3

Airfield Design

OVERVIEW

The basic configuration of the runway and taxiway system at Hanford Municipal Airport has changed moderately since the airport was constructed in 1950. These changes include an increase in the length of the runway and parallel taxiway, and construction of two blast pads.

Major components of an airport's airfield include its runways, taxiways, and navigational aids, and the various protected areas around these features.

This chapter contains a comprehensive assessment of future airfield development needs. Notable among the issues examined are the following:

- Realignment of Taxiway A
- Enhancement of Runway 32 nonprecision approach
- Acquisition of land east of the airport

BASIC DESIGN FACTORS

The overall design of an airport's airfield is shaped by a concise set of key factors. This section looks first at the external influences on airfield design—the demand determinants—and then at the fundamental needs that result from these demands.

Demand Determinants

In simple terms, the demand placed on an airport's airfield facilities can be defined in terms of three key parameters:

- The total volume of aircraft operations;
- The types of aircraft seeking to operate at the airport; and
- The weather conditions that affect those operations.

The specific demand determinants for Hanford Municipal Airport are outlined below.

Aircraft Activity Volume

The *Master Plan* activity forecasts (see Chapter 2) anticipate that total annual aircraft operations at Hanford Municipal Airport will reach approximately 13,800 annually in 20 years, compared to approximately 7,600 annual operations at present.

Design Aircraft

Currently, the majority of operations at the Hanford Municipal Airport are generated by single-engine piston aircraft. The airport also sees regular use by larger, faster aircraft such as twin-engine piston, twin-engine turboprop, and small- to medium-size business jets. The current critical aircraft (defined by the FAA as the most demanding aircraft with more than 500 annual operations) is the twin-engine piston. The Beech Baron is representative of this class of aircraft

Beech Baron

In the future, the most demanding class of aircraft regularly using the airport will be light business jets. The Cessna Citation Bravo is representative of this class of aircraft.

Cessna Citation Bravo (C550)

Max. Takeoff Weight: 14,800 pounds
Wingspan: 52.17 feet

The forecasts described in Chapter 2 indicate that the smaller aircraft will continue to dominate the airport's usage, but that business jet aircraft activity will have the most rapid growth. By 2025, some 600 (4.3%) of the airport's projected 13,800 aircraft operations are expected to be generated by light-to-medium size business jets, up from 200 (2.6%) of the present 7,600 operations.

Needs Assessment

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

- The runway length needed to serve the critical aircraft;
- The classification of the runways and taxiways for design purposes;
- The adequacy of the runway/taxiway system capacity; and
- The adequacy of the runway system wind coverage.

Runway Length

The length of the runway required to accommodate the most demanding airplanes anticipated to use the airport is a fundamental airfield design factor. Runway length requirements for specific aircraft are dependent upon airfield elevation and design temperature (the average high temperature for the hottest month). For several categories of small aircraft, the FAA has established formulas indicating the desirable runway length. For large aircraft, this data is available in performance charts provided by aircraft manufacturers.

Specific length requirements for Hanford Municipal Airport's runway is analyzed in subsequent sections of this chapter.

Airport Classification / Design Standards

Another basic airfield design requirement which 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 lateral clearances, are also very 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 (Advisory Circular AC 150/5300-13, *Airport Design*). The primary determinants of ARC classifications are the approach speed and wingspan of the most demanding types of aircraft expected to operate at the airport, together with the type of approach capability the runway has or will have.

Table 3B summarizes the FAA design standards associated with several ARC classifications relevant to Hanford Municipal Airport. Later sections of this chapter examine the significance of these standards with respect to individual components of the airfield design.

Table 3A
Airport Reference Code (ARC) Criteria

Approach Category	Approach Speed Range	
A		<91 kts
B	≥91 kts	<121 kts
C	≥121 kts	<141 kts
D	≥141 kts	<166 kts
E	≥166 kts	
Design Group	**Wingspan Range**	
I		<49 feet
II	≥49 feet	<79 feet
III	≥79 feet	<118 feet
IV	≥118 feet	<171 feet
V	≥171 feet	<214 feet
VI	≥214 feet	<262 feet

Hanford Municipal Airport Reference Code (ARC-B-II) criteria are shaded.

Item	FAA Airport Design Standards [1]			Existing Facility Runway 14-32
Airport Reference Code	**C-II**	**C-II**	**B-II**	**B-II**
Aircraft Approach Speed	<141 kts	<141 kts	<121 kts	<121 kts
Aircraft Wingspan	<79 ft.	<79 ft.	<79 ft.	<79 ft.
Aircraft Weight Group (lbs)	>12,500	>12,500	>12,500	>12,500
Approach Visibility Minimums	Visual or ≥¾ mile	<¾ mile	Visual or ≥¾ mile	Visual or ≥¾ mile
Runway Setbacks				
From Runway Centerline to:				
Parallel Runway Centerline[7]	700 ft.	700 ft.	700 ft.	n/a
Hold Line	200 ft.	250 ft.	250 ft.	200 ft.
Parallel Taxiway	300 ft.	400 ft.	240 ft.	240 ft.
Aircraft Parking Line	400 ft.	500 ft.	250 ft.	250 ft.*
Building Restriction Line[8]	495 ft.	745 ft.	495 ft.	400 ft.
Taxiway Design				
Width	35 ft.	35 ft.	35 ft.	35 ft.**
Safety Area Width	79 ft.	79 ft.	79 ft.	79 ft.
Taxiway and Taxilane Setbacks				
From Taxiway Centerline to:				
Parallel Taxiway/Taxilane[9]	105 ft.	105 ft.	105 ft.	n/a
Fixed or Movable Object	66 ft.	66 ft.	66 ft.	66 ft.
From Taxilane Centerline to:				
Fixed or Movable Object	58 ft.	58 ft.	58 ft.	> 58 ft.
Runway Protection Zone [10]				
Width at Inner End	500 ft.[10]	1,000 ft.	500 ft.[10]	500 ft.[10]
Width at Outer End	1,010 ft.	1,750 ft.	700 ft.	700 ft.
Length	1,700 ft.	2,500 ft.	1,000 ft.	1,000 ft.

Notes:

* *Aircraft parking line on east side of runway.*

** *Taxiway C is 30-feet wide. All other taxiways meet/exceed B-II requirements.*

Source: Data compiled by Mead & Hunt, Inc. (January 2006)

Table 3B

Airport Design Standards

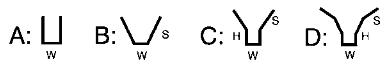
Hanford Municipal Airport

Notes:

1 Source: FAA Advisory Circular 150/5300-13, Change 8, *Airport Design* (September 2004).

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 3B, continued

Operational Capacity

An airport's operational 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. At very busy airports, airfield capacity can be the major determinant of future runway/taxiway system improvement requirements.

Visual flight rules (VFR) are a set of aviation regulations under which a pilot may operate an aircraft, if weather conditions are sufficient to allow the pilot to visually control the aircraft's attitude, navigate, and maintain separation with obstacles such as terrain and other aircraft.

Instrument flight rules (IFR) are a set of regulations and procedures for flying aircraft without the assumption that pilots will be able to see and avoid obstacles, terrain, and other air traffic; it is an alternative to visual flight rules (VFR), where the pilot is primarily or exclusively responsible for see-and-avoid.

Based on FAA methods for estimating capacity and delay for long range planning (Advisory Circular 150/5060-5, *Airport Capacity and Delay*), Hanford Municipal Airport's operational capacities are:

- Hourly VFR capacity: 98 operations;
- Hourly IFR capacity: 59 operations;
- Annual Service Volume: 230,000 operations.

The final number is theoretical and assumes a relatively high usage of the airport during off-peak hours. Even if demand is more concentrated during peak hours, however, the airport's runway capacity is well above the projected annual demand. The theoretical hourly IFR capacity can probably not be realized due to relatively long approach and missed approach segments. The practical limit for small aircraft is likely to be in the range of 6 to 8 approaches per hour.

Wind Coverage

The two facets of local weather conditions that most directly affect the design of an airport's airfield are wind and visibility. Wind conditions — specifically speed and direction — determine the optimum alignment of the runway or runways. Visibility conditions, both horizontally and the height of cloud ceilings, are key factors with respect to whether instrument approach capabilities are needed.

FAA guidelines establish that the orientation of an airport's runways should enable the airport to be usable, with crosswinds at an acceptable velocity, during at least 95% of the year. 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. Small, light aircraft are more affected by strong crosswinds than larger, heavier planes. For small planes, the FAA considers a 10.5 knot crosswind to be the maximum acceptable, whereas heavy jets can tolerate as much as 20 knots.

Weather data for Hanford Municipal Airport was recorded by the National Oceanic and Atmospheric Administration (NOAA) over a four year period (1999-2003). Analysis of this data indicates that, even with maximum crosswinds of only 10.5 knots, the airport's primary runway (14-32) has nearly 100% wind coverage under all weather and IFR conditions. Therefore, a crosswind runway is not essential. The data also revealed that prevailing winds at Hanford Municipal Airport are mostly from the northwest.

RUNWAY

Classification

Two factors play a part in determining the appropriate Airport Reference Code for an airport's runways. Ideally, the runway classification should be based solely upon the critical aircraft for which a demand for use of the runway can be identified. Often, though, a runway's existing dimensions and the extent to which it can reasonably be upgraded are significant considerations.

As noted earlier, the most demanding aircraft expected to use the Hanford Municipal Airport are light business aircraft. The Cessna Citation Bravo is representative of this class of aircraft. This aircraft is in ARC B-II. Therefore, runway design criteria for ARC B-II have been used in this plan.

Given this projected usage, the desirable classification for Runway 14-32 and its associated taxiway is ARC B-II. A comparison of the existing Runway 14-32 dimensions against ARC B-II standards reveals that the facilities meet or exceed all FAA requirements.

Parallel Taxiway A was realigned (e.g., 240-feet from the runway centerline) and widened from 30-feet to 35-feet at the end of 2005. The realignment and enhanced taxiway width brought the runway into full compliance with ARC B-II standards. Table 3B, *FAA Airport Design Standards,* summarizes ARC B-II standards and existing airfield facilities at Hanford Municipal Airport.

Table 3A also includes requirements for ARC C-II. When comparing B-II to C-II standards, it is evident that considerable modifications to the existing facilities at the airport would be necessary to upgrade to ARC C-II. Most significant, is the C-II requirement for a Runway Safety Area (RSA). The width of the C-II RSA is 500 feet and the length beyond the runway end is 1,000 feet. For Runway 32, this means 700 more feet is required plus the 300 feet beyond the end required under the current B-II standard.

Additionally, the threshold to Runway 14 would need to be displaced approximately 700 feet to meet the C-II RSA standard. Consequently, Runway 32 would need to be extended by 700 feet to maintain the current runway length (5,180 feet). At this time, it is not deemed practical to extend Runway 32. While jet activity is forecast to increase, activity by larger jets using the airport will not increase such that it would warrant an ARC change. That is, it is not anticipated that jet operations would increase to 500 operations annually. Therefore, the ARC for Hanford Municipal Airport will continue to be B-II.

As a side note, it is important to recognize that designing airfield facilities to comply with the standards for a particular Airport Reference Code does not restrict the airport to usage only by corresponding-sized aircraft. As noted earlier, the FAA sets 500 operations per year as the usage criterion for determining the critical aircraft. Larger aircraft can use an airport provided that, at the determination of the pilot, they can do so safely. Moreover, the airport need not be designed with respect to the standards for these larger aircraft provided that they will operate less often than the threshold level. In addition to wingtip clearances and other dimensional considerations, pavement strength is often a major determinant of how large of an aircraft an airport can safely accommodate even on a rare basis.

Length

Two tools are available to help assess Hanford Municipal Airport's future runway length requirements. One is an FAA computer program (derived from data in Advisory Circular 150/5325-4A, *Runway Length Requirements*) which calculates the runway length needed to accommodate certain percentages of the nation's small and large airplane fleets. The second useful tool is the performance data supplied by the manufacturers of individual aircraft models.

At Hanford Municipal Airport's elevation (244 feet) and average maximum, hottest-month temperature (96°F), the FAA's computer program indicates the runway length requirements for large airplanes weighing less than 60,000 pounds to be as shown in Table 3C. Most of these aircraft are small-to-medium business jets.

Table 3C
Runway Length Requirement for Specific Business Jets

Aircraft	Maximum Gross Takeoff Weight (Pounds)	Required Runway Length (feet)
Cessna Citation Bravo	14,800	3,600
Cessna Citation Encore	16,630	3,490
Dassault Falcon 50EX	39,700	4,890
Raytheon Hawker 800XP	28,000	5,030

This data indicates that the current 5,180-foot length of Runway 14-32 is adequate for 75 percent of the aircraft of this class when limited to 60 percent of their useful load. An increased runway length would be necessary to enable higher useful loads to be carried. The primary benefit of a longer runway would be an increase in nonstop flight distances. Consideration of a runway extension is not recommended, as the most demanding class of aircraft expected to use the airport on a regular basis is light jets.

Width

FAA standards for runway width relate directly to the runway's Airport Reference Code. The FAA standard width for runways accommodating ARC B-II aircraft is 75 feet. Runway 14-32 meets this standard and will be maintained at its present width of 75 feet over the 20-year planning horizon.

Pavement Strength

The FAA Airport Master Record for Hanford Municipal Airport provides the source of runway pavement strength data. No independent investigations were conducted as part of this *Master Plan* study.

Airfield pavements are rated according to the weight of the aircraft that they can accommodate on a regular basis. Aircraft with multi-wheeled main landing gear can be heavier than those with single-wheel landing gear because the loads are distributed over more wheels.

The main runway is rated at 30,000 pounds for aircraft with single-wheel gear and 45,000 pounds for aircraft with dual-wheel landing gear configuration. The runway strength is adequate to accommodate small-to-medium-size business jet aircraft. Therefore, no change in the present runway strength is recommended.

Approaches

Traffic Patterns

There are two established traffic patterns at Hanford Municipal Airport. On approach to Runway 14, the traffic pattern is left-hand. The approach to Runway 32 is righthand. The pattern altitude is 1,244 feet MSL, 1,000 feet above the airport elevation. No changes are recommended.

Instrument Approach Procedures

Two instrument approach procedures serve Hanford Municipal Airport. One utilizes the global positioning system (GPS), while the other uses the Visalia VOR. Both are nonprecision approaches. The GPS-based approach provides a straight-in approach to Runway 32. It has approach visibility minimums as low as 1 mile. This procedure has better decision height minimums than the VOR approach; 398 feet above the runway elevation. The VOR-based approach *(VOR-A)* allows aircraft to circle to land on both Runway 14 and 32. The VOR procedure has visibility minimums as low as 1 mile, with a decision height of 476 feet above the runway elevation.

VOR (definition): **Very High Frequency Omnidirectional Range** station. A type of navigational aid that provides bearings to or from its location.

Approach Lighting System

With valley fog being a significant seasonal constraint, an improved instrument approach would be of value to airport users. Currently, when low cloud ceilings occur, aircraft intended for Hanford will land at Visalia Municipal Airport which is 15 nautical miles to the east. Visalia Municipal Airport has an Instrument Landing System which includes an approach lighting system.

It appears possible to improve the nonprecision instrument approach to Runway 32 by lowering current GPS approach minimums from 1-mile to as low as ¾ mile. However, some form of approach lighting system would be required to support the improved minimums. The least extensive light system that would enable reduction of approach minimums is a Medium-Intensity Approach Lighting System (MALS). A MALS is a multi-light system with groups of lights defining the approach path.

At Hanford Municipal Airport, no additional land would need to be acquired to install the MALS. The grade within the MALS area is relatively flat. The runway end elevation is 242-feet. Terrain elevations within the MALS area range from 236-feet to 242-feet. Therefore, only minor grading would be necessary if the MALS is installed.

There would be one significant drawback to installation of the MALS. The improved instrument approach minimums would require shifting the Building Restriction Line from 400 feet from the runway centerline to 640 feet from the runway centerline. This would eliminate much of the area currently available for aircraft hangars and related structures. The airport's only Fixed Base Operator (which provides flight training, aircraft maintenance, aircraft rental, etc.) and largest hangar (which contains the Airport Manager's office) would fall within the new Building Restriction Line. While it is possible that these buildings would be able to remain, further expansion would be prohibited.

There are two principal means of funding development of approach lighting systems: the FAA's internal Facilities and Equipment fund and Airport Improvement Program (AIP) grants. The AIP program includes both entitlement and discretionary grants. The Facilities and Equipment fund is used by the FAA to develop facilities that the agency installs and maintains. The AIP program provides grants to airport operators for the development and maintenance of aviation facilities.

Given the low volume of operations at Hanford Municipal Airport, it is anticipated that the airport will not be able to have an approach lighting system installed using funding from either the Facilities and Equipment fund or an AIP discretionary grant. Priority for these systems will be given to airports with higher activity levels.

It would be possible for the City to develop an approach lighting system using AIP entitlement grant funds. It would take most of two year's entitlement funds to install a MALS. The City would be responsible for maintenance of the MALS and would bear the burden of liability for its operation.

Given that a superior instrument approach system is available 15 nautical miles away, the cost and liability of the MALS is judged to outweigh the benefit of the system. Therefore, no approach lighting system is proposed.

Runway Protection Zones

The function of a Runway Protection Zone (RPZ) is to enhance the protection of people and property on the ground near the ends of runways. FAA standards call for RPZs to be under control of the airport through fee title ownership or other means. RPZs ideally should be clear of all objects. However, certain low-intensity uses are generally considered acceptable on lands determined to be impracticable for the airport to acquire.

The size for the existing Runway Protection Zone (RPZ) at each end of the airport's two runway ends is set in accordance with the respective types of runway approaches:

- *Runway 32*: Nonprecision; and
- *Runway 14*: Visual (includes a circle-to-land approach)

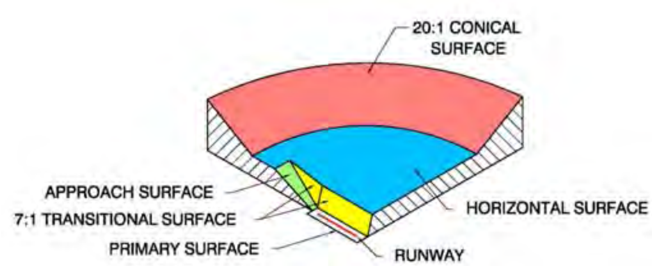
The master plan (and associated airport layout plan) preserves the option of upgrading the approach to Runway 14 to a straight-in nonprecision approach.

Established RPZ dimensions for Runway 32 are 500 foot inner width, 700 foot outer width, and a length of 1,000 feet. Runway 32 RPZ lies entirely on airport property. Approximately one-quarter of the existing RPZ for Runway 14 is on airport. The remainder of the RPZ consists of approximately 11.5 acres lying north of Third Street. This area encompasses Highway 198 and all or portions of four (mainly industrial) parcels. This part of the RPZ is not regulated by the City. Therefore, it is recommended that the city obtain avigation easements over the unregulated portions of the RPZ to Runway 14.

FAR Part 77

Federal Aviation Regulations (FAR) Part 77, *Objects Affecting Navigable Airspace,* establishes standards for reviewing potential obstructions to navigable airspace near airports. This airspace is defined for each airport by a series of imaginary surfaces. The dimensions and slopes of these surfaces depend on the configuration and approach categories of each airport's runways.

Typical FAR Part 77 Surfaces



Generally, most critical among FAR Part 77 surfaces are the approach surfaces extending outward and upward from 200 feet beyond each runway end. At Hanford Municipal Airport, the current Runway 32 approach surface has a 34:1 (1 foot vertically per 34 feet horizontally) slope — consistent with this runway's nonprecision instrument approach capabilities. Runway 14 with its visual approach has a 20:1 slope.

No comprehensive assessment of Hanford Municipal Airport's approach surfaces has been conducted in conjunction with this Master Plan study. Although not available in a mapped format, a review of the most recent survey of the airport's approach surfaces is one conducted by the California Division of Aeronautics in October 2005 and summarized in the FAA Airport Master Record data sheet for the airport. This investigation indicated that the controlling obstacles for each runway end to be as follows:

- *Runway 14:* 17-foot road, 245 feet from the existing edge of pavement, 2:1 clear slope
- *Runway 32:* 50:1 clear slope

As indicated by the Division of Aeronautics' survey, Third Street is a penetration of the 20:1 approach surface to Runway 14. Clearing Third Street would require realignment of the road by several hundred feet. However, realignment of the road is not practical due to the proximity of the road to Highway 198. A discussion of the means to resolve this nonstandard condition is discussed in the section entitled *Threshold Siting Surface*.

Based on Division of Aeronautics' data, the clear slope for Runway 32 meets the FAA approach slope requirement for a nonprecision runway. However, results from a ground survey conducted in March 2005 identified power poles located south of Runway 32 (Figure 3A). Twelve of these power poles penetrate the existing 34:1 approach to Runway 32. However, none of these poles penetrate the threshold siting surface. Therefore, the runway threshold may remain in its current location while steps are taken to remove the poles.

The closest power pole is approximately 1,500-feet southeast of the extended centerline to Runway 32. These power poles are roughly 62-feet tall. The City is working closely with the electrical utility to underground or relocate the power lines. No other obstructions penetrate the approach surface to Runway 32. The approach would meet the 34:1 slope clearance standard when underground work is completed. One additional pole penetrates the east side transitional surface. It is a lower priority for relocation or undergrounding.

Future Approaches

Enhancement of the existing circling GPS approach procedure to Runway 14 is anticipated within the planning horizon of this *Master Plan*. A straight-in GPS approach to Runway 14 would have a 34:1 approach slope with minimums not lower than one mile.

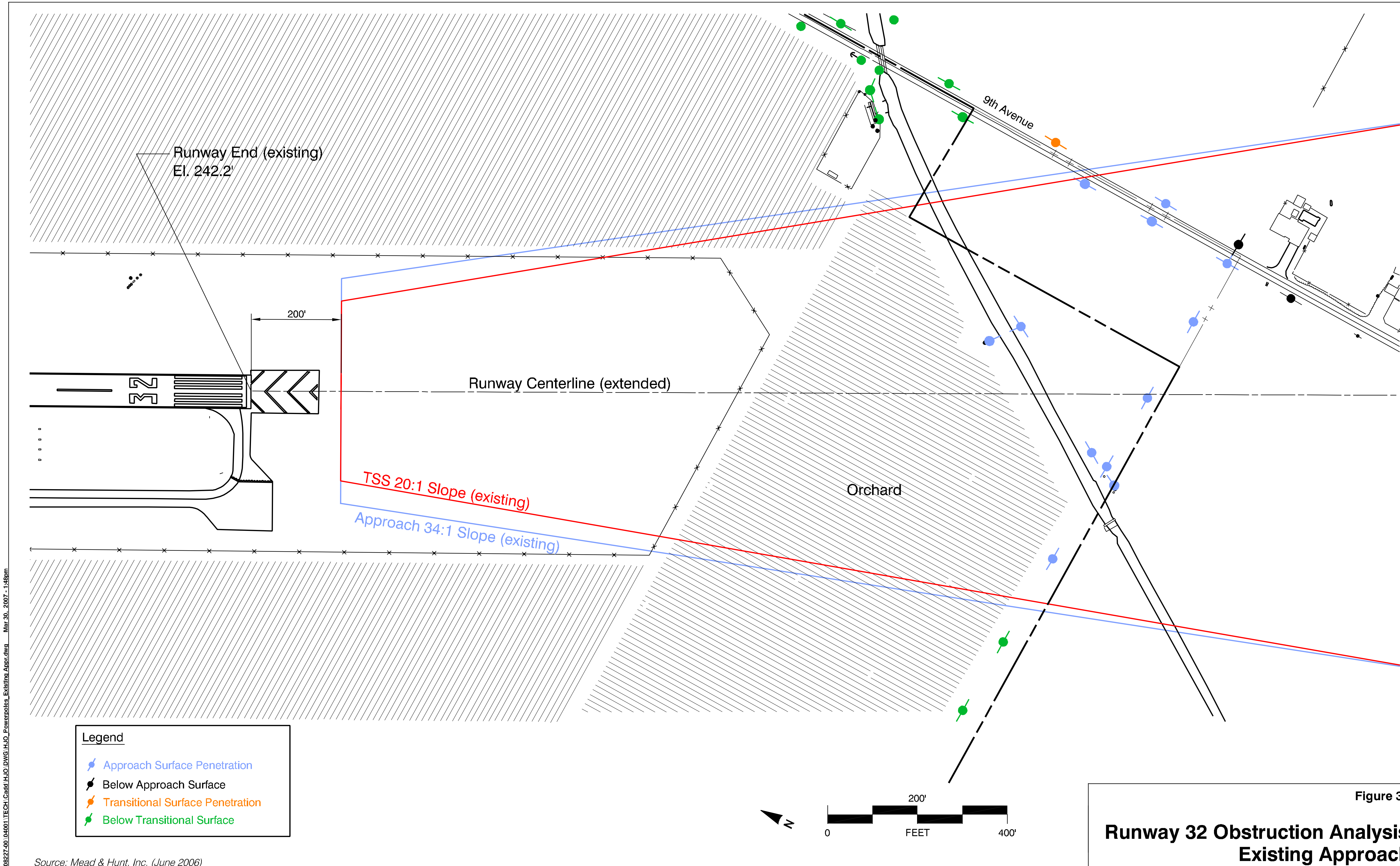
Threshold Siting Surface

It was noted earlier in the chapter that Third Street penetrates the 20:1 approach surface for Runway 14. Where penetrations of an approach surface occur, the Federal Aviation Administration (FAA) uses the threshold siting surface to evaluate the penetration. Generally, displacement of a runway threshold should be considered when an object that cannot be removed obstructs aircraft navigating to a landing threshold, for environmental factors (e.g., noise abatement), or to provide the standard runway safety area.

Third Street existed when Runway 14-32 was extended a few years ago. It was the controlling obstruction for approaches to Runway 14. As a part of this project the runway end was relocated 140 feet to meet the threshold siting surface requirement over the road.

Subsequent to the runway extension project, the FAA revised threshold siting surface requirements. The location of the end of Runway 14 does not provide adequate clearance under the new requirements for night circle-to-land approaches. As the road cannot be closed or relocated, there are two alternative ways to remedy the nonstandard condition (See Figure 3B):

- Displace the landing threshold for Runway 14 by 205 feet
- Install a red obstruction light adjacent to Third Street to alert pilots of the present of the close-in road.



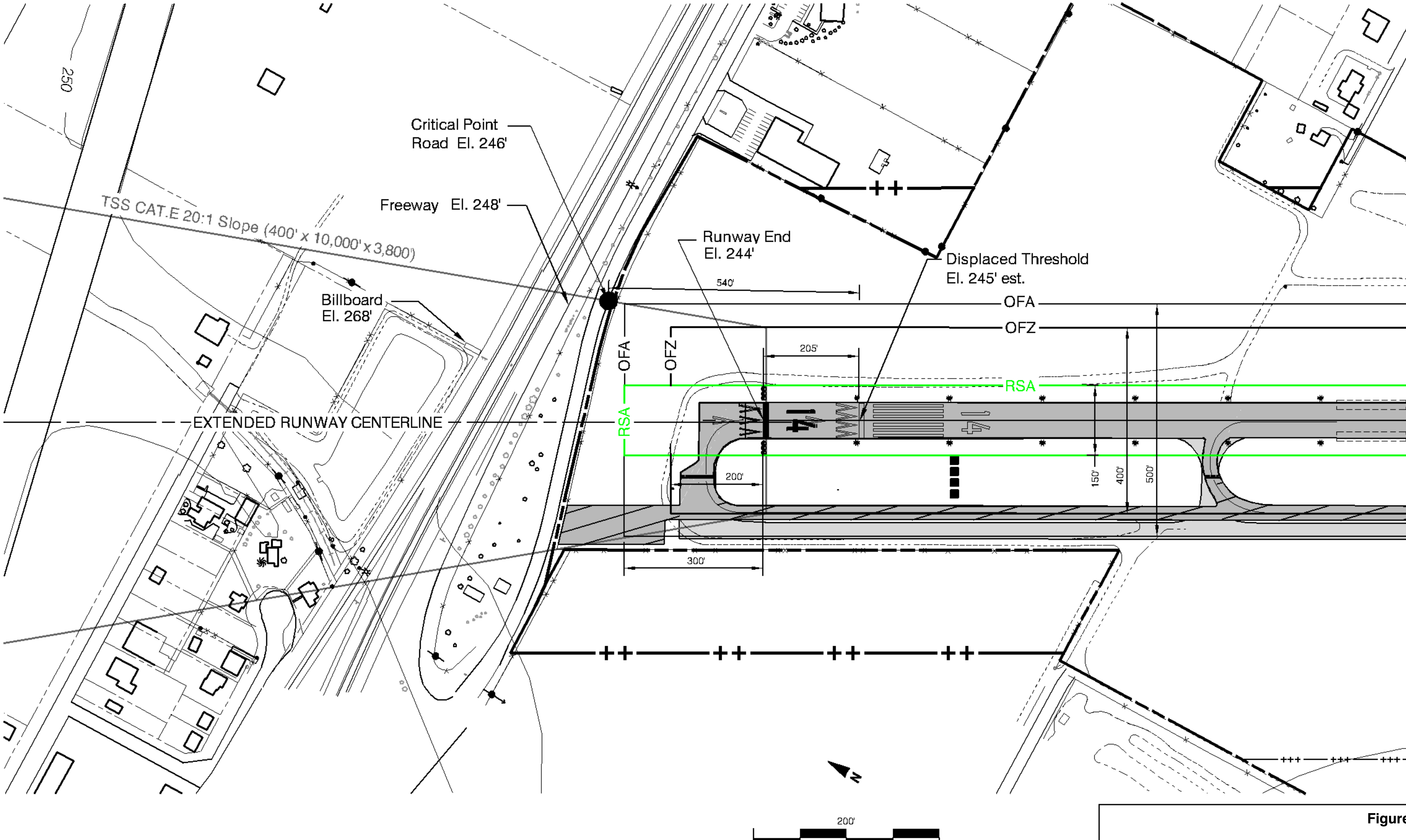
Source: Mead & Hunt, Inc. (June 2006)

X:08227-00 04001 \TECH Cadd HJO DWG HJO_Powerpoles_Existing Appr.dwg Mar 30, 2007 - 1:48pm

Figure 3A

Runway 32 Obstruction Analysis Existing Approach

Hanford Municipal Airport



Source: Mead & Hunt, Inc. (June 2006)

Figure 3B

Runway 14 Obstruction Analysis

Hanford Municipal Airport

Displacement of the threshold would affect a small percentage of aircraft using the airport. Most landings are made on Runway 32. When landings are made on Runway 14 the majority of aircraft using the airport would not be affected by a reduction in runway length of 205 feet. This displaced threshold would principally affect business jets. Given that the recent runway extension was constructed to accommodate this class of aircraft, it would be unfortunate to reduce the runway length available. Therefore, it is recommended that an obstruction light be installed to warn pilots of the road's presence.

Critical Areas and Setback Requirements

Runway Safety Areas

Runway Safety Areas (RSAs) are graded areas situated along the sides and ends of runways. RSAs must be clear of objects except ones that must be located near the runway because of their aeronautical function. Under dry conditions, the area must be capable of supporting emergency equipment and the occasional passage of an aircraft without causing structural damage to the aircraft.

For the ARC B-II nonprecision runway classification applicable to Runway 14-32, the RSA is required to be 150 feet wide and extend 300 feet beyond the runway ends. The RSA for the existing length of Runway 14-32 meets FAA standards.

Object Free Areas

Like RSAs, Object Free Areas (OFAs) also surround runways and are to be clear of nonessential objects including parked airplanes. The major difference between these two critical areas is that the grading criteria for RSAs do not apply to OFAs. Ditches, for example, can be located in an OFA. Also, aircraft may taxi or hold within an OFA, but not an RSA.

For Runway 14-32, the required OFA dimensions are a width of 500 feet and a length of 300 feet beyond the runway ends. For the existing runway length, the OFA meets applicable criteria.

The **Runway Safety Area** (RSA) is a graded area surrounding and upon which the runway surface is constructed intended to enhance the safety of airplanes in the event of an unintended excursion from the runway's paved surface. This area must be:

- Cleared and graded with no potentially hazardous humps, ruts, depressions, or other surface variations,
- Adequately drained to prevent water accumulation,
- Capable of supporting snow removal equipment, rescue and firefighting equipment, and occasional aircraft passage without causing structural damage to the aircraft,
- Free of objects, except for those that need to be located in the RSA because of their function, and then, to the extent practical, mounted on low impact (frangible) structures.
- Capable, under normal (dry) conditions, of supporting airplanes without causing structural damage to the airplanes or injury to their occupants.

An **Object Free Area** (OFA) is a two-dimensional ground surface surrounding the runways, taxiways, and taxilanes. The OFA clearing standards preclude parked airplanes, operations, and objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes. The OFA should be under direct control of the airport operator.

Obstacle Free Zones

A third critical area surrounding a runway is the Obstacle Free Zone (OFZ). Only frangible-mounted navigational aids are allowed to penetrate an OFZ. Other objects, including taxiing or parked airplanes, are not permitted.

For Runway 14-32, the required OFZ dimensions are a width of 400 feet and a length of 200 feet beyond the runway ends. The OFZ meets current FAA criteria.

The **Obstacle Free Zone** (OFZ) is a three-dimensional volume of airspace that supports the transition of ground to airborne aircraft operations (and vice versa). The OFZ clearing standard precludes taxiing and parked airplanes and object penetrations, except for frangible visual NAVAIDs that need to be located in the OFZ because of their location.

Building Restriction Line

The building restriction line (BRL) establishes the closest location that buildings can be placed relative to a nearby runway or, in some cases, a primary taxiway. The FAA no longer defines a specific BRL setback distance standard, but rather provides guidance on factors to be considered in determining the BRL location.

At Hanford Municipal Airport, the BRL for Runway 14-32 is set at 400 feet on each side of the runway centerline. Effectively, the BRL is established to create a visually uniform "flight line" facing the runway. At the established distance, a 21-foot tall building situated at the same elevation as the runway would not penetrate the 7:1 transitional surface of FAR Part 77.

Other Runway Features

Blast Pads

Blast pads consist of light-duty pavement situated beyond the ends of runways. They serve to minimize erosion and the blowing of dirt and debris from unprotected ground that result when aircraft, particularly jets, apply full power to initiate their takeoffs. Although paved, blast pads are not usable by aircraft under normal circumstances and are not included in the runway length.

At Hanford Municipal Airport, jets generally utilize Runway 32 for departures. Consequently, a blast pad is 150-feet beyond the end of Runway 32. No change is recommended.

Marking

Runway 32 is marked with nonprecision instrument markings. Runway 14 is marked with visual markings. At such time as the approach to Runway 14 is improved, the runway should be re-striped with nonprecision markings.

Lighting

This runway is equipped with a medium-intensity runway edge lighting system (MIRL). The lighting is pilot controlled. An approach lighting system (discussed above) would supplement this existing lighting.

Electronic Navigational Aids (NAVAIDS)

- **Runway 32** — Runway 32 is equipped with GPS straight-in instrument approach capabilities. The GPS nonprecision instrument approach to Runway 32 has visibility minimums as low as 1 mile. These minimums would be reduced to as low as ¾ mile if an approach lighting system (i.e., MALS) is installed.
- **Runway 14 —** Runway 14 does not have a straight-in instrument approach procedure. A straight-in GPS approach procedure is planned for the runway. The GPS approach procedure will have visibility minimums of one-mile.
- **Terminal NAVAIDS** — Another electronic NAVAID, Very-High-Frequency Omnidirectional Range (VOR), is situated near the airport. The VOR allows aircraft to circle to land at either end of the runway. The VOR approach procedure has visibility minimums as low as 1 mile.

Visual Approach Aids

Both ends of the Runway 14-32 have four-box precision approach slope indicators (PAPI-4L) with approach slopes set at 3.5° (i.e., Runway 14) and 3.0° (i.e., Runway 32). Runway 32 is equipped with runway end identifier lights (REIL).

A standard green-and-white beacon, located south of the airport manager's office, helps pilots to find the airport at night.

TAXIWAYS

Taxiways provide the linkages by which aircraft travel between runways and parking facilities in the airport building area. At Hanford Municipal Airport, one taxiway parallels Runway 14-32. The parallel taxiway, designated Taxiway A, runs the full length of the west side of Runway 14-32 and provides access to each end. Sections of Taxiway A vary in width (See Table 3D adjacent).

Table 3D

Taxiway Design Widths

Taxiway	Width
A	35 feet
B	75 feet
C	30 feet
D	35 feet
E	35 feet
F	35 feet

The recent realignment of Taxiway A facilitated the widening of Taxiways A (north end), D, E, and F to meet the 35 foot ARC B-II standard. The south end of Taxiway A where it connects with the approach end of Runway 32 is 35-feet wide. Taxiway C is 30-feet wide. It does not meet B-II requirements. Taxiway B exceeds the B-II standard.

Runway-to-Taxiway Separation

In November 2005, Taxiway A was realigned and set a distance of 240-feet from the centerline of the runway to the taxiway centerline to meet ARC B-II standards.

Taxiway Object Free Area

As presently configured, the distance from the centerline of Taxiway A to adjacent aircraft parking positions is approximately 66 feet. This amount of wingtip clearance is ample for the current mix of aircraft using the airport. It meets FAA standards for aircraft with wingspans up to 79 feet.

Exit Taxiways and Holding Bays

- **Taxiway Exits —** The two end taxiways (A) and five mid-field taxiways (B-F) that serve as exits from Runway 14-32 are appropriately spaced to minimize the time needed for aircraft to exit the runway after landing. Taxiway D will have direct access from the runway to the fuel island on the FBO apron. Another exit taxiway is located midfield from Taxiway A and connects at the north corner of the FBO apron.
- **Taxiway Fillets** — As part of the recent parallel Taxiway A realignment, angled fillets for Taxiways D, E, and F were enhanced to accommodate use by larger aircraft.

- **Holding Bays** — Holding bays provide a location where aircraft can conduct pre-flight run-ups or wait for instrument departure clearance without blocking access to the runway by other aircraft. Typically, holding bays are situated along the taxiways that serve the ends of the runway. A holding bay exists at each end of the parallel taxiway serving Runway 14-32 at Hanford Municipal Airport. As part of Taxiway A realignment project, a new holding bay was constructed on the west end of Taxiway A, west of Runway 14.

Other Features

- **Lighting** — As part of the realignment of the parallel taxiway in 2006, taxiway edge lighting was installed.
- **Marking and Hold Lines** — On the north end of Taxiway A, lead-in taxiway markings exist. Taxiway A centerline and edge stripe markings are in accordance with FAA standards. Hold lines, as required by FAA standards, are marked on each of the seven locations where a taxiway intersects with the runway. All taxiway hold line markings are established consistent with ARC B-II design requirements (e.g., 200 feet from the runway centerline).

OTHER AIRFIELD COMPONENTS

Signage

FAA standards for airfield signage are set forth in Advisory Circular 150/5340-18D, *Standards for Airport Sign Systems*. These standards mandate installation of certain instructional signs at all airports. Other types of signs provide guidance to pilots. These signs are recommended at all airports, but required only at airports that are certified for commercial air passenger operations under FAR Part 139. Hanford Municipal Airport is not a Part 139 airport.

The mandatory signs are considered essential for airport safety. Among these are:

- Holding position signs at taxiway intersections with runways;
- Holding positions signs at intersections between runways; and
- Holding position signs for ILS Critical Areas.

Recommended signs include ones that show the designation of or direction to runways and taxiways. For runways used by turbojet aircraft, runway distance remaining signs are also recommended. All signs on lighted runways or taxiways should be lighted.

Holding position signs at Hanford Municipal Airport are lighted. In early 2006, Light Emitting Diode (LED) lights will be installed on the parallel taxiway and all exit taxiways.

Supporting Facilities

- **Wind Indicators**—A single wind cone is located at the airport. The wind cone is collocated with the segmented circle, immediately south of the FBO ramp. The wind cone at the segmented circle is lighted. The current location of the segmented circle and wind cone preclude a contiguous apron. It divides the transient/based tiedown apron into two sections. Therefore, it is recommended that this area be paved in the future to achieve a contiguous ramp. This would require that the tiedown apron be reconfigured and the wind cone be relocated approximately 860 feet northeast of Runway 32.
- **Automated Surface Observing System (ASOS)**—The Hanford Municipal Airport's ASOS provides real-time weather observations including temperature, dew point, wind speed and direction, altimeter setting, visibility condition, and precipitation. This data is communicated to pilots by an automated, continually updated, radio broadcast and also is available by telephone. Most of the sensor equipment used to gather the weather data is located east of Runway 32.
- **Compass Rose**—Consisting of a symbol painted on airfield pavement, a compass rose is used by aircraft maintenance personnel to verify the accuracy of the magnetic compass in aircraft. One is marked on the airline apron adjacent to Taxiway B.

LEGEND

	EXISTING	PROPOSED
AIRPORT ACQUIRED WITH FEDERAL FUNDS	(hatched)	N/A
AIRPORT PURCHASED WITH LOCAL FUNDS	(blank)	N/A
ACTIVE AIRFIELD PAVEMENT	(shaded)	N/A
AIRPORT PROPERTY BOUNDARY	297 Acres	342 Acres
AVIGATION EASEMENT	N/A	— + + + —

AIRPORT PROPERTY DATA

PARCEL	ACRES	FUNDING	GRANT NO.
1	1.7 ac	FAA	09
2	1.0 ac	FAA	09
3	1.2 ac	FAA	10
4	114	FAA	05
5	6.25	FAA	06
6			
7	40	FAA	09
8	130 ac	City	N/A

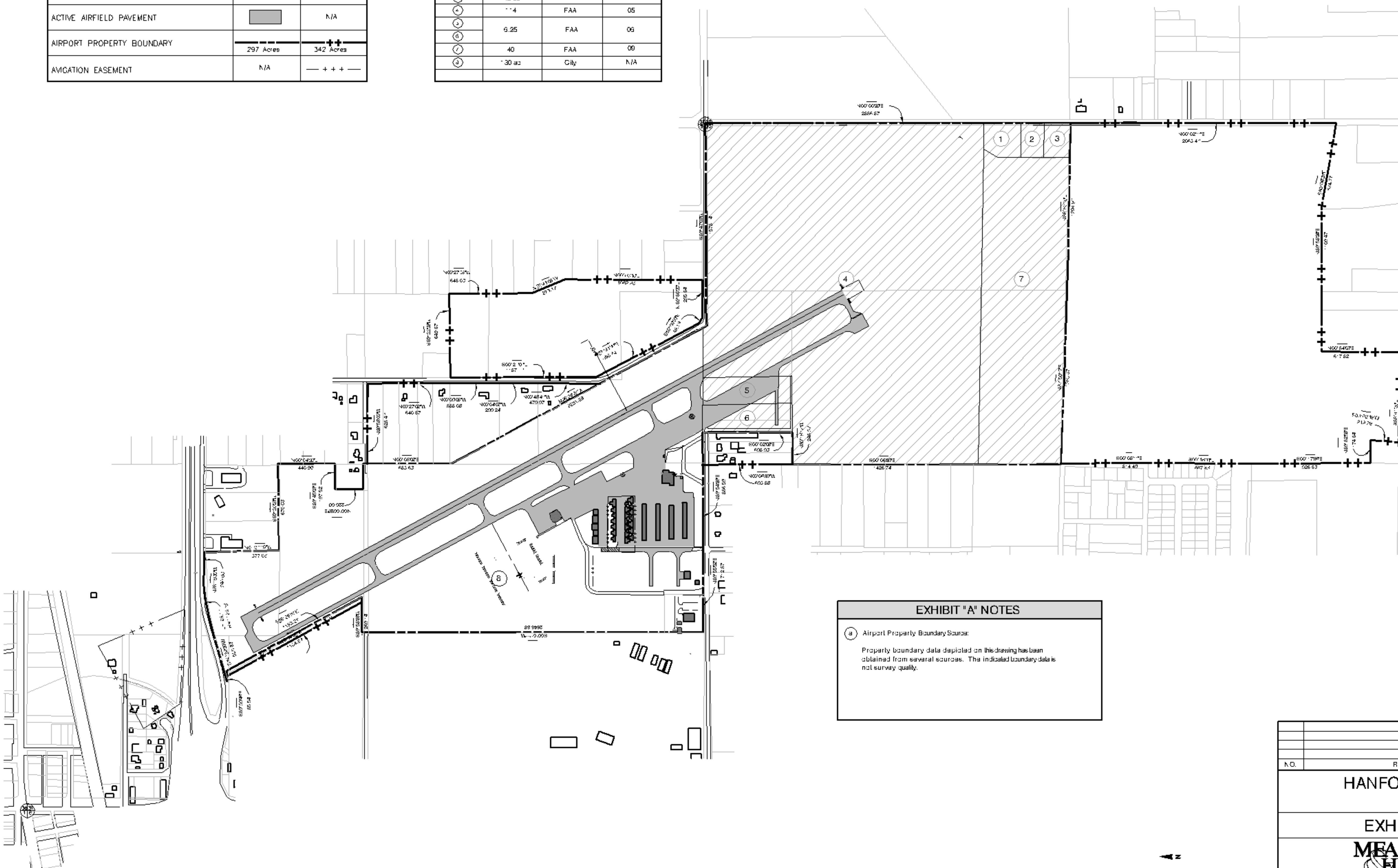


EXHIBIT "A" NOTES

(a) Airport Property Boundary Source:

Property boundary data depicted on this drawing has been obtained from several sources. The indicated boundary data is not survey quality.

NO.	REVISION	SPONSOR	DATE

HANFORD MUNICIPAL AIRPORT

HANFORD, CALIFORNIA

EXHIBIT A PROPERTY MAP

MEAD & HUNT

DESIGN: DD	DRAWN: CB/TE	DATE: JUNE 2006	SHEET 3 OF 3

The preparation of these documents was financed in part through a planning grant from the Federal Aviation Administration as provided under Section 505 of the Airport and Airway Improvement Act of 1982, as amended. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of these documents by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted herein nor does it indicate that the proposed development is environmentally acceptable in accordance with appropriate public laws.