangars and 18 tiedowns.

Individual hangar units would total 203 in this concept, compared to an estimated 2023 requirement of 229. Based and transient tiedowns would total 170, compared with a 2023 requirement of 134.

### **Landside Concept C**

Landside Concept C (Figure 6-3) emphasizes a combination of FBO development and hangars. This concept is similar to Concept B, with two exceptions. The older hangar area would be replaced entirely with new hangars, rather than a combination of hangars and tiedowns. Also, the northeast area (about 1.5 acres) would be leased to an FBO for development by the FBO, rather than development by the airport. It is expected that this space would be used by an FBO currently at the airport (possibly Ray's Flying Club). FBO space would total about 9.7 acres in this concept. Vehicle parking for the FBO and Air Combat sites would be outside the airport's security fence. Individual hangar units would total 209 in this concept, compared to an estimated 2023 requirement of 229. Based and transient tiedowns would total 150, compared with a 2023 requirement of 134.





### **Landside Concept D**

Landside Concept D (Figure 6-4) represents greater emphasis on providing FBO space. An additional two acres of FBO space would be added, bringing the FBO space to approximately 11.1 acres. Vehicle parking for the FBO and Air Combat sites would be outside the airport's security fence. Under this concept, development would occur as follows.

**Phase 1A (2003 to 2005).** Nineteen hangars (10 junior executive and 9 T-hangars) would be built in the area between Air Combat and Ray's Flying Club. Occupants of the two older north-south hangar buildings would have the opportunity to relocate their aircraft to the new hangars once they are finished.

A 1.3-acre FBO site would be available at the northwest corner.

**Phase 1B (2006 to 2008).** Fourteen T-hangars would be constructed in the area now occupied by the westerly north-south row of older T-hangars.

**Phase 2 (2009 to 2013).** The Ray's Flying Club facility would be relocated to the northeast corner of the airport, offering good street visibility and a larger area. Fourteen T-hangars would be constructed in the area now occupied by Ray's Flying Club once groundwater monitoring is completed. The remaining older wooden T-hangars would be replaced with 24 T-hangars and 12 junior executive hangars.

**Phase 3 (2014 to 2023).** The existing Air Combat area could be expanded from 0.8 acres to about 1.6 acres.

This concept would provide a total of 202 individual hangar units, compared to an estimated 2023 requirement of 229. Based and transient tiedowns would total 163, compared with a 2023 requirement of 134.

### **EVALUATION OF LANDSIDE ALTERNATIVES**

Five preliminary landside concepts were presented to the Planning Advisory Committee for their review at the meeting on August 13, 2002. Following that meeting the landside concepts were revised, reduced to four, and the phasing of landside improvements for each concept was added to produce the refined concepts described here.

The four alternative landside concepts were evaluated according to the criteria described at the beginning of this section. A summary evaluation matrix is presented as Table 6-4. Concepts are rated as excellent, good, fair or poor with respect to each criterion.



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**Table 6-4  
Summary of Evaluation of  
Alternative Landside Development Concepts**

<b>Criterion</b>	<b>Concept A</b>	<b>Concept B</b>	<b>Concept C</b>	<b>Concept D</b>
Long Term Aviation Needs – Hangars [a]	<u>Fair</u> – Satisfies 2008 hangar needs but not 2013 needs.	<u>Fair</u> – Satisfies 2008 hangar needs but not 2013 needs.	<u>Fair</u> – Satisfies 2008 hangar needs but not 2013 needs.	<u>Fair</u> – Satisfies 2008 hangar needs but not 2013 needs.
Long Term Aviation Needs – Tiedowns [a]	<u>Good</u> - Satisfies 2023 tiedown needs.	<u>Good</u> - Satisfies 2023 tiedown needs.	<u>Good</u> - Satisfies 2023 tiedown needs.	<u>Good</u> - Satisfies 2023 tiedown needs.
Long Term Aviation Needs – FBO Space [a]	<u>Good</u> - FBO space reduced by 0.9 acres, but corporate area increases potential FBO space by 1.5 acres.	<u>Good</u> - FBO space reduced by 0.9 acres, but corporate area increases potential FBO space by 1.5 acres.	<u>Good</u> - FBO space increased by 0.6 acres.	<u>Excellent</u> - FBO space increased by 2 acres, satisfying 2023 needs.
Safety of Aircraft Operations	<u>Excellent</u> - Satisfies FAA airport design standards for landside facilities.	<u>Excellent</u> - Satisfies FAA airport design standards for landside facilities.	<u>Excellent</u> - Satisfies FAA airport design standards for landside facilities.	<u>Excellent</u> - Satisfies FAA airport design standards for landside facilities.
Community and Environmental Compatibility	<u>Excellent</u> - No new non-compatible landside development.	<u>Excellent</u> - No new non-compatible landside development.	<u>Excellent</u> - No new non-compatible landside development.	<u>Excellent</u> - No new non-compatible landside development.
Flexibility to Accommodate Change	<u>Fair</u> - Provides mix of hangar sizes. Build-out of north side somewhat limits flexibility.	<u>Good</u> - Provides mix of hangar sizes. Tiedowns provide some flexibility to meet changing needs.	<u>Fair</u> - Provides mix of hangar sizes. Build-out of north side somewhat limits flexibility.	<u>Fair</u> - Provides mix of hangar sizes. Build-out of north side somewhat limits flexibility.





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**Table 6-4  
Summary of Evaluation of  
Alternative Landside Development Concepts  
(Continued)**

<b>Criterion</b>	<b>Concept A</b>	<b>Concept B</b>	<b>Concept C</b>	<b>Concept D</b>
Efficiency of Construction Phasing	<u>Excellent</u> – Allows all tenant lease areas and hangars to remain occupied while replacement facilities are constructed.	<u>Excellent</u> – Allows all tenant lease areas and hangars to remain occupied while replacement facilities are constructed.	<u>Excellent</u> – Allows all tenant lease areas and hangars to remain occupied while replacement facilities are constructed.	<u>Excellent</u> – Allows all tenant lease areas and hangars to remain occupied while replacement facilities are constructed.
Operational Efficiency	<u>Good</u> - Improved access and parking for north side. New hangars can be accessed from two gates.	<u>Excellent</u> - Improved access and parking for north side. New hangars can be accessed from one gate at end of alleyway.	<u>Excellent</u> - Improved access and parking for north side. New hangars can be accessed from one gate at end of alleyway.	<u>Excellent</u> - Improved access and parking for north side. New hangars can be accessed from one gate at end of alleyway.
Relative Financial Effectiveness – Net Increase (Decrease) in Leased Area [a]	<u>Excellent</u>	<u>Good</u>	<u>Excellent</u>	<u>Good</u>
FBO Acres	(0.9) [b]	(0.9) [b]	0.6	2.0
T-hangars	8	19	19	24
Jr. Ex. Hangars	37	26	30	22
Ex. Hangars	4	0	4	0
Corp. Hangars	<u>2</u>	<u>2</u>	<u>0</u>	<u>0</u>
Total Hangars	51	47	53	46

[a] Refer to Table 6-3.

[b] An addition of 0.6 acres with the new corporate area.

Source: P&D Aviation analysis.



### **Landside Concept A**

Advantages of this concept are:

- Improves access and auto parking for north-side facilities
- Provides a larger lease area for Air Combat
- Makes available new, larger replacement facilities for Ray's Flying Club with street visibility.
- Replaces 37 old T-hangar units (4 buildings) in poor condition
- Provides a variety of new hangar sizes
- Meets the estimated 2008 hangar requirement (207 provided vs. 195 needed for 2008)
- Meets the estimated tiedown need for 2023
- Allows all tenant lease areas and hangars to remain occupied while replacement facilities are constructed

Disadvantages are:

- Builds out essentially all of north side, leaving little flexibility to accommodate unforeseen needs
- Does not increase FBO space
- Some tiedown space for Ray's Flying Club tenants would need to be located on the south side of the airport
- Falls short of meeting the estimated total hangar need for 2023 (207 provided vs. 229 needed)

### **Landside Concept B**

Advantages of this concept are:

- Improves access and auto parking for north-side facilities
- Provides a new, larger lease area for Air Combat with better street visibility
- Makes available new replacement facilities for Ray's Flying Club
- Replaces 37 old T-hangar units (4 buildings) in poor condition
- Provides a variety of new hangar sizes
- Meets the estimated 2008 hangar requirement (203 provided vs. 195 needed for 2008)
- Significantly exceeds the estimated tiedown need for 2023 (175 provided vs. 134 needed)
- Allows all tenant lease areas and hangars to remain occupied while replacement facilities are constructed

Disadvantages are:

- Does not increase FBO space





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- Some tiedown space for Ray's Flying Club tenants would need to be located on the south side of the airport
- Falls short of meeting the estimated total hangar need for 2023 (203 provided vs. 229 needed)

**Landside Concept C**

Advantages of this concept are:

- Improves access and auto parking for north-side facilities
- Provides a new, larger lease area for Air Combat with better street visibility
- Makes available new 1.5-acre FBO lease area, which could be used by Ray's Flying Club, increasing total FBO space to 9.7 acres (0.3 acres short of 2023 needs)
- Replaces 37 old T-hangar units (4 buildings) in poor condition
- Provides a variety of new hangar sizes
- Meets the estimated 2008 hangar requirement (209 provided vs. 195 needed for 2008)
- Meets the estimated tiedown need for 2023 (155 provided vs. 134 needed)
- Allows all tenant lease areas and hangars to remain occupied while replacement facilities are constructed

Disadvantages are:

- Builds out essentially all of north side, leaving little flexibility to accommodate unforeseen needs
- Falls short of meeting the estimated total hangar need for 2023 (209 provided vs. 229 needed)
- Some tiedown space for Ray's Flying Club tenants would need to be located on the south side of the airport

**Landside Concept D**

Advantages of this concept are:

- Improves access and auto parking for north-side facilities
- Provides approximately two acres of new FBO area, increasing total FBO space to 11.1 acres, exceeding the estimated 2023 needs
- Provides a larger lease area for Air Combat
- Replaces 37 old T-hangar units (4 buildings) in poor condition
- Provides a variety of new hangar sizes
- Exceeds the estimated tiedown need for 2023 by 29 (163 provided vs. 134 needed)
- Allows all tenant lease areas to remain occupied while replacement facilities are constructed



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Disadvantages are:

- Falls short of meeting the estimated total hangar need for 2023 (192 provided vs. 229 needed)
- Builds out essentially all of north side, leaving little flexibility to accommodate unforeseen needs
- Some tiedown space for Ray's Flying Club tenants would need to be located on the south side of the airport

**Recommended Landside Concept**

The final four landside development concepts were evaluated and presented at the second Planning Advisory Committee on December 18, 2002. As a result of these evaluations, Landside Concept A, with some refinements, was selected. The Master Plan development concept, shown in Figure 2-1, emphasizes hangar development, with a mix of sizes ranging from T-hangars to junior executive hangars. This concept is preferred because it (1) provides the greatest number of hangars in Phase 1A, (2) provides a mix of hangar sizes, (3) meets the 2008 hangar needs, (4) replaces the older wooden hangars in poor condition, and (5) allows all tenant areas to remain occupied while new facilities are built.

