3

Airfield Design

OVERVIEW

The two key airfield design issues addressed in this chapter are the future length of Runway 5-23 (the main runway) and the future location of Runway 4-22 (the sailplane runway). The need for additional taxiways under certain design assumptions is also discussed.

Basic Design Factors

The airport's operational role, that of a general aviation airport, requires that it serve a wide variety of aircraft sizes and types. This role recently changed with the loss of the United States Forest Service's fire attack base. The anticipated relocation of the California Department of Forestry and Fire Fighting base within the next couple of years is expected to bring to an end the airport's long-standing role as a fire attack base. Throughout the 20-year planning period, the principal elements of the airport's role are expected to be serving recreational and business users. The purpose of the proposed airfield improvements is to enhance this established role.

Existing facilities and site constraints shape future airfield configuration options. The most significant constraints are the mobile home park north of the airport and the railroad tracks to the south. To a lesser degree, the public roads to the west and south also constrain development.

Demand Determinants

For the purposes of establishing airfield dimensional standards, the FAA defines the critical airplane as the type or types that "will make substantial use of the airport in the foreseeable future. Substantial use means 500 or more annual itinerant operations or scheduled commercial service". (FAA Order 5090.3B)

Cessna Skyhawk

In general terms, airfield operational demand characteristics are defined by the airport role and projected activity levels as addressed in the preceding chapter. In the more specific context of airfield facility design issues, these demand factors can be summarized as follows:

- **Design Aircraft** — The majority of operations at Hemet-Ryan Airport are generated by single-engine aircraft and sailplanes. However, the airport also sees use by larger, faster aircraft such as twin-engine piston and turboprop aircraft, and small and medium-size business jets (e.g., Citation VII and Falcon 900).
- **Runway Approach Type** — Hemet-Ryan Airport is presently served by one straight-in GPS approach, a circle-to-land approach using a nondirectional beacon, and a GPS-based circle-to-land approach. The straight-in approach is to Runway 5. The lowest approach minimums for the airport are 1,215 feet above the airport elevation and 1¼ -mile visibility (GPS Runway 5).
- **Aircraft Activity Volume** — The *Master Plan* activity forecasts indicate that Hemet-Ryan Airport has a potential to grow to 100,000 annual operations over the next 20 years (compared to approximately 70,000 at present).

Needs Assessment

RUNWAY CAPACITY FACTORS

- Runway configuration.
- Location of runway exits.
- Existence of air traffic control facilities and navigational aids.
- Mix of aircraft types (including helicopters) using the airport.
- The amount of touch-and-go training activity.
- The extent of instrument versus visual weather conditions.
- Peaking conditions (i.e., the hourly, daily, and seasonal variations in traffic demands.
- The proximity of nearby airports and other factors affecting airspace use.

For the purposes of airfield design, the above operational demands must be translated into facility needs. In basic terms, these needs can be assessed with respect to the following four factors:

- **Operational Capacity** — An airport's airfield capacity is generally measured in terms of the number of aircraft operations the runway and taxiway system can accommodate in an hour or over a year. Calculation of airfield capacity, particularly annual capacity, is dependent upon various physical and operational factors, as listed to the left.

  Given the current high level of activity and forecast increases, it is essential that future runway/taxiway system improvements maximize airfield capacity. The airfield capacity is rated at 355,000 annual operations. This level is well above forecast activity levels.

  Peak-period capacity is of limited concern. Based upon the FAA's capacity model, the runways can accommodate approximately 197 VFR operations per hour and 62 IFR operations per hour. However, actual peak VFR capacity is probably higher due

to the unique nature of the soaring operations (e.g., two aircraft depart at a time). Actual IFR capacity is probably lower due to the high elevation of the missed approach fix, which necessitates a longer than usual climb-out.

- **Runway Length** — The length of runway required to accommodate the most demanding airplanes anticipated to use an airport is a fundamental airfield design factor. Runway length requirements for specific aircraft are dependent upon airfield elevation, design temperature (the average high temperature for the hottest month), and the stage length (distance to be flown). The FAA has established formulas indicating the desirable runway length for various classes of aircraft. If a particular aircraft is especially key to an airport's role, this data is available in performance charts provided by aircraft manufacturers. Specific length requirements for Hemet-Ryan Airport's runways are analyzed in subsequent sections of this chapter.

- **Airport Classification/Design Standards** — Another basic airfield design requirement that must be assessed is the capability of the facilities to safely accommodate the types of aircraft that seek to operate at the airport. Runway length is a key component of this assessment, but other facility dimensions — such as pavement widths and the lateral clearances from the runway to adjacent taxiways and structures — also are important.

  FAA design standards for these features are set in accordance with the *Airport Reference Code* (ARC) applicable to the airport as a whole or, in many cases, to individual runways or taxiways. The primary determinants of ARC classifications are:

  - The approach speed, wingspan, and weight of the most demanding types of aircraft a runway or taxiway is intended to serve; and
  - The existing or planned runway approach type and visibility minimums.

  Table 3A summarizes the FAA design standards associated with several ARC classifications potentially applicable to Hemet-Ryan Airport. The significance of these standards with respect to individual components of the airfield design is discussed in subsequent sections of this chapter.

Item	FAA Airport Design Standards[1]			
Airport Reference Code	B-I (small)	B-I	B-II	C-II
Aircraft Approach Speed	<121 kts	<121 kts	<121 kts	<141 kts
Aircraft Wingspan	<49 ft.	<49 ft.	<79 ft.	<79 ft.
Aircraft Weight Group (lbs)	≤12,500	>12,500	>12,500	>12,500
Approach Visibility Minimums	Visual or ≥¾ mile	Visual or ≥¾ mile	Visual or ≥¾ mile	Visual or ≥¾ mile
Runway Design				
Width	60 ft.	60 ft.	75 ft.	100 ft.
Blast Pad				
Width	80 ft.	80 ft.	95 ft.	120 ft.
Length beyond Runway End	60 ft.	100 ft.	150 ft.	150 ft.
Safety Area				
Width	120 ft.	120 ft.	150 ft.	400 ft.
Length beyond Runway End	240 ft.	240 ft.	300 ft.	1,000 ft.
Obstacle Free Zone[2]				
Shape[3]	A	A	A	C
Width (W)	250 ft.	400 ft.	400 ft.	400 ft.
Vertical Height (H) [4,5]	NA	NA	NA	NA
Slope (S) [6]	NA	NA	NA	NA
Object Free Area				
Width	250 ft.	400 ft.	500 ft.	800 ft.
Length beyond Runway End	240 ft.	240 ft.	300 ft.	1,000 ft.
Gradient (maximum)	2.0%	2.0%	2.0%	2.0%
Runway Setbacks				
From Runway Centerline to:				
Parallel Runway Centerline[7]	700 ft.	700 ft.	700 ft.	700 ft.
Hold Line	125 ft.	200 ft.	200 ft.	250 ft.
Parallel Taxiway	150 ft.	225 ft.	240 ft.	300 ft.
Aircraft Parking Line	125 ft.	200 ft.	250 ft.	400 ft.
Building Restriction Line[8]	370 ft.	495 ft.	495 ft.	495 ft.
Helipad for:				
Small Helicopters (≤6,000 lbs.)	300 ft.	500 ft.	500 ft.	500 ft.
Medium Helicopters (≤12,000 lbs.)	500 ft.	500 ft.	500 ft.	500 ft.
Heavy Helicopters (>12,000 lbs.)	700 ft.	700 ft.	700 ft.	700 ft.
Taxiway Design				
Width	25 ft.	25 ft.	35 ft.	35 ft.
Safety Area Width	49 ft.	49 ft.	79 ft.	79 ft.
Taxiway and Taxilane Setbacks				
From Taxiway Centerline to:				
Parallel Taxiway/Taxilane [9]	69 ft.	69 ft.	105 ft.	105 ft.
Fixed or Movable Object	45 ft.	45 ft.	66 ft.	66 ft.
From Taxilane Centerline to:				
Fixed or Movable Object	40 ft.	40 ft.	58 ft.	58 ft.
Runway Protection Zone[10]				
Width at Inner End	250 ft[10]	500 ft.[10]	500 ft.[10]	500 ft.
Width at Outer End	450 ft.	700 ft.	700 ft.	1,010 ft.
Length	1,000 ft.	1,000 ft.	1,000 ft.	1,700 ft.

TABLE 3A

Airport Design Standards

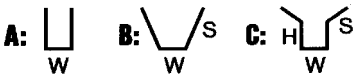
Hemet-Ryan Airport

Notes:

[1] Source: FAA Advisory Circular 150/5300-13, Change 4, *Airport Design* (November 1994).

[2] Object Free Zone normally extends 200 feet beyond end of runway; additional length required for runways with approach systems.

[3] Runway Obstacle Free Zone cross-section shapes:



[4] Height increases 3 feet per 1,000 feet of airport elevation.

[5] Indicated dimensions for runways with approach visibility minimums <¾ mile are for Category I instrument runways. Criteria for Category II and Category III runways are more restrictive.

[6] Maximum of 0.8% in first and last quarters of runway.

[7] Indicated runway separation is for planning purposes. FAA air traffic control criteria permit simultaneous operations by light, single-engine propeller airplanes with runways as close as 300 feet apart and by twin-engine propeller airplanes with runway separation of 500 feet. [FAA Order 7110.656].

[8] The FAA no longer has fixed-distance standards for the Building Restriction Line location. The indicated setback distances are based on providing 7:1 transitional slope clearance over a 35-foot building situated at the same base elevation as the adjacent runway and can be adjusted in accordance with local conditions.

[9] Assumes same size airplane uses both taxiway and adjacent taxiway/taxilane. Distance can be reduced if secondary taxiway/taxilane is limited to use only by smaller airplanes.

[10] For runways with approach visibility minimums of ¾ mile or more, but less than 1 mile, runway protection zone dimensions are 1,000 feet width at inner end, 1,510 feet width at outer end, and a length of 1,700 feet.

TABLE 3A, continued

- **Wind Coverage** — Strong winds at an airport can represent additional airfield design concerns. FAA guidelines establish that the orientation of an airport's runway or runways should enable the airport to be useable, with crosswinds of an acceptable velocity, during at least 95% of the year. Airports with lower annual wind coverage qualify for FAA funding for a crosswind runway. The criteria for an acceptable crosswind velocity are tied to the runway's airport reference code and thus to the type of aircraft using the runway.

Information on wind data collected at the Hemet-Ryan Airport indicates that the airport's runways are usable 98% of the year. This meets the FAA criteria; no crosswind runway is needed.

RUNWAY 5-23

Current Role

Runway 5-23 serves as the main runway at Hemet-Ryan Airport. The runway is 4,325 feet long and 100 feet wide. The pavement is designed to accommodate aircraft weighing up to 80,000 pounds with single-wheel main gear, and 130,000 pounds with dual-wheel main gear.

Runway 5-23 serves all powered aircraft using Hemet-Ryan Airport, except for aircraft used as tow planes and a small number of ultralights that weigh enough to be technically classified as aircraft. This runway has accommodated the full spectrum of aircraft ranging from single-engine, single-seat, piston-powered aircraft, to four-engine fire attack aircraft, to corporate jets. Although the fire attack aircraft are currently expected to relocate in the near future, the balance of the spectrum of aircraft are expected to continue to use the airport. Following the departure of fire attack aircraft, the most demanding aircraft will be corporate jets.

Future Role

The analysis presented in Chapter 2 concluded that the airport would remain predominantly a recreationally oriented airport. However, anticipated increases in recreational opportunities and industrial development are forecast to increase the frequency of use by transient business jets. Most of the business jet operations are expected to

originate within California, especially southern California. The jets will principally be those in the 20,000 to 30,000 pound range. The new class of small jets is expected to be a significant proportion of the jets using Hemet-Ryan Airport.

In the future, corporate jets will be the most demanding user of the airport. That is, the needs of these aircraft will define the required characteristics of the main runway. The three physical characteristics that define a runway's capabilities are: strength, width and length. Each is analyzed in the paragraphs that follow.

Pavement Strength — Most of the corporate jets using the airport are expected to have gross weights less than 30,000 pounds (dual wheel). Occasionally, corporate aircraft may use the airport, which have gross weights up to 60,000 pounds (dual wheel). The existing pavement strength is more than adequate to accommodate these aircraft.

If the runway is extended, pavement section should be designed to accommodate regular use by 30,000-pound aircraft and less frequent use by 60,000 pound, dual-wheel aircraft. At the time the pavement design for an extension is developed, the potential for fire attack aircraft to return should be evaluated. If the return of fire attack aircraft appears plausible, the pavement section design should include consideration of the need to increase the strength of the extension to match that of the existing runway.

Runway Width — The runway is currently 100 feet wide. This width meets FAA design guidelines for aircraft with approach speeds up to 141 knots and wingspans up to 118 feet. This fully meets the anticipated future needs of the airport.

Runway Length —As noted earlier, the most demanding aircraft expected to regularly use Hemet-Ryan Airport weigh less than 30,000 pounds. Occasionally, the airport will see use by aircraft with weights up to 60,000 pounds. However, no specific aircraft were identified as the critical aircraft. Therefore, determining the appropriate runway length will need to be based upon a broad analysis of this general class of aircraft.

The principal factors determining the runway length required for aircraft operations are temperature and altitude. The mean (average) maximum temperature at the airport is 98.6°F. The runway's highest elevation is 1,515 feet above mean sea level.

The FAA has a program that calculates runway length requirements for various groups of aircraft types under a variety of scenarios. When the airport's temperature, elevation and other characteristics were input into the program, the data below was generated.

RUNWAY LENGTH (IN FEET) REQUIRED TO ACCOMMODATE:	
All small aircraft with less than 10 passenger seats	4,370
All small aircraft	4,710
75% of large aircraft of 60,000 pounds or less at 60% useful load	5,170
100% of large aircraft of 60,000 pounds or less at 60% useful load	6,520
75% of large aircraft of 60,000 pounds or less at 90% useful load	7,590

The current runway length (4,315 feet) approximately equals the length required to accommodate small aircraft (i.e., those weighing less than 12,500 pounds) with less than 10 passenger seats. In selecting a future runway length, it is appropriate to reconsider the key elements of the future critical aircraft:

- The corporate jets expected to use the airport are predominantly from the lighter end of the spectrum (under 30,000 pounds)
- The point of origin for these flights will be within California, with many originating in southern California. The amount of fuel carried for these flights will be lower than flights with more distant origins. Therefore, most of these aircraft departing Hemet-Ryan Airport will require modest fuel loads. This means these aircraft will have lower payloads and require less runway length.

Both of these factors suggest that an extension at the shorter end of the spectrum would be adequate. The shortest runway length shown in the table above (5,170 feet) would accommodate most (75%) large aircraft under 60,000 pounds with 60% of their possible payload. This length is of the same magnitude as the extension shown on the currently adopted airport layout plan. Therefore, it is recommended that the future runway length for Runway 5-23 be retained at 5,300 feet.

AIRPORT REFERENCE CODE

Understanding the Airport Reference Code Concept

FAA airfield design standards are linked to the approach speed, wingspan, and weight of the most demanding aircraft to regularly use that part of the airfield. The most demanding aircraft is termed the "critical" aircraft. There may be more than one critical aircraft at an airport. Where there is more than one runway, each runway could have a different critical aircraft. There may also be one critical aircraft for wingspan and another for weight.

Aircraft Approach Category (speed)
- A: less than 91 knots
- B: 91 knots or more but less than 121 knots
- C: 121 knots or more but less than 141 knots

Airplane Design Group (wingspan)
- I: Up to but not including 49 feet
- II: 49 feet up to but not including 79 feet
- III: 79 feet up to but not including 118 feet
- IV: 118 feet up to but not including 171

Aircraft are categorized by their approach category, design group, and weight. Aircraft are assigned to one of five approach categories based upon their approach speed. The three approach categories relevant to Hemet-Ryan are shown on the adjacent table. Based upon their wingspan, aircraft are also assigned one of six design groups. The four design groups relevant to this airport are shown on the adjacent table. Finally, aircraft are categorized as either "small" if they have maximum certificated takeoff weights of 12,500 pounds or less. Aircraft with higher weights are termed "large" aircraft.

FAA airfield design standards are defined by the "Airport Reference Code" (ARC) of the critical aircraft. The approach category, design group, and weight of the critical aircraft define the ARC. For example, the Piper Navajo has an approach speed of 100 knots, a wingspan of 40.7 feet, and has a maximum weight of 6,200 pounds. Therefore, it can be categorized as a B-I (small) aircraft. Where the Piper Navajo is the critical aircraft, the ARC would be B-I (small).

Applying the Airport Reference Code Concept

Cessna Citation

The currently adopted airport layout plan indicates that the DC-4 is the current critical aircraft for Runway 5-23, and the C-130 is the future critical aircraft. These fire attack aircraft have ARCs of B-III and C-IV, respectively. Because fire attack operations are expected to end at Hemet-Ryan Airport, the appropriate critical aircraft for Runway 5-23 needs to be redefined.

As noted earlier in the section on Airport Role, the most demanding aircraft to regularly use Runway 5-23 is forecast to be business jets weighing less than 30,000 pounds. Representative aircraft would be the Cessna Citation III and the Hawker 800XP. This class of aircraft is in ARC B-II. Therefore, it would normally be appropriate to use

the airfield design standards in ARC B-II for this runway. However, this runway was designed to ARC B-III standards. The existing runway width and runway safety area were constructed to B-III standards.

There would be significant costs, but no operational benefits, to reducing the runway width and runway safety area dimensions. Therefore, it is proposed that the existing runway and safety area dimensions be retained. Further, it is proposed that these dimensions be used in any extension of Runway 5-23.

SITING THE EXTENSION

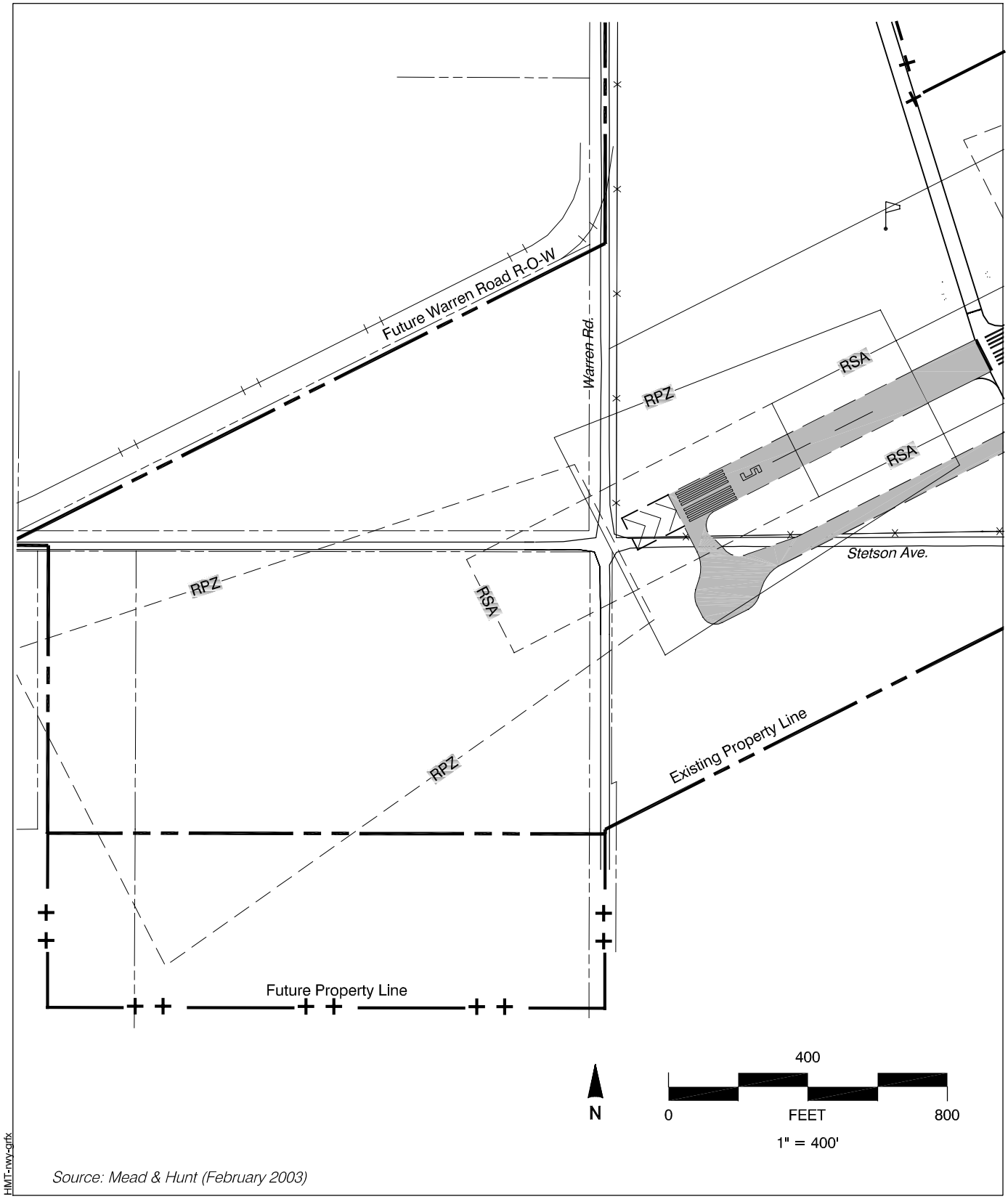
To reach a length of 5,300 feet an extension of 985 feet is required. The current airport layout plan shows all of this extension being placed on the southwest end of Runway 5-23. It would be physically possible to place the extension on the northeast end, or a portion on each end. Regardless of which alternative is selected, an extension will require:

- Paving of an additional 985 feet of runway with 100 foot width
- Extension of the parallel taxiway and creation of a new runup apron
- Installation of additional runway edge lights
- Paving of a blast pad
- Grading of a safety area 600 feet beyond the runway end and 300 feet wide (the B-III standard)

The specific requirements of the alternative ways of extending Runway 5-23 to 5,300 feet are as follows:

Full-Length Southwesterly Extension — In addition to the features listed above, a 985-foot extension to the southwest would require the relocation of Warren Road and Stetson Avenue (Figure 3A). This would be accomplished by swinging the alignment of Warren Road to the west and connecting to the existing alignment of Stetson Avenue about 1,700 feet west of the current intersection. Stetson Avenue's current alignment would be replaced with one along the south side of the railroad tracks. The existing perimeter fencing would be extended along the airport property line.

Full-Length Northeasterly Extension — A 985-foot extension of Runway 5-23 to the northeast would require the acquisition of property (Figure 3B). Although the runway could be constructed on existing airport property, land would be needed for the parallel taxiway



Source: Mead & Hunt (February 2003)

FIGURE 3A

Full Length Southwest Extension

Hemet-Ryan Airport

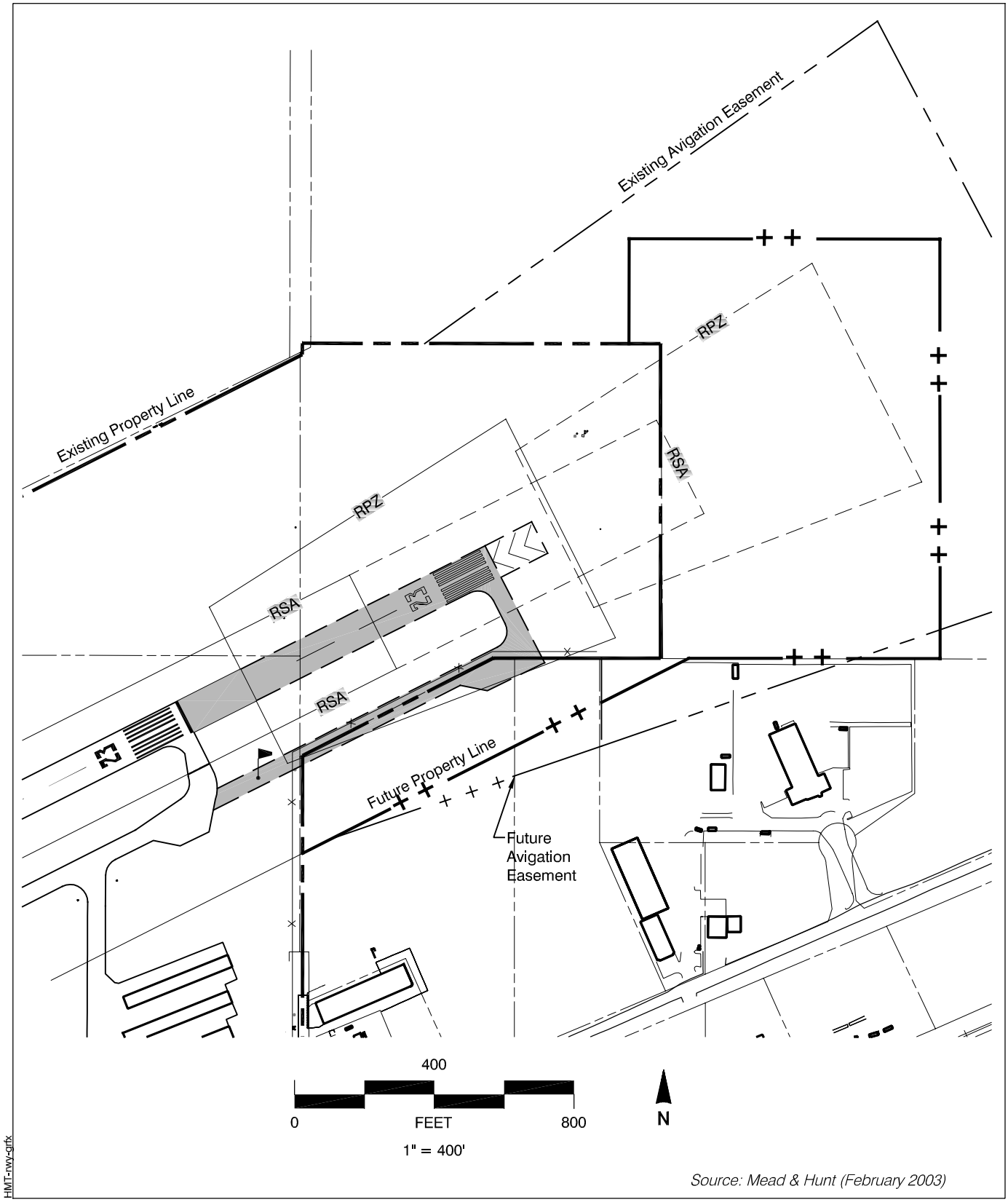


FIGURE 3B

Full Length Northeast Extension

Hemet-Ryan Airport

and runway safety area (RSA). Additional land would be needed so that the runway protection zone (RPZ) fell within airport property. A total of about 28 acres would need to be acquired in fee simple to support this alternative. It would also be useful to extend the existing avigation easement.

An extension to the northeast could trigger a need to revise the land use compatibility policies adopted by the Riverside County Airport Land Use Commission (ALUC) and the City of Hemet. These changes would require substantial modifications to the planned development of the area east of the airport. Staff with the City of Hemet indicated that the changes would eliminate planned large-scale commercial development. They anticipated that the City Council would oppose the changes.

One means of mitigating some effects of a full-length extension to the northeast is to retain the landing threshold at its present location. Technically this is termed a "displaced threshold." With a displaced threshold in this location, aircraft landing on Runway 23 would follow the same path that they do today. However, aircraft departing on Runway 23 would begin their takeoff roll from the extension. Aircraft would have 985 feet more for takeoffs on Runway 23 than for landings.

The displaced threshold would reduce the utility of the extension. Because aircraft typically require less runway for landing than takeoff, the loss of utility would be small. However, under some circumstances (e.g., high temperature or large payload), some of the aircraft that the extension was designed to accommodate (i.e., corporate jets) would be unable to land.

For landings and takeoffs in the opposite direction (using Runway 5), the full length of the runway would be available. Winds favor the use of Runway 5 only about a dozen days per year. As the southwest end of the runway would remain in its present location, there would be no change in the flight paths of aircraft landing on Runway 5.

Even with the displaced threshold, there is the potential that the ALUC would wish to modify the existing compatibility policies. Although there would be sound technical reasons to minimize the change, there would be minor alterations in the way the airport would be used. These could result in ALUC policies that would affect current development plans in the City of Hemet.

Extensions At Both Runway Ends — Another option would be to extend both runway ends so that the resulting length was 5,300 feet. It would be physically possible to apportion the extension to each runway end in any manner one wished. For analytical purposes, one

alternative was chosen that represents a distinct variation from the two alternatives presented above: 485-foot extension to the southwest and 500-foot extension to the northeast (Figures 3C and 3D).

At its southwestern end, this alternative will be very similar to the full-length southwestern extension evaluated above. All of the alignment changes would occur on airport property. The full length of the runway would be usable for landings or takeoffs using Runway 5.

At the northeastern end, Runway 23 would be extended 500 feet in this alternative. The extension and its associated runway safety area could be constructed on property already owned by the airport. Land would need to be acquired for the parallel taxiway and runway protection zone. About 16 acres would need to be acquired in fee simple. As in the full-length northeastern extension alternative, it would be desirable to extend the existing avigation easement.

This 500-foot extension has potentially the same type of land use compatibility impacts on the City of Hemet as the full-length alternative, only to a lesser degree. As with the full-length alternative, it would be possible to retain the existing threshold location for landings on Runway 23. The difference between this alternative and the full-length alternative is that there would be 4,800 feet available for landings on Runway 23, instead of only 4,315 feet. This difference is just large enough to be a significant improvement, albeit to only a limited degree.

Comparing the Alternatives

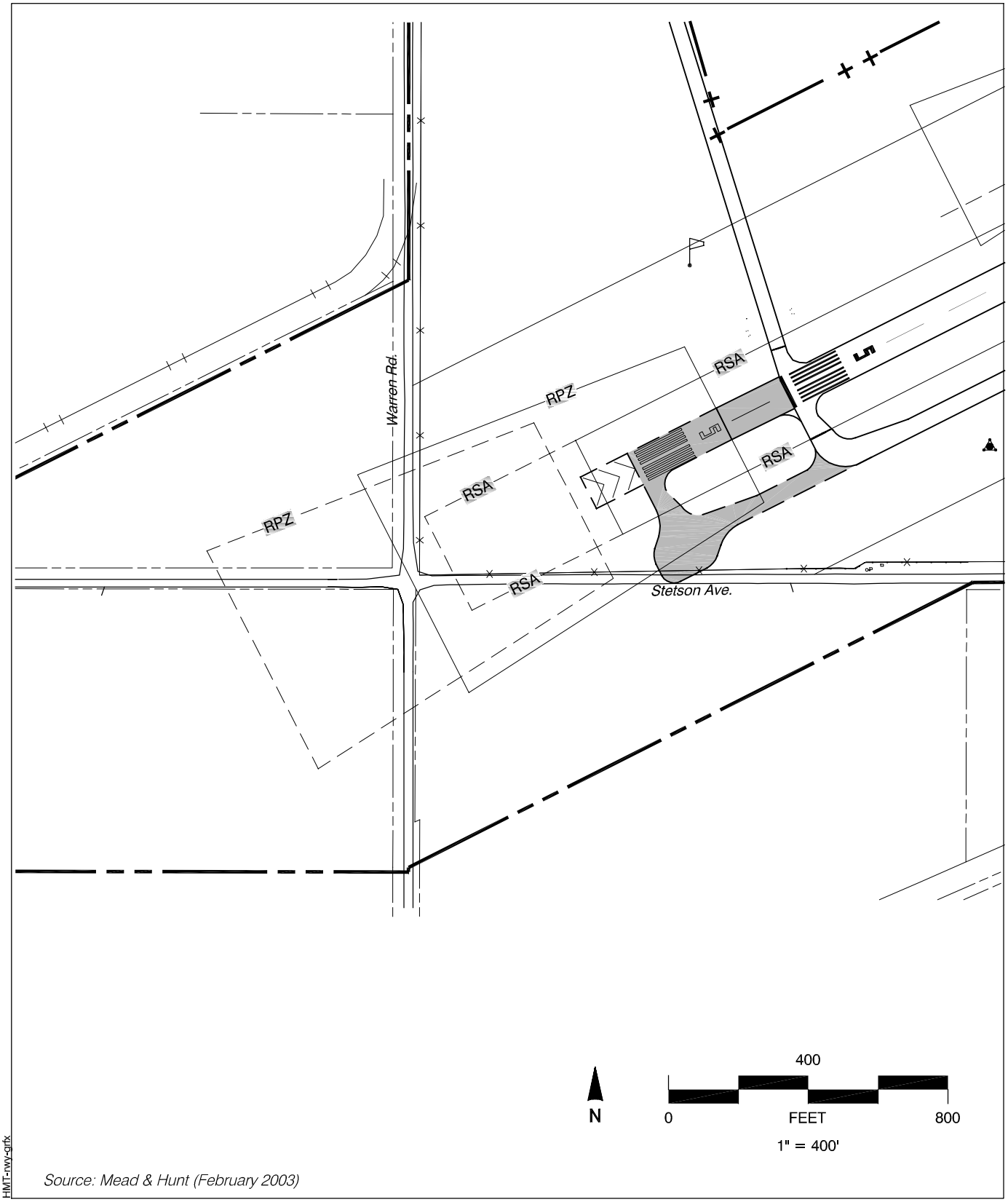
The three alternatives have some common features. All three alternatives would:

- Provide 5,300 feet of runway for departures on Runway 23, the runway most commonly used for departures
- Provide 5,300 feet of runway for landings and takeoffs on Runway 5

Table 3B summarizes the pros and cons of each alternative.

Conclusion

Based upon the preceding analysis, the full-length southwesterly extension has been selected. This alternative provides the full 5,300 feet of runway for all operations while minimizing the potential for conflict with nearby land uses.



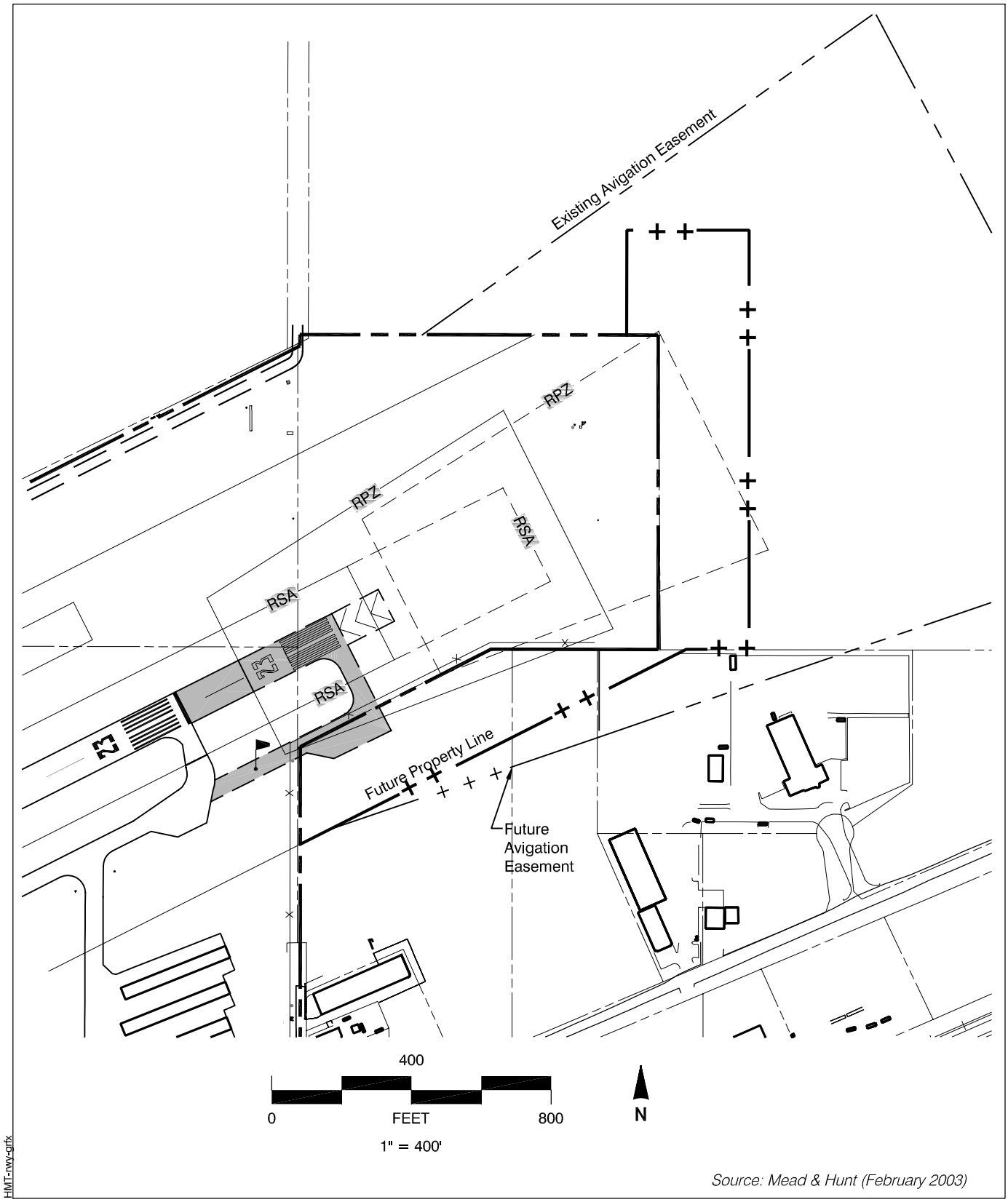
HMT-rwy-grfx

Source: Mead & Hunt (February 2003)

FIGURE 3C

Partial Southwest Extension

Hemet-Ryan Airport



Source: Mead & Hunt (February 2003)

FIGURE 3D

Partial Northeast Extension

Hemet-Ryan Airport

FULL-LENGTH SOUTHWESTERN EXTENSION

Pros	*Cons*
› Provides 5,300 feet of runway for all operations	› Requires relocation of Warren Road and Stetson Avenue
› Least likely to conflict with existing land use compatibility policies	› Most difficult to implement in near term

FULL-LENGTH NORTHEASTERN EXTENSION (NO DISPLACED THRESHOLD)

Pros	*Cons*
› Provides 5,300 feet of runway for all operations	› Most likely to conflict with existing land use compatibility policies
› Does not require road relocation	› Requires most property acquisition

FULL-LENGTH NORTHEASTERN EXTENSION (WITH DISPLACED THRESHOLD)

Pros	*Cons*
› Does not require road relocation	› Limited potential to conflict with existing land use compatibility policies
	› Provides the shortest amount of runway for landings on Runway 23 of all alternatives
	› Requires most property acquisition

EXTENSIONS AT BOTH ENDS (NO DISPLACED THRESHOLD)

Pros	*Cons*
› Provides 5,300 feet of runway for all operations	› Modest potential to conflict with existing land use compatibility policies
› Does not require relocation of Warren Road	› Requires relocation of Stetson Avenue

EXTENSIONS AT BOTH ENDS (WITH DISPLACED THRESHOLD)

Pros	*Cons*
› Does not require relocation of Warren Road	› Requires relocation of Stetson Avenue
› Lowest potential to conflict with existing land use compatibility policies among alternatives with some northeastern extension	› Provides only 4,800 feet of runway for landings on Runway 23

TABLE 3B

Runway 5-23 Extension Alternatives
Hemet-Ryan Airport

SOARING FACILITIES

Current Facilities

Soaring contributes a major share of aircraft operations as Hemet-Ryan Airport. To accommodate the high volume of activity an elaborate system of facilities has been developed to safely and efficiently launch and retrieve aircraft. The major elements of the soaring area include:

- One paved runway, Runway 4-22
- A designated sailplane staging area
- A dirt sailplane landing area
- A dirt tow plane landing area
- A designated sailplane holding area
- A delineated aircraft parking and storage area

Runway 4-22

Runway 4-22 is almost exclusively devoted to soaring operations. To a limited degree it is also used for ultralight operations. In its soaring role, it is principally used for the towing of sailplanes. Larger sailplanes occasionally use it for landings. Most sailplane tows use Runway 22. About 10 days each year tows are made to the northeast on Runway 4.

Pavement Strength — The runway pavement has a rated capacity of 5,000 pounds for single main gear aircraft. Given its restricted role as a sailplane runway, the pavement strength is adequate.

Runway Width — The runway is 25 feet in width. The FAA minimum standard for runways is a width of 60 feet. However, the soaring FBO has indicated that it is adequate for launching of sailplanes.

Runway Length — The runway currently has a published length of 2,045 feet. However, a "staging limit line" is painted across the runway about 560 feet from the Runway 22 end. This first segment of the runway is used as an entrance taxiway. Tows actually begin immediately beyond the staging limit line. Therefore, the operational length of the runway is 1,485 feet. The prior airport layout plan showed a future length of 2,500 feet. The sailplane fixed base operator indicates that the current length is adequate and that additional length would not provide any operational benefits.

Standard Soaring Pattern of Use

In order to accommodate the high volume of use and unique operational requirements of soaring, a distinct sequence is used to launch and recover aircraft. The text that follows describes the current operational procedures. This sequence is also illustrated in Figure 3E.

Sailplanes are staged on the runway prior to tows. A white bar is painted on the runway about 360 feet from the northeastern end. This bar marks the limit of the sailplane staging area for tows on Runway 22. Several sailplanes will be staged on the runway at one time waiting for a tow. Following a launch, the next sailplane in line will be rolled forward and positioned for the tow. Once the tow rope is connected and preparations are complete, the sailplane pilots signals his or her readiness by wagging the rudder. After sufficient height has been reached, and the planes have passed beyond the adjacent mobile home park, the two planes make a right turn.

Returning tow planes land on the dirt landing area northeast of the threshold for Runway 22. The dirt landing area is angled about 11° more northerly than Runway 4-22. Typically, only 400 to 600 feet of the dirt strip is used for the landing rollout. The bare dirt that defines the balance of the 900-foot long strip has been created by the towropes dragging along the ground.

Following a landing, a tow plane will taxi in the grass south of Runway 22, bypassing sailplanes holding in the first segment of the runway. Once past the line of sailplanes, the tow plane taxis onto the runway. Ground crews connect the towrope, and another launch is made.

Sailplane pilots have a strong preference for landing on turf or dirt runways. Although sailplanes can land on paved runways, to do so accelerates wear on the wing and tail skids.

Returning sailplanes land on a marked landing area between Runway 4-22 and Runway 5-23. The landing area is a box, 300 feet long and 50 feet wide. Following landings, the standard procedure is for the sailplane to be rolled forward into a holding area immediately beyond the landing area. The holding area is a box 200 feet long by 50 feet wide. Once in the holding area, the sailplane is rotated so that it faces Runway 4-22. When a break in departures permits, the sailplane is rolled across Runway 4-22. The sailplane is then either rolled to the tiedown area or returned to the queue of aircraft waiting for a tow on Runway 4-22.

SOARING AREA ISSUES

Introduction

Typically, busy sailplane airports will have separate runways for: tows (i.e., departures), sailplane landings, and tow plane landings. Where a long runway is available, tows and tow plane landings are sometimes conducted on separate segments of one runway.

Some form of the three-way split in soaring operations described above (and summarized to the right) is used at most busy soaring centers. Due to the fact that sailplane ground movement requires them to be either pushed or towed, capacity and safety are compromised if busy soaring centers use only one or two runways. Unfortunately, the Federal Aviation Administration (FAA) has not established design guidelines for sailplane operations. Nor are there explicit FAA guidelines for runways that are solely used for landings or solely for takeoffs. The challenge is to meet these standards while addressing the unique capacity and safety requirements of soaring.

Following a recent inspection, the Division of Aeronautics issued a letter to Riverside County noting that the sailplane and tow plane landing areas were not listed on the airport's permit. Although letters have been exchanged, and other communication has occurred, the topic has not been resolved. As an attachment to one letter, the Division of Aeronautics provided copies of the National Transportation Safety Board (NTSB) accident briefs for aircraft accidents that have occurred on or near Hemet-Ryan Airport during the period 1983 to 1998. The Aeronautics staff included the accident records to substantiate their assertion that the landing areas were unsafe. However, the NTSB did not cite the airfield configuration or standard operating procedures as a factor in any of the accidents.

Defining Specific Issues

Seven specific issues have been identified that directly relate to soaring operations. The paragraphs that follow describe these issues.

Length of Runway 4-22 — It was noted earlier that, although the runway currently has a published length of 2,045 feet, the operational length of the runway is 1,485 feet for departures to the west (Runway 22). The prior airport layout plan showed a future length of 2,500 feet. The sailplane fixed base operator indicates that the current length is adequate and that additional length would not provide any operational benefits. A future length needs to be defined.

Width of Runway 4-22 — The current runway width is 25 feet, rather than the FAA standard of 60 feet. The soaring FBO has indicated that the current width is acceptable, and does not see any benefit to widening the runway.

Substandard Runway Separation — Neither Runway 4-22, or the two landing areas meets FAA standards for simultaneous operations. The distance between the sailplane landing area, and Runway 4-22 and Runway 5-23 is too small to meet either the airfield design standard or the air traffic control operational standard for simultaneous same direction operations. As the western end of the tow plane landing area is about the same distance from Runway 5-23 as the paved sailplane runway (4-22), it is also too close to the runway to meet standard the standard runway separation criteria. Runway 4-22 and the tow plane landing runway are closely aligned and only 200 feet apart. They could not be operated independently, if they were used for both landings and takeoffs.

Landing Areas Lack Delineation — In one accident brief provided by the Division of Aeronautics (NTSB case LAX91LA165), a student pilot had difficulty in identifying the sailplane landing area due to the growth of new grass. Although not cited as a contributing factor by the NTSB, it appears that clearer marking might have reduced the likelihood of this accident. More clearly delineating the landing areas would also make it easier to document compliance with FAA airfield design standards.

Whittier Road — Whittier Road currently extends only as far as the soaring center. However, the City of Hemet General Plan anticipates the road being extended, curving to the north, and connecting with West Acacia Road. The General Plan shows only a conceptual alignment for the road. As more than half of the road's alignment lies on land owned by Riverside County (i.e., airport property), the County will have significant say over the actual future alignment.

Two alternative road alignments are possible: a continuous roadway that curves to the north; or one that follows the existing property boundary. In the latter case, a stop sign or signal would be required at the sharp bend near the soaring center. The standard right-of-way width for this class of road is 88 feet. Regardless of the final alignment of the road, several airport buildings located near the northern property line will need to be relocated when the road is extended.

Land Acquisition Needed — Regardless of the ultimate status or configuration of the landing areas, additional land should be acquired. If soaring is to remain viable at Hemet-Ryan Airport, additional property north of the existing airport boundary should be acquired in fee simple. This land is needed to ensure that the area remains open. Because towropes dangle about 130 feet below the tow planes when they are slowed for landing, the adjacent area needs to remain free of trees and structures. This area should also remain open for those occasions when sailplanes land short.

Not Recognized Runways — Currently the tow plane and sailplane landing areas are not recognized as runways. The sailplane landing area is shown on the previously adopted airport layout plan, but it is not designated as a runway. The tow plane landing area does not appear on the airport layout plan at all. Neither of these landing areas is listed on the airport's permit issued by Caltrans' Division of Aeronautics.

Meeting FAA Requirements

Alternate sailplane area configurations were evaluated based upon FAA airfield design criteria contained in Advisory Circular 150/5300-13 (Change 7) *Airport Design* and FAA Order 7110.65N *Air Traffic Control*. The key FAA criteria are listed below. As noted earlier, these criteria do not address either the unique physical properties of sailplanes or standards for runways with operations in only one direction. A subsequent section presents recommended modifications to FAA standards.

The key FAA criteria for defining the location for various sailplane-related activities are:

- **Runway Safety Area (RSA)** — Except for objects that need to be located within the RSA because of their function (e.g., runway edge lights), all objects are prohibited. RSAs must be cleared and graded to meet specific slope requirements.
  - **Dimensions**: A rectangular area, centered on the runway, 120 feet wide and extending 240 feet beyond the runway end.
- **Obstacle Free Zone (OFZ)** — Except for frangible visual flight aids, all objects (including taxiing and parked aircraft) are prohibited.
  - **Dimensions**: A rectangular area, centered on the runway, 250 feet wide and extending 200 feet beyond the runway end.
- **Object Free Area (OFA)** — Above ground objects are prohibited, except it is permissible to have air navigation equipment and taxiing aircraft, and to hold aircraft.
  - **Dimensions:** A rectangular area, centered on the runway, 250 feet wide and extending 240 feet beyond the runway end.

- **Runway Protection Zone (RPZ)** — That portion of the RPZ that is outside of the OFA is designated as a controlled activity area. FAA standards permit some uses within this area, provided that they do not attract wildlife. Automobile parking is specifically cited as a permitted use.
  - **Dimensions**: A trapezoidal area, centered on the extended runway centerline and beginning 200 feet beyond the runway end, 250 feet wide nearest the runway end, 1,000 feet long, and extending 450 feet wide at the end furthest from the runway end.
- **Runway Separation Standards** — The airfield design standard for simultaneous same direction operations under visual flight rules is 700 feet. The operational standard for air traffic controllers for simultaneous same direction operations under visual flight rules for light, single-engine propeller aircraft is 300 feet.

Modifications to FAA Standards

Note: For about 10 days each winter, sailplane tows depart on Runway 4 (i.e., to the east). As these operations occur during periods of very low sailplane activity, Runway 4-22 can function conventionally during this period.

As FAA design guidelines do not explicitly address departure only and landing only runways, nor the unique physical attributes of sailplanes, the following interpretations have been made:

- When Runway 22 is used for departures, the OFZ and OFA boundaries end at the runway. That is, OFZ and OFA boundaries do not extend behind the point of departure.
- The OFZ standard used for the sailplane runway is one level higher than required. The OFZ width for aircraft with approach speeds of less than 50 knots is only 120 feet. As some sailplanes have wingspans over 100 feet, the standard for small airplanes with approach speeds over 50 knots was used. The OFZ width for this class of aircraft is 250 feet.
- Sailplane parking is set so that no aircraft would be closer than 100 feet beyond the OFZ for the two landing runways. This exceeds the FAA design standard by 100 feet.
- Although Runway 22 and the two landing areas meet the requirements for RPZs, RPZ criteria do not apply to runway ends that neither receive landings nor departures.

ANALYSIS OF SOARING ISSUES

Runway 4-22 Length and Width

The sailplane fixed base operator indicates that the current runway length and width are adequate. As no operational benefits have been identified, both are recommended to retain their current dimensions. However, the runway end should be moved to the location of the *staging limit line* marked on the runway. With this change, the published runway length would become 1,485 feet. The published runway width would remain 25 feet.

Standard Runway Separation

Runway separation requirements for Runway 4-22, the tow plane landing area, and the sailplane landing area are separately evaluated in the paragraphs that follow.

Runway 4-22

The centerline-to-centerline separation between Runway 5-23 and Runway 4-22 is about 350 feet. There are only about 750 feet between Runway 5-23 and the property line on the north side of the airfield. Therefore, it is not possible to relocate Runway 4-22 to meet the planning standard for simultaneous operations. However, the separation does exceed the operational standard for air traffic controllers for simultaneous, same direction operations by small aircraft. The level of safety would be severely reduced if Runway 4-22 was eliminated, and sailplane launches were made from Runway 5-23. There would be continuous conflicts between powered aircraft attempting to use Runway 5-23 while soaring launches were being made. The optimum approach is to obtain a modification from FAA standards to permit continued operation of Runway 4-22 in its present location.

Tow Plane Landing Area

There are two separation issues involving the tow plane landing area:

- The separation from Runway 5-23
- The separation from Runway 4-22

As with Runway 4-22, the tow plane landing area is about 350 feet from Runway 5-23 at its closest point. Similarly, it would not be pos-

sible to relocate the runway. Therefore, the same approach proposed for Runway 4-22 is proposed for the tow plane landing area: retain the runway in its present location.

Currently the east end of Runway 4-22 and the west end of the tow plane landing area are separated by about 200 feet. When the remarking proposed above is implemented, this separation will be increased to 560 feet. If both runways were operated in the conventional manner (i.e., having both landings and takeoffs), the runways could not be used simultaneously. However, as noted earlier, Runway 22 is used only for departures and the tow plane landing area is used only for landings towards the west. There are no flight operations in between the two runways. Therefore, only runway-oriented criteria apply (e.g., OFZ).

In a previous section, it was proposed to move the end of Runway 22 to the location of the *staging limit line*. In order to continue to provide a location for staging sailplanes it is proposed to convert the first 200 feet of abandoned runway to an entrance taxiway. The balance of the abandoned section of runway (about 160 feet) would be marked as unusable. With this modification, the tow plane landing runway would meet FAA standards for the RSA, OFA, and OFZ. This would permit both simultaneous use of the runways and staging of sailplanes on the entrance taxiway.

Sailplane Landing Area Location

There is no way for the sailplane landing area, or its adjacent holding area, to meet FAA standards in their present location. The wings of sailplanes using the runway would penetrate the OFZ for Runway 5-23. An alternative site for a sailplane landing area is needed.

Unfortunately, the area devoted to soaring is significantly constrained by existing development. Only three alternative sites for the sailplane landing area have been identified (Figure 3F). One site is north of and parallel to the tow plane landing runway. A second site is west of the buildings associated with the soaring center. The third choice is to use the existing tow plane landing runway. Table 3C identifies the pros and cons of these alternative sites. Based upon the factors listed in Table 3C, moving sailplane landings to the current tow plane landing runway is the selected alternative. The most critical factor was the risk associated with short landings at the site west of the soaring FBO. Additionally, creating a new sailplane runway north of the tow plane runway constrains extension of Whittier Road, and increases the risk that an overshot landing by a sailplane would enter the sailplane tiedown area.

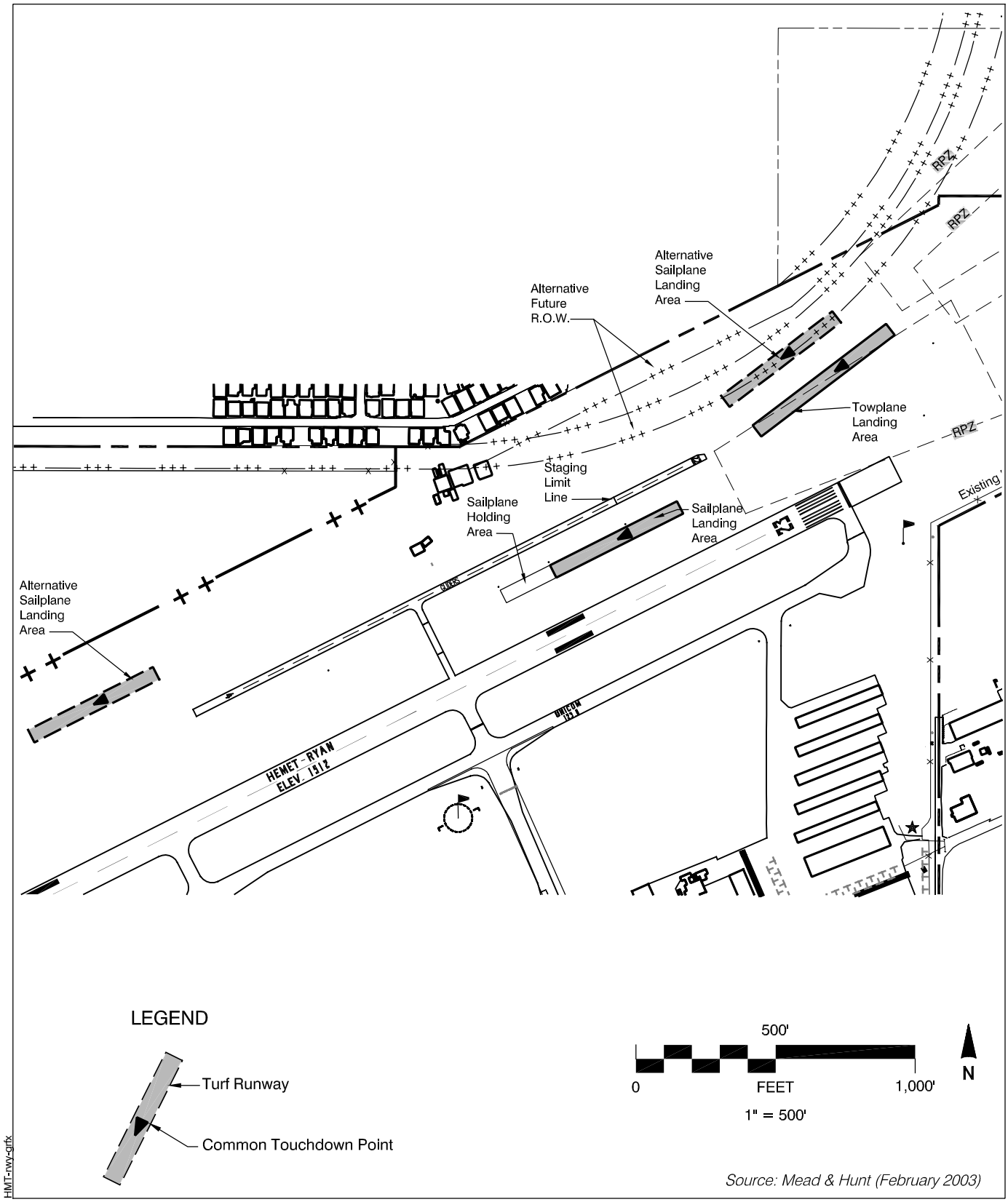


FIGURE 3F

Sailplane Landing Area Alternative Sites

Hemet-Ryan Airport

ALTERNATIVE SITES

Existing Landing Area

Pros	*Cons*
› Already exists, no construction required	› Only has 226-foot separation from the centerline of Runway 5-23, does not meet runway separation, OFZ or OFZ standards
› Closest to launching area	› Overrun landings extend into sailplane holding area
› Convenient to tiedown area	› Requires returning sailplanes to cross runway 4-23

Use Tow Plane Landing Area

Pros	*Cons*
› Increases centerline-to-centerline separation from the main runway (Runway 5-23) to 350 feet	› Requires relocation of tow plan landings to the main runway (Runway 5-23)
› Does not further constrain extension of Whittier Road	› Requires replacement of some runway edge lights on the main runway (Runway 5-23) with semi flush-mounted lights
› Meets FAA standards for RSA, OFA, OFZ, and RPZ	
› Most convenient to end of Runway 22 for relaunches	
› Close to tiedown area	

Landing Area North of Tow Plane Landing Area

Pros	*Cons*
› Increases centerline-to-centerline separation from the main runway (Runway 5-23) to 550 feet	› Would require acquisition of adjacent property to provide clear area for undershot landings
› Meets FAA standards for RSA, OFA, OFZ, and RPZ	› Overrun landings could extend into sailplane tiedown area
› Closest to tiedown area	› Does not meet FAA standard for runway separation
› Convenient to end of runway 22 for relaunches	› Landings could extend into sailplane tiedown area

Landing Area West of Soaring Center Buildings

Pros	*Cons*
› Increases centerline-to-centerline separation from the main runway (Runway 5-23) to 550 feet	› Requires landings over buildings in soaring center; short landing could impact buildings or areas where people congregate
› Meets FAA standards for RSA, OFA, OFZ, and RPZ	› Does not meet FAA standard for runway separation
› Does not require property acquisition	› Furthest from relaunch area
	› Furthest from tiedown area

Source: Mead & Hunt (April 2004)

TABLE 3C

Sailplane Landing Area Alternatives

Hemet-Ryan Airport

Runways Lack Delineation

It is recommended that permanent markers be installed to define the limits of the sailplane landing area. As a part of this project, the landing area should be graded to better define its limits.

Whittier Road

It is recommended that curving alignment of Whittier Road shown conceptually in the City of Hemet's general plan not be implemented. Instead, an angled alignment is recommended. This may require use of a stop sign at the point of the angle. Figure 3F illustrates the recommended alignment.

Land Acquisition Needed

To support the continued viability of soaring as Hemet develops, 21 acres should be acquired in fee simple (see Airport Layout Plan).

Not Recognized Runways

Currently the tow plane and sailplane landing areas are not recognized as runways. The FAA does not have standards for either sailplanes or departure- or landing-only runways. Therefore, it is uncertain what response the FAA would give following a formal airspace review. However, given the current Division of Aeronautics' concerns relating to the sailplane and tow plane landing areas, some form of FAA review is appropriate. It is proposed that:

- Only the paved runways to be shown on the ALP associated with this master plan report.
- The sailplane landing area depicted in Figure 3G be reviewed by the FAA's planning staff as a part of their review of the master plan.

Summary of Consistency with FAA Criteria

The changes to the soaring area described earlier in this chapter are designed to meet FAA criteria. Where FAA criteria do not address the unique operating characteristics of sailplanes or do not address single-direction runways, alternative standards are defined. Figure 3G presented the recommended soaring area layout. The results of this effort can be summarized as follows:

- All FAA design criteria for the main runway (Runway 5-23) are met, except the runway-to-runway separation standard.
- Although Runway 4-22 and the landing area cannot meet the design requirement of a 700-foot separation from Runway 5-23, they both meet the air traffic control standard for simultaneous, same-direction operations for light, single-engine aircraft. Because the sailplane landing area is no closer to Runway 5-23 than Runway 4-22, a comparable and acceptable level of safety can be maintained.
- Departures on Runway 22 can be conducted while landings on the proposed sailplane landing area are conducted without violating any FAA standards. There is sufficient separation between Runway 22, its entrance taxiway, and the landing areas to meet FAA standards for RSAs, OFZs, OFAs, and RPZs.

Operating Rules

To support the modifications to the sailplane operations area, a number of operating rules are proposed.

- All sailplane tows will be made from Runway 4-22.
- All sailplane landings will be made in the soaring operations area.
- All tow plane landings will be made on either Runway 23 or Runway 4, depending upon wind direction.
- When Runway 4 is being used for tows:
  - The dirt sailplane landing area may not be used
  - The lead-in taxiway for Runway 22 may not be used for staging sailplanes
  - Tow planes should land on Runway 4.
- All aircraft must park within the designated parking area.
- When Runway 22 is being used for tows:
  - Sailplanes may only be staged on the paved entrance taxiway
  - Sailplanes may only land within the marked boundary of the sailplane landing runway.
  - Tow planes may land only on Runway 23.
- Emergencies:
  - In the event of an aborted takeoff or other emergency landing situation, pilots will follow recommended safe emergency landing procedures.
  - Pilots should avoid creating a hazard for aircraft operating on Runway 5-23.