



Basic Design Factors

The Federal Aviation Administration (FAA) provides guidance and standards for airport design through a series of Advisory Circulars (ACs). These guidelines promote airport improvements which enhance airport safety and operational utility. Major considerations include:

- The total volume of aircraft operations;
- The types of aircraft seeking to operate at the airport; and
- Availability of instrument approach procedures.

Airport Role

The purpose of the proposed airfield improvements is to continue to facilitate the established airport role and enhance the airport's ability to accommodate the forecast growth in business aircraft operations.

The operational role of Willows-Glenn County Airport – that of a general aviation airport – requires it to serve a wide variety of aircraft sizes and types. Currently, the airport primarily serves agricultural (aerial applicators) and personal/recreational aircraft operations. The aerial applicators principally use single-engine turboprop aircraft. The personal/recreational use aircraft are mostly single-engine, piston-powered aircraft. The airport also sees regular, but less frequent use by piston and turboprop twins, and small-to-mid-size business jets.

Additionally, Willows-Glenn County Airport is used by several helicopter operators. The most frequent helicopter user is the California Highway Patrol (CHP). CHP helicopter operations occur on a daily basis. CHP maintains a fuel tank located immediately east of Runway 16. Other helicopter users include agricultural applicators, the California Department of Forestry and Fire Protection (CDF), and private contractors involved in wildland fire suppression.

As discussed in Chapter 2, the operational role of the airport is expected to remain essentially the same as at present throughout the 20-year planning period. The airport will continue to serve as a base of operations for light-to-medium general aviation aircraft. While agricultural operations and recreational use will continue to account for

This chapter presents a comprehensive assessment of future airfield needs at Willows–Glenn County Airport. Major issues addressed are:

- *Future reclassification of Runway 16-34 to accommodate regular use by turboprops and business jets*
- *Modification of the taxiway system to improve circulation and safety*
- *Relocation of the existing helicopter parking position*
- *Resolving the nonstandard runway safety area in the approach to Runway 34*

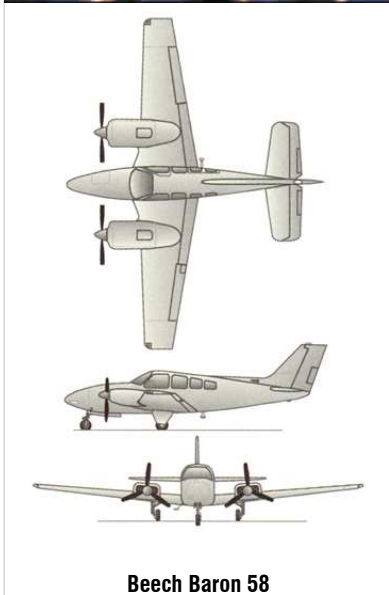


Aircraft Approach Category

- Category A: aircraft approach speed less than 91 knots.
- Category B: speed 91 knots or more but less than 121 knots.
- Category C: speed 121 knots or more but less than 141 knots.
- Category D: speed 141 knots or more but less than 166 knots.
- Category E: speed 166 knots or more.

Airplane Design Group

- Group I: wingspan up to but not including 49 feet.
- Group II: 49 feet up to but not including 79 feet.
- Group III: 79 feet up to but not including 118 feet.
- Group IV: 118 feet up to but not including 171 feet.
- Group V: 171 feet up to but not including 214 feet.
- Group VI: wingspan greater than 214 feet.

**Beech Baron 58**

the majority of aircraft operations, the percentage of operations by transient business/corporate aircraft is expected to increase.

It is anticipated that with enhanced airport facilities and planned growth of industrial and commercial uses in the community, the airport will experience moderate growth. Accordingly, the future role of the airport will be defined less by the introduction of new uses and more by changes among the roles that the airport currently serves (e.g., volume of activity and aircraft mix).

Airport Classification

For airfield design purposes, the FAA has established a set of airport classifications known as Airport Reference Codes (ARC). An ARC is applicable to each airport and its individual runway and taxiway components. The primary determinants of these classifications are the critical aircraft (design aircraft) a runway or taxiway is intended to serve and the instrument approach minimums applicable to a particular runway end. Each ARC consists of two components relating to an airport's design aircraft:

Aircraft Approach Category — depicted by a letter (A-E), this component relates to aircraft approach speed, an operational characteristic that provides an indication of runway length requirements. Within this category, aircraft that have gross weights of 12,500 pounds or less are classified as *small* and have distinct airfield design criteria.

Airplane Design Group — depicted by a Roman numeral (I-VI), the second component relates to airplane wingspan, a physical characteristic.

Generally, Aircraft Approach Category applies to runways and runway-related facilities. Airplane Design Group primarily relates to separation criteria involving taxiways and taxilanes.

Aircraft Activity Volume

The *Master Plan* activity forecasts (in Chapter 2) indicate that Willows-Glenn County Airport has a potential to reach a total activity level of 36,000 annual operations over the 20-year planning period, compared to approximately 29,500 annual operations at present.

Design Aircraft

Existing Conditions – Presently, the fleet mix (i.e., mix of aircraft types) for Runway 16-34 is quite varied, ranging from small-single piston engine aircraft to turbine-powered business jets. The largest aircraft regularly using the airport are medium-sized turboprops (e.g., Beechcraft King Air 350) and light jets (e.g., Cessna Citation series). There is an occasional use by medium sized jets (e.g., ones with gross weights in the 30,000 to 40,000 pound range). However, the volume of use by these larger aircraft has not yet reached 500 annual operations.

The most demanding class of aircraft that exceed the 500 per year threshold is the small twin-engine piston aircraft (e.g., Beech Baron 58). These aircraft have approach speeds of less than 121 knots (typically around 100 knots), wingspans of less than 49 feet (typically less than 40 feet), and weigh less than 12,500 pounds at their gross maximum weight (typically between 5,000 and 6,500 pounds). Therefore, the current ARC for Runway 16-34 is B-I (Small).

Runway 13-31 is used almost exclusively by single-engine aircraft. The dominant aircraft in this group is the turboprop version of the Grumman Ag Cat. The Ag Cat's approach speed falls within Category A, its wingspan within Design Group I, and it has a ramp weight of less than 12,500 pounds (i.e., Small). The current ARC, for Runway 13-31, is therefore functionally established as A-I (Small).

Future Conditions – The forecast prepared as part of this *Master Plan* indicates that the airport will see increased use by small- to medium-sized business jets over the next 20 years. Use by the smaller jets (e.g., Cessna Citation Bravo) is expected to exceed the 500 operations per year threshold. Medium-sized jets are expected to see less frequent airport use. Jet activity will largely be limited to Runway 16-34. Its length and nonprecision instrument approach capabilities will make it the preferred runway. Reclassification of the runway will be necessary to meet FAA design standards for aircraft having larger wingspans and higher approach speeds.

Runway 13-31 currently serves as the airport's crosswind runway and it is used primarily by agricultural operators based at the airport. However, the current classification for Runway 13-31 is A-I (Small). Because Runway 13-31 primarily serves agricultural aircraft operations and seldom sees use by aircraft larger than ARC A-I (Small), it is recommended that the runway be reclassified; from an ARC B-I (Small) to ARC A-I.

Runway 16-34	<i>Beech Baron 58</i>
Approach Speed:	96 knots
Wingspan:	37.8 feet
Max. Takeoff Weight:	5,500 pounds
Airplane Height:	12 feet, 1 inch
ARC classification	B-I (Small)

Runway 13-31	<i>Grumman Ag Cat</i>
Approach Speed:	Less than 91 knots
Wingspan:	42.5 feet
Max. Takeoff Weight:	7,020 pounds
Airplane Height:	12 feet, 1 inch
ARC classification	A-I (Small)

Runway 16-34	<i>Cessna Citation Bravo</i>
Configuration:	Twin turbine
Approach Speed:	Less than 121 knots
Wingspan:	52.2 feet
Max. Weight:	15,000 pounds
Airplane Tail Height:	15 feet
ARC classification:	B-II

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.

VOR—Very High Frequency Omni-directional Range. A radio navigation aid operating in the 108-118 MHz band. A VOR ground station transmits a two-phase directional signal. The aircraft's VOR receiver enables a pilot to identify his radial or bearing to/from the ground station. VOR is the most commonly used ground based radio navigation aid in general aviation flying.

DME—Distance-Measuring Equipment. A combination of ground and airborne equipment which gives a continuous slant range distance-from-station readout by measuring time-lapse of a signal transmitted by the aircraft to the station and responded back. DMEs can also provide groundspeed and time-to-station readouts by differentiation.

GPS—Global Positioning System. A U.S. developed satellite-based high-precision navigation system now in widespread use by commercial and private operators.

Meteorological Conditions and Prevailing Winds

Willows-Glenn County Airport is situated in the northern end of California's Central Valley at an elevation of 138 feet Mean Sea level (MSL). Generally visibility is good. However, in the winter months rainy weather and Tule fog regularly limit visibility. Prevailing winds at the airport are predominately from the north-northwest.

Strong winds at an airport can represent additional airfield design concerns. 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. Ideally, an airport's runway orientation will provide maximum headwind and minimum crosswind components. 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. Small, light aircraft are more affected by strong crosswinds than are 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.

Wind data collected from the National Climatic Data Center's Oroville station indicate that the primary runway (Runway 16-34) provides 98.5% wind coverage for a runway with an ARC (B-II) classification. This data indicates that a crosswind runway is not required. Runway 13-31 provides 99.4% coverage for a runway classified as ARC (A-I).

Instrument Approach Capabilities

Two instrument approach procedures serve Willows-Glenn County Airport: VOR/DME and GPS. These procedures provide straight-in nonprecision instrument approaches to Runway 34. Both approach procedures allow aircraft to circle-to-land to other runway ends.

The lowest approach minimums are associated with the GPS approach to Runway 34. The minimums for this approach are 444 feet above the airport elevation and as low as 1 statute mile visibility. The VOR/DME approach minimums for Runway 34 are 464 feet above the airport elevation and as low as 1 statute mile visibility. No straight-in approaches are available for Runways 16, 13, and 31.

Runway 16-34

Runway 16-34 is the primary runway at Willows-Glenn County Airport. The role of the runway is anticipated to evolve over the 20-year planning period. The forecasts anticipate a shift towards greater use of

airport facilities for business activities by both twin-engine turboprop and jet aircraft. Review of the runway's existing conditions, analysis of future needs, and an evaluation of alternatives, are necessary to address the future role of Runway 16-34. The central issue of Runway 16-34 will be how to meet FAA airfield design standards to accommodate the larger jet aircraft which are anticipated to use Willows-Glenn County Airport. This would require a reclassification of Runway 16-34, from ARC B-I (Small) to ARC B-II.

Existing Condition

Although Runway 16-34 currently has a published length of 4,125 feet, runway markings indicate that the north end of the runway (i.e., Runway 16) has been relocated 381 feet to the south. Additionally, a recent survey for National Geodetic Survey indicated that the displaced threshold for Runway 16 is 3 feet further from the physical end of the runway than previously thought. Consequently, only 4,125 feet of the runway is available for takeoffs and landings. The runway is 100 feet wide.

The runway length available is generally sufficient to accommodate the aircraft that currently use the airport. The runway length may impose some limitations on more demanding aircraft (e.g., medium-sized business jets), especially when high summer temperatures occur. The runway length, width and pavement strength exceed the requirements to be classified as an ARC B-I (Small) runway.

To fulfill its role as a primary runway, Runway 16-34 has been enhanced with a variety of electronic and visual landing aids. The primary arrival runway end (Runway 34) is served by a Visual Approach Slope Indicator (VASI), as well as three nonprecision instrument approach procedures. A pilot-controlled medium intensity runway lighting (MIRL) system assists pilots at night and under other low visibility conditions.

Future Condition

In the future, Willows-Glenn County Airport is forecasted to receive more than 500 annual operations by aircraft in the ARC B-II category. The Cessna Citation Bravo is representative of this class of aircraft. Because of its length, business jets are expected to continue their use of Runway 16-34.

Runway Length Requirements

A useful tool available to assess Willows-Glenn County Airport’s future runway length requirements is the FAA computer program (derived from data in Advisory Circular 150/5325-4A, *Runway Length Requirements*). This program calculates the runway length needed to accommodate certain percentages of the nation’s small and large airplane fleets.

The tabulation below shows the runway length requirements for Willows-Glenn County Airport as calculated by the FAA computer program. The calculations are predicated on the airport’s elevation (139 feet MSL) and mean maximum temperature (94.1°F) for the hottest month of the year. Three categories should be considered:

- 100% of small airplanes with less than 10 passenger seats
- Small airplanes with 10 or more passenger seats (i.e., 100% of all small aircraft)
- 75% of large airplanes of 60,000 pounds or less at 60 percent useful load

Table 3A Airport and Runway Data	
Airport elevation	139 ft
Mean daily maximum temperature of the hottest month	94.10 ft
Maximum difference in runway centerline elevation	5 ft
Length of haul for airplanes of more than 60,000 pounds	500 miles
Dry runways	
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with approach speeds of less than 30 knots	300 ft
Small airplanes with approach speeds of less than 50 knots	810 ft
Small airplanes with less than 10 passenger seats:	
75 percent of these small airplanes	2,590 ft
95 percent of these small airplanes	3,160 ft
100 percent of these small airplanes	3,750 ft
Small airplanes with 10 or more passenger seats:	
Large airplanes of 60,000 pounds or less:	
75 percent of these large airplanes at 60 percent useful load	4,770 ft
75 percent of these large airplanes at 90 percent useful load	7,090 ft
100 percent of these large airplanes at 60 percent useful load	5,670 ft
100 percent of these large airplanes at 90 percent useful load	8,970 ft
Airplanes of more than 60,000 pounds	Approx. 5,060 ft
<i>Reference: Chapter 2 of AC 150/5325-4A, Runway Length Requirements for Airport Design, no Changes included.</i>	

The FAA computer program indicates that only 3,750 feet of runway is needed to accommodate 100% of small airplanes *with less than 10 passenger seats*. This category encompasses most of the aircraft utilizing Willows-Glenn County Airport. The current runway length exceeds this length by 378 feet.

To accommodate 100% of all small aircraft a runway length of 4,360 feet would be needed. This length could be met if the existing relocated runway end was converted to a displaced threshold; the published length would be increased to 4,506 feet. This topic will be discussed later in this chapter.

The planned upgrade to ARC (B-II) means that the runway will need to be designed to accommodate large aircraft (i.e., those weighing over 12,500 pounds). The FAA computer model groups together aircraft weighing between 12,500 pounds and 60,000 pounds. Because Willows-Glenn County Airport will principally be serving the lower end of this spectrum, the numbers produced by the FAA model will tend to be higher than required.

The shortest runway length for large aircraft produced by the model is for the category of 75% of large airplanes of 60,000 pounds or less at 60 percent useful load. The indicated length for this category is 4,770. Meeting this length would require a 264-foot extension to the paved length of the runway.

Runway length requirements can be further clarified by calculating the runway requirements for the design aircraft. According to the aircraft manufacturer, the Cessna Citation Bravo needs approximately 3,600 feet of runway for take-off and landing operations at the design elevation and temperature.

As expected, the runway length for the design aircraft is significantly less than that for the general category. The conclusion drawn is that a length somewhat less than the 4,770 feet would be adequate for the mix of aircraft types expected to use Willows-Glenn County Airport during the 20-year planning period. If it were possible to utilize the full paved length of Runway 16-34 (i.e., 4,506 feet), this length is judged sufficient to support the ARC shift to ARC B-II. The feasibility of this change is discussed in the section entitled Runway 16 Siting Issues which follows.

Runway Width

The runway width requirement for an ARC B-II runway with instrument approach minimums greater than one-mile of visibility is 75 feet. Runway 16-34 width was reduced from its original width of 150 feet to



Cessna Citation Bravo



Willows Visitor:
Hawker 800XP — ARC C-II

its current width of 100 feet. Although this width exceeds the required width, no change is proposed. While reducing the width would reduce maintenance costs, it would require relocation of the runway edge and threshold lights. The benefit is judged not be worth the cost. Given that the airport does receive occasional use by aircraft in Category C, the additional width provides some benefit.

Pavement Strength

As the primary runway, Runway 16-34, has a pavement strength rated at 38,000 pounds for single-wheel landing gear, 53,000 pounds for dual-wheel landing gear, and 90,000 pounds for dual-tandem wheel landing gear. The existing runway pavement can adequately accommodate all aircraft currently using the airport, as well as, all aircraft anticipated to use Runway 16-34 throughout the 20-year planning timeframe.

Runway Safety Area Requirements	Airport Reference Code (ARC)	
Runway 16-34	B-I (Small)	B-II
Width	120 feet	150 ft
Length beyond runway end	240 feet	300 ft

Runway Safety Area

Surrounding the runway is a rectangular-shaped area called the Runway Safety Area (RSA). The purpose of the RSA is to provide a level of protection in the event of an aircraft undershoot, overrun, or veer-off. This area must be clear of obstacles that could damage an aircraft, be adequately drained to avoid ponding, and be free of potentially damaging surface ruts. The FAA has placed a very high priority in ensuring that adequate RSAs are provided whenever possible.

FAA guidelines establish the RSA dimensions in relation to the runway ends and runway centerline based on the existing airport reference code (ARC). Accordingly, the RSA dimensions for a B-I (Small) runway are 120 feet wide (centered on the runway) along the entire length of the runway and extending 240 feet beyond each runway end. When the runway is upgraded to ARC B-II, the RSA dimension will increase to 150 feet wide (75 feet either side of centerline) for the entire length of the runway and extend 300 feet beyond each runway end. RSA standards are met at the Runway end and along the sides of the runway. However, Runway 34 is nonstandard.

Currently, the longitudinal grades south of Runway 34 are too abrupt to meet standards. This could be corrected with a modest amount of regrading. The larger issue is that a canal crosses through the current and proposed RSA. With regrading, only about 220 feet of the area south of the runway would qualify as RSA. To meet current RSA standards the canal would need to be shifted to the south about 20 feet. A shift of 80 feet would be required to meet the future RSA standard.



At its widest this canal is about 20 feet wide and 15 feet deep. It splits immediately west of the extended runway centerline into two ditches. A corrugated metal pipe drains the west side of the runway into this canal. Although the size and configuration of the canal are modestly complex, there are no obvious physical constraints that would prevent this section of the canal from being realigned and/or placed in a box culvert. An engineering analysis would be needed to define the optimum design. When the drainage channel is realigned to resolve the current nonstandard condition, it would be efficient to design the realignment to meet the future standard for ARC B-II. Some property acquisition will likely be needed to support the canal modification.

Runway 16 Threshold Siting Issues

Existing Condition

As a part of the last pavement maintenance project, the threshold for Runway 16 was relocated 381 feet south from the north end of the runway pavement. Although no documentation has been found, it is believed that the threshold was relocated to provide FAR Part 77 approach clearance over the existing State Highway 162. The current threshold siting surface (day-night visual runway for small aircraft with approach speeds over 50 knots) does not require relocation of the threshold.

Currently, the pavement north of the runway end is marked as a lead-in taxiway for Runway 16. Current FAA policy is to discourage the continued use of lead-in taxiways (called aligned taxiways by the FAA), siting operational and safety concerns as well as possible runway incursions.

It is therefore recommended that the current function and markings of the lead-in taxiway and threshold to Runway 16 be modified in the future to create a displaced threshold. The implications of this recommendation are discussed below.

Future Condition

It is recommended that the existing Runway 16 landing threshold remain in the same location, and that the existing lead-in taxiway be converted into useable runway with a 381-foot displaced threshold. The displaced threshold will allow the full use of the runway (4,506 feet) for landings and takeoffs on Runway 34, as well as takeoffs on Runway 16.

However, the displaced threshold will not change the current amount of runway available for landings on Runway 16. Displaced threshold markings will delineate the landing threshold (381 feet south of the

physical end of pavement) to Runway 16. Therefore, the total runway length available for landings on Runway 16 will be 4,125 feet, the runway's current length.

Retaining this threshold location will permit the runway to meet the threshold siting surface criteria when a straight-in nonprecision approach is created for night operations by aircraft in Approach Categories A and B (see Figure 3A). This displaced threshold will also make it feasible to install traffic signals and street lights when Airport Road is realigned. The realignment will allow Airport Road to match the location of the public road serving the adjacent commercial center. Traffic signals or utility poles up to about 35 feet in height will be possible at the four-way intersection. Standard 30-foot street lights can be installed along the first 150 feet of the new alignment of Airport Road. The subsequent 130 feet of the west side of the alignment could only accommodate reduced size street lights. However, standard lights could be placed on the eastern side of the road. The proposed displacement will also provide threshold siting surface clearance over the truck parking area west of Nancy's restaurant. However, truck parking is proposed to be eliminated because the parking area falls within the runway protection zone and object free area for Runway 16.

The recapturing of 381 feet of runway will result in two operational benefits. One, reestablishment of the runway end at the physical end of pavement will eliminate the existing lead-in taxiway as it will be converted into a displaced threshold. Two, the recapturing of pavement will increase the overall length of Runway 16-34 by 381 feet without constructing additional pavement.



The increase in length will result in a total future runway length of 4,506 feet for landings and takeoffs on Runway 34 and takeoffs on Runway 16. The runway length available for landings on Runway 16 will remain the same as at present, 4,125 feet, thereby not affecting landing operations on Runway 16.

Line of Sight Along Runway

It is important for pilots to be able to visually verify that the runway is clear of other aircraft prior to takeoff. For a runway with a parallel taxiway, FAA standards require that any two points five feet above the runway centerline be mutually visible for one-half the runway's length. This runway does not have any significant grade breaks or humps that would interfere with visibility along the runway. Therefore, it meets the line of sight standard along its length.

Runway 34 Threshold Siting Issues

Existing Condition

The existing end of Runway 34 is proposed to remain in its present location. Currently a service road that passes through the primary surface as it curves around the runway end. This road is accessible only through a locked swing gate. It is intended to be used only for maintenance activities and emergency access. While it would be desirable to have this road independent of the runway, there is no requirement that it must be. County staff and others using the service will need to follow standard procedures and visually verify that crossing this section will not interfere with an aircraft landing or taking off. As can be seen in Figure 3B, a farm road south of the irrigation canal penetrates the threshold siting surface.

Future Condition

In order to provide standard runway safety area dimensions, this master plan includes relocation of the canal south of the runway. Relocation of the canal provides an opportunity to relocate the associated farm road. Increasing the separation between the runway end and farm road will enable vehicles on the farm road to remain clear of the threshold siting surface.

Runway 13-31

Runway 13-31 currently serves as Willows-Glenn County Airport's crosswind runway. Runway 13 begins between the intersection of Taxiway B and Taxiway C, and extends 3,788 feet southeast, towards Interstate-5.

As noted previously in this chapter, the main runway, Runway 16-34, exceeds the 95% threshold requirement for wind coverage as defined by the FAA. This suggests that the current crosswind runway (Runway 13-31) is not needed for this purpose.

However, about 70% of all airport operations at Willows-Glenn County Airport occur on Runway 13-31. These operations are generated primarily by agricultural aircraft. The proximity of Runway 13-31 to the building area, and existing agricultural facilities, make the runway convenient for use by agricultural operators.

Existing Condition

Runway 13-31 has a marked length of 3,788 feet and is 60 feet wide. At the present time, the available runway length is sufficient to

accommodate agricultural and other small aircraft that operate out of the airport.

Because it lacks runway lights, Runway 13-31 is not used for night operations or when visibility is low. No visual approach aids or runway lighting exists on Runway 13-31.

Future Condition

According to FAA standards, Willows-Glenn County Airport does not require a crosswind runway. However, the runway does provide a means of separating the high volume of crop duster activity from other general aviation activity. It also enables the airport to remain open when the main runway is closed for maintenance or other reasons. Given that the runway represents a significant investment, it should be retained at its present length and width.

Currently, pavement northeast of the runway threshold is marked as a lead-in taxiway for Runway 13. As mentioned earlier, lead-in taxiways are discouraged by the FAA. Therefore, it is recommended that the lead-in taxiway be replaced with two right-angle entrance taxiways. Two alternative methods could be used to close the lead-in taxiway. First, the area could be striped as unusable. This has the advantage of providing a paved area for overshoot landings on Runway 31 (the most common direction) or undershoot landings on Runway 13. Alternately the taxiway pavement could be removed. This alternative has the advantage of making use of this closed taxiway physically impossible. A final decision on the choice can be the subject of subsequent discussions between Glenn County and FAA staff.

Required Runway Dimensions

Defining Critical Aircraft

At Willows-Glenn County Airport, the most demanding class of aircraft expected to regularly use Runway 13-31 will be agricultural aircraft with weights in the range of 3,000 to 9,000 pounds. Representative of this class would be the Grumman Ag Cat (7,020 pounds gross weight). Therefore, the Grumman Ag Cat is defined as the critical aircraft for Runway 13-31.

Runway Length Requirement

The FAA's runway length software (from Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design*) indicates that a length of 3,750 feet is needed to accommodate 100% of small aircraft weighing less than 12,500 pounds. This advisory circular indicates that crosswind runways length should be 100% of the design length

for the class of aircraft that it serves. Currently, Runway 13-31 has a length of 3,788 feet and can accommodate all small aircraft using the airport. Therefore, no change in the runway's length is required to fulfill its current or future role. However, as will be discussed later in this chapter, meeting FAA design standards will require shortening this runway by 238 feet. The resultant runway length will be 3,550 feet. This reduced length will still accommodate over 95% of small aircraft.

Runway Width

For a runway with instrument approach minimums of greater than $\frac{3}{4}$ mile visibility in ARC A-I (Small), the runway width requirement is 60 feet. Currently, Runway 13-31 has a width of 60 feet and meets FAA design standards. No change in the existing width is required.

Pavement Strength

Runway 13-31 has a pavement strength rated at 12,000 pounds for aircraft with single-wheel main landing gear. Due to the limited length and width of the runway, the runway is primarily used by small local aircraft. Heavier aircraft use the airport's main runway, Runway 16-34. Because the current pavement strength is adequate to accommodate both existing and forecast aircraft, a change in the runway pavement strength is not recommended.

Runway Safety Area

FAA guidelines establish RSA dimensions in relation to the runway ends and runway centerline. The RSA is also based on the airport reference code of the critical aircraft and the type of approach to the runway. For Runway 13-31, the ARC is A-I (Small) and assumes instrument approach minimums no lower than $\frac{3}{4}$ mile. Accordingly, the RSA dimensions for Runway 13-31 are 120 feet wide (60 feet either side of centerline) for the entire length of the runway and extending 240 feet beyond each runway end. The existing RSA for Runway 13-31 meets FAA standards.

Runway 31 Threshold Siting Issues

Existing Condition

Runway 31 currently has a 200-foot displaced threshold. A service road underlies the approach to this runway about 600 feet south of the runway end. Immediately south of the service there is an irrigation canal. However, as can be seen in Figure 3C, there are no objects underlying the threshold siting surface that justify this relocation. Note that this siting surface begins at the end of the runway, because this runway serves small aircraft with visual approaches.

Future Condition

There are no existing or proposed objects that would penetrate a threshold siting surface based upon the physical end of the runway. Therefore, the existing displaced threshold can be eliminated.

Line of Sight Along Runway

It is important for pilots to be able to visually verify that the runway is clear of other aircraft prior to takeoff. For a runway without parallel taxiway, FAA standards require that any two points five feet above the runway centerline be mutually visible along the runway's length. This runway does not have any significant grade breaks or humps that would interfere with visibility along the runway. Therefore, it meets the line of sight standard along its length.

Helipad

Existing Condition



Helipad – A designated landing site for helicopters. It is equivalent to a runway. A helipad may or may not also be a helicopter parking position. Helicopters must taxi to a helicopter parking position.

A helipad is located at the north end of the airport east of the approach end of Runway 16. The helipad consists of a 60-foot square pad with inoperative perimeter lights. The largest helicopter to regularly use the helipad is the A-Star 350 flown by the California Highway Patrol (CHP). Therefore, the A-Star 350 has been designated the critical aircraft for this helipad. The tail rotor clearance arc for this helicopter has a diameter of 56 feet.

The helipad commonly receives twice daily use by a CHP helicopter. It also receives occasional use by other helicopters. These other users include helicopters used for utility patrol.

The CHP has placed a small fuel tank adjacent to the helipad for refueling its helicopters with Jet A. A hedge is located between the helipad and the adjacent tiedown apron. This hedge and fuel tank fall within the helipad safety area and need to be relocated. Additionally, the helipad is located too close to Taxiway D (the parallel taxiway serving Runway 16-34). The rotor clearance arc extends 6 feet into this taxiway's Object Free Area (described below). The future alignment of Taxiway D will pass through this helipad. For all of the reasons noted above, this helipad needs to be relocated. As An interim measure, the California Division of Aeronautics has requested that the inoperative edge lights be removed and the helipad remarked as a helicopter parking position.

Future Condition

As noted above, a new location is needed to accommodate the regular use by helicopters. One of the key choices is whether the new facility will be designed as a helipad or helicopter parking position. This choice is evaluated below. In either case, ideally the replacement facility would have the following characteristics:

1. Meets all FAA design guidelines
2. Provides adequate separation from fixed-wing parking positions to minimize potential for exposure to dust and debris from rotor wash
3. Would permit helicopter operations to be independent of the airport's runways
4. Reasonable walking distance to the on-airport restaurant

This helicopter facility will need to have certain design features regardless of its location or role (i.e., whether helipad or parking position). Because most of the helicopters using this facility will have skids rather than wheels, the pad will need to be constructed of Portland cement concrete. The pad will need to be illuminated to support use at night. It will need to have markings to clearly identify it as solely for helicopter use. The specific markings will differ depending upon whether it is designed as a helipad or helicopter parking position.

The configuration of the building area constrains the range of potential choices. The building area is shallow, except in the area already devoted to hangars. Conceptually there are three general areas in which a new helipad or helicopter parking position could be located:

- Immediately east of the helipad's current location
- Southeast of the present location along the existing flight line
- Southeast of the present location in the interior of the airport.

Sites fully meeting FAA design guidelines (Criteria 1 above) could be accommodated in all three areas. Therefore, the analysis will focus on the other three criteria.

Shifting the helipad east of its present location would be possible. A helipad in this area would provide sufficient separation for its operations to be independent of those on Runway 16-34. However, creating an approach to the helipad that would be independent of Runway 13-31 would require elimination of most uses on the southern apron. Additionally, a helipad or helicopter parking position on this site would eliminate at least a half dozen tiedowns, and reduce the potential to expand the tiedown apron. As discussed in Chapter 4, this location is the most efficient location for parking smaller transient and

based fixed-wing aircraft. An alternate location for helicopters would be desirable.

The remaining choices for a helicopter facility are southeast of the existing helipad. A site could be created along the flight line southeast of the helipad's current location. Conceptually a pad could be located anywhere along the Aircraft Parking Limit line for Runway 13-31. Possible sites could range from immediately south of Taxiway B to the southern end of the building area.

Although there are a large range of possible sites along the flight line, sites within reasonable walking distance of the airport's restaurant are more likely to be used. Walking distances to the restaurant for sites on or adjacent to the apron would range from about 700 to 1,200 feet. This is judged to be the limit of an acceptable walking distance.

Sites on or adjacent to this apron could be designed as either a helipad or helicopter parking position. However, creating approaches to a helipad that are independent of the two runways would require the approaches to be aligned parallel to the two runways. This would eliminate most tiedown positions on the two existing aprons. A helicopter parking position would not require this extensive clearing needed for a helipad. The principal transient helicopter operator is the California Highway Patrol. The CHP's chief pilot indicated that their standard procedure is to make approaches to the runways at Willows-Glenn County Airport. Therefore, there would be little operational benefit to offset the costs of creating a helipad; a helicopter parking position would provide about the same level of utility. Therefore, creating a helicopter parking position on or adjacent to the southern tiedown apron would be a viable alternative.

The third area in which the helicopter facility could be located is in the interior of the southeastern quadrant of the building area. There is sufficient open land to construct a helicopter facility in this area. It would have to be designed as a helipad with approaches from the north and south. Distances are too great for hover-taxiing to be feasible.

In order to provide clear approaches a helipad site would need to be at least 500 feet south of the existing hangar area. At this location, it would be possible for helicopter operations to be independent of operations on the airport's two runways. However, this would place the helipad about 2,000 feet walking distance from the airport restaurant. This distance increases the potential that a helipad would not be used. A site in this location would also eliminate the potential for further development of this interior area. This has negative financial and development implications for the airport.

Based upon the preceding analysis, it is concluded that a helicopter parking position (not a helipad) located on or adjacent to the southern tiedown apron would offer the greatest utility. Within this area, the optimum location is at the southern end of the south apron. This would place the helicopter parking position away from the most frequently used taxiways and from most fixed-wing parking positions. However, it provides a paved path for hover-taxiing and is convenient regardless of which runway is used for the approach.

Other Runway Design Considerations

Line of Sight Between Runways

Section 503 of Advisory Circular 150/5300-13, *Airport Design*, contains the line of sight standards for runways. This section includes visibility standards for both along runways and between intersecting runways. FAA standards do not contain a visibility standard for between runways that do not intersect. However, because staff from the FAA's Burlingame Airports District Office raised sight distance as an issue following a recent site visit, the line of sight between runways has been evaluated as if the two runways did intersect.

For evaluating line of site between runways, the FAA defined a Runway Visibility Zone. Within the Runway Visibility Zone there needs to be an unobstructed line of site between any two points five feet above the runway centerlines. Figure 3D depicts the existing and future Runway Visibility Zone as if Runway 13-31 was extended along its current alignment until it intersected with Runway 16-34. The Runway Visibility Zone boundaries will change when the aligned taxiway at the north end of Runway 16-34 is converted back to being part of the runway.

No structures, terrain or vegetation obstruct the line of sight between the two runways within the defined Runway Visibility Zones. Therefore, it is concluded that the line of sight between the two runways is acceptable.

Obstacle Free Zone (OFZ)

The Obstacle Free Zone (OFZ) is a defined volume of airspace centered above the runway centerline. In order to provide clearance protection for aircraft landing or taking off from the runway and for missed approaches, the OFZ is required to be clear of all objects, except for frangible visual NAVAIDs that need to be located in the

OFZ because of function. This standard precludes taxiing or parking aircraft within the OFZ.

Runway 16-34

Runway 16-34 is classified as an ARC B-I (Small). The current dimensions of the OFZ for Runway 16-34 are 250 feet wide (125 feet from runway centerline) and extend 200 feet beyond each runway end. The existing OFZ for runway 16-34 meets current FAA standards.

The future classification of Runway 16-34 will be ARC B-II. The future OFZ dimensions for an ARC B-II runway are 400 feet wide (200 feet from runway centerline) and extend 200 feet beyond each runway end. Runway 16-34 meets the future OFZ standard.

Runway 13-31

Runway 13-31 is classified as an ARC (A-I) runway. The existing OFZ dimensions for Runway 13-31 are 250 feet wide (125 feet from runway centerline) extending 200 feet beyond both runways ends. Taxiway D currently passes through the OFZ for Runway 13-31. Taxiway D is proposed to be shifted to the east to provide standard runway-to-taxiway separation for Runway 16-34 when it is upgraded to ACR B-II. This would increase the amount Taxiway D penetrates the OFZ for Runway 13-31.

It is proposed to shorten Runway 13-31 at its northwestern end to provide a standard OFZ. The runway end would be relocated such that the OFZ for Runway 13-31 is tangent to the OFZ for Taxiway D. This will require shortening this runway by 244 feet. The resultant runway length will be 3,550 feet. This reduced length will still enable Runway 13-31 to accommodate over 95% of small aircraft.

Object Free Area (OFA)

Object Free Area (OFA) is a two-dimensional area that surrounds a runway. The OFA clearing standards preclude parked airplanes and objects, except whose location is fixed by an aeronautical function. The OFA should be under the direct control of the airport operator.

Runway 16-34

FAA design standards for ARC B-I (Small) facilities, such as Runway 16-34's, specify that the OFA be 400 feet wide for the full length of the runway and extend a minimum of 240 feet beyond the ends of runway pavement. The existing OFA has a width of 400 feet (centered on the runway) and extends 240 feet beyond the runway's ends. The current OFA meets FAA design standards for an ARC B-I (Small) runway.

The future designation of Runway 16-34 will be ARC B-II. This forthcoming runway designation will require increasing the OFA to a width of 500 feet (250 feet from the runway centerline) and extending it 300 feet beyond each runway end.

Runway 34 does not meet the ARC B-II standard for the OFA, beyond the runway end; the berm associated with the channel is a penetration. In order to meet the ARC B-II requirement, additional property will need to be acquired. Realignment of an existing channel would also be necessary to meet the OFA standard. As noted earlier, this channel realignment is also needed to provide a standard runway safety area.

Runway 13-31

The existing OFA dimensions for Runway 13-31 meet FAA design standards for an ARC A-I (Small) runway. Runway 13-31's OFA has a width of 250 feet (125 feet from runway centerline) and extends 240 feet beyond both runway ends. Because the role of Runway 13-31 will remain the same in the future, the current OFA will not increase. This OFA will shift towards the west when the runway end is relocated.

Runway Protection Zone (RPZ)

A Runway Protection Zone (RPZ) is a trapezoidal area beyond each end of an airport's runways. The RPZ is centered on the extended runway centerline. The FAA expanded the purposes of an RPZ to include both enhancing the safety of aircraft operations and protecting people and property on the ground. The term *Runway Protection Zone* has replaced the formerly used term *Clear Zone*.

The FAA recommends that airport owners acquire sufficient property interest within the RPZs to control the use of land within those areas. Ideally, RPZs should be clear of all objects other than aviation-related objects that functionally must be located within the RPZs.

The existing RPZ dimensions for Willows-Glenn County Airport's runways are provided in the following table:

Runway End	16	34	13	31
Approach Visibility Minimums	Visual or 1-mile	Visual or 1-mile	Visual or 1-mile	Visual or 1-mile
Length	1,000 feet	1,000 feet	1,000 feet	1,000 feet
Inner-Width	250 feet	250 feet	250 feet	250 feet
Outer-Width	450 feet	450 feet	450 feet	450 feet

Runway 13-31

The RPZ for Runway 13 lies mostly on airport property. However, about 0.04 acre of the western corner of the RPZ lies on adjacent private land. A little over half (4.9 acres) of the RPZ for Runway 31 lies off-airport property. The off-airport portion of the RPZ includes two canals and farmland. No easements exist over off-airport properties. The dimensions of these RPZs will not change, because no changes to this runway’s capabilities are planned. However, the planned relocation of the end of Runway 13 (to meet obstacle free zone standards) will shift the RPZ entirely onto airport property. It is recommended that an avigation easement be acquired for the off-airport portions of the RPZ for Runway 31.

Runway 16-34

The outer portion (2.6 acres) of the existing RPZ for Runway 16 lies off-airport. A two-lane state highway (Highway 162) and undeveloped land fall within the RPZ. No easements exist over the off-airport property. However, local zoning regulations limit the use of the property to open space uses.

The future placement of the RPZ for Runway 16 will be based on two factors: conversion of the existing runway end to a displaced threshold, and the reclassification of Runway 16-34 to ARC B-II. The new runway end will be relocated 381 feet to the north, which will shift the established RPZ 375 feet further north.

Table 3C		
Future Runway Protection Zone		
Dimensions		
Runway End	16	34
Length	1,000 feet	1,000 feet
Inner width	500 feet	500 feet
Outer width	700 feet	700 feet

As the adjacent table indicates, the reclassification of Runway 16-34 will require larger RPZs. With the new displaced threshold and the reclassification of the runway, about three-quarters of the RPZ for Runway 16 will be located off-airport. Accordingly, it is recommended that Glenn County acquire this property in fee simple.

On airport, a portion of a truck parking lot will fall within the southeast corner of the future RPZ for Runway 16 and within the FAR Part 77 primary surface. When the runway end is converted to a displaced threshold, the truck parking lot will need to be closed to provide required clearances.

Aircraft Parking Line (APL)

The Aircraft Parking Line (APL) is established to define where it is appropriate to park aircraft. Typically, APLs are set to provide required separation from either a runway or parallel taxiway depending upon which is more restrictive. However, other restrictions may also apply.

Runway 13-31

A parallel taxiway is planned to serve Runway 13-31. The northern portion of this taxiway will be used by all classes of aircraft that use the airport (i.e., from single-engine, piston aircraft to twin-engine turbojets), because of its cross connection with the main runway. Accordingly, the east side APL is set 66-feet from the centerline of the future parallel taxiway. This provides standard wingtip clearances for aircraft with wingspans up to 79 feet (i.e., ARC B-II).

Runway 16-34

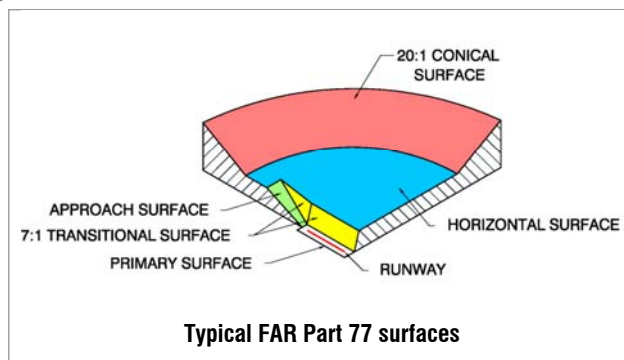
Runway 16-34 is currently classified as ARC B-I (Small). Consistent with this classification, the established APL is set 45 feet from the centerline of Taxiway D (this runways parallel taxiway). The existing helipad's required rotor clearance arc extends about 6 feet into the current taxiway's object free area. As noted previously in the chapter, this nonstandard situation needs to be remedied.

When the runway is upgraded to ARC B-II, the APL will need to be increased from 45 feet from the center of Taxiway D to 66 feet. As part of the upgrade, this parallel taxiway will be shifted from 200 feet from the runway centerline to 240 feet from the centerline. The combination of these two changes will shift the APL 61 feet further from the runway centerline.

Building Restriction Line (BRL)

The building restriction line defines the limits of development of all on-airport structures, except facilities required by their function to be located near runways and taxiways. The FAA Airport Design Advisory Circular no longer establishes standard setback distances or building restriction lines. Rather, the FAA recommends that the BRL encompass the following items defined on the airport layout plan:

- Runway Protection Zones,
- Runway Visibility Zones between intersecting runways,
- Air Traffic Controller line-of-sight,
- NAVAID critical areas,
- Aircraft Parking Restriction Lines,
- Taxiway/Taxilane Object Free Areas, and
- Location where a standard building meets Part 77 surfaces.



Typically, the most restrictive factor in establishing BRLs is the Part 77 surfaces. The standard height assumed for buildings is 35 feet. However, a more realistic building height of 25 feet has been used for

Willows-Glenn County Airport. This height should accommodate the largest foreseeable building at the airport. Any exceptions can be individually evaluated. Generally, these standards are reflected in the BRLs in place at Willows-Glenn County Airport.

Runway 13-31, the nearest runway to the building area, effectively establishes the eastern portion of the BRL. Using a 25-foot building height clearance, the BRL along Runway 13-31 is established 300-feet from the runway centerline. No structures penetrate this segment of the BRL.

The Part 77 surfaces are wider for Runway 16-34 because it has straight-in nonprecision instrument approaches. Using a 25-foot building height clearance, the BRL for areas lateral to Runway 16-34 is set 425 feet from the runway centerline. This segment of the BRL is clear except in the northeastern corner of the building area.



Airport Restaurant



Fuel Island

There are two uses in the northeast corner that are inconsistent with the proposed BRL: the aviation fuel tank and the on-airport restaurant. The fuel tank is associated with the self-service fuel island. This tank penetrates about three feet into the future FAR Part 77 transitional surface. An airspace review of the tank should be performed at the time the parallel taxiway for Runway 16-34 is relocated (to support the change to an ARC B-II). It is anticipated that installation of an obstruction light would be sufficient. However, should relocation be necessary, the *Airport Layout Plan* for Willows-Glenn County Airport includes an alternate site for the fuel island south of Taxiway B.

The western half of the on-airport restaurant lies within the proposed BRL. The commercial truck parking area associated with the restaurant is located within the BRL. Although these uses penetrate the proposed Part 77 surfaces, they were not so intrusive as to prevent the airport from obtaining several straight-in instrument approaches. Nonetheless, these uses in this location are undesirable from a long-term airfield planning perspective. Another location for these uses should be found. The only readily plausible new location would be between the loop in the planned airport entrance road and Highway 162. The only other areas on the airport with sufficient acreage are buried within the airport's southeastern quadrant.

Taxiway System

Willows-Glenn County Airport is served by a system of taxiways and taxilanes that connect the building area to the runways. A full-length parallel taxiway (Taxiway D) serves Runway 16-34. A cross-field taxiway (Taxiway C) connects Runways 16-34 and 13-31. Taxiways A and B, at the north end of the airfield, connect the runways to the building area. Currently, all taxiways can accommodate the existing and future design aircraft: Grumman Ag Cat, Beech Baron, and Cessna Citation Bravo.

Two modifications to the taxiway system are proposed. First, Taxiway D is proposed to be relocated 40 feet to the east to meet FAA setback requirements for a B-II runway. Also to be discussed is the proposed full length taxiway for Runway 13-31. Concerns related to the lead-in (aligned) taxiways at the end of Runways 13 and 16 are addressed earlier in this chapter in the sections on these two runways.

Taxiway A

Taxiway A connects the northern end of Runway 16-34 to the transient tiedown apron and the hangar area. The taxiway is 35 feet wide. This exceeds the standard for ARC B-I (Small) and meets the standard for ARC B-II. No changes are required.

Taxiway B

Taxiway B connects the building area to both runways. It begins near the approach end of Runway 16 and connects to the building area. Within the building area, Taxiway B provides direct access to the northern and southern tiedown aprons and the three banks of hangars. At its narrowest point between the building area and Runway 16, the taxiway is 75-ft wide. This width exceeds the width required for both the current and proposed ARC. However, as this taxiway will become part of the expansion of the southern apron and the parallel taxiway for Runway 13-31 no change is required.

Taxiway C

Taxiway C connects Runway 16-34 (from Taxiway D) to Runway 13-31. It is located approximately 1,700 feet from the approach end of Runway 16, and connects to Runway 13-31 about 1,150 feet from the approach end of Runway 13. The taxiway is approximately 950 feet in length and 50 feet wide. Taxiway C exceeds the required width for the current and proposed ARC. However, as the financial benefit of reducing the width is small, no change is proposed.

Taxiway D

Taxiway D serves as a full length parallel taxiway for Runway 16-34. The taxiway is 35 feet wide and is currently setback 200 feet east of the runway. Currently, the taxiway exceeds ARC B-I (Small) requirements. At its current location, the taxiway connects Runway 16-34 to Taxiway B and Taxiway C. The southern end of the taxiway includes a run-up apron which serves the approach end of Runway 34. Due to the planned reclassification of Runway 16-34 from an ARC B-I (Small) runway to a B-II runway, realignment of the taxiway is necessary to meet new setback standards.

In the future, the taxiway will be relocated 40 feet to the east to meet setback standards for a B-II runway. The distance between the runway centerline and parallel taxiway centerline will be 240 feet. The alternative of shifting the runway 40 feet to the west was also considered, but was rejected on the grounds of prohibitive cost. Shifting the runway would require:

- Reconstruction of portions of the runway to provide additional pavement and meet lateral gradient requirements
- Relocation of the runway edge lighting system
- Acquisition of additional property, because the west side building restriction line is currently at the property line.

Proposed Taxiway E

Regularly spaced exit taxiways allow landing aircraft to leave the runway expeditiously. This improves the functioning of the airport in several ways:

- Runway capacity is increased by enabling a landing aircraft to quickly clear the runway for the next aircraft.
- Safety is improved by minimizing the time that an aircraft spends on the runway, reducing the potential for interaction with another aircraft landing or taking off.

Currently there is about 2,400 feet between the exit taxiway at the end of Runway 34 and Taxiway C. For runways serving smaller aircraft there is value in having an exit taxiway every 1,500 to 1,700 feet. Creating a new exit taxiway (Taxiway E) midway between the two existing taxiways would benefit landings to the south.

Proposed Taxiway F

Runway 13-31 is the busier of the two runways at Willows-Glenn County Airport. Currently, aircraft landing on Runway 13-31 must taxi on the runway to reach the building area. For the same reasons noted in the previous section, creating a full-length parallel taxiway would improve safety and efficiency. The northern segment of this parallel taxiway would also serve as an apron edge taxiway for the southern tiedown apron. The “new” taxiway will need to meet FAA taxiway standards for a B-I (Small) runway. The taxiway will be 35-feet wide.

A full-length parallel taxiway is proposed to serve Runway 13-31. However, a partial parallel that extends between Taxiway B and an extension of Taxiway C would provide most of the benefits of a full-length parallel taxiway at less than half the cost. Because most landings on Runway 13-31 are on Runway 31 (i.e., from the southeast), creating a partial parallel taxiway at the northern end would provide convenient and efficient points to exit the runway. This partial parallel would also make it possible to eliminate the lead-in (aligned) taxiway at the northern end of Runway 13-31.

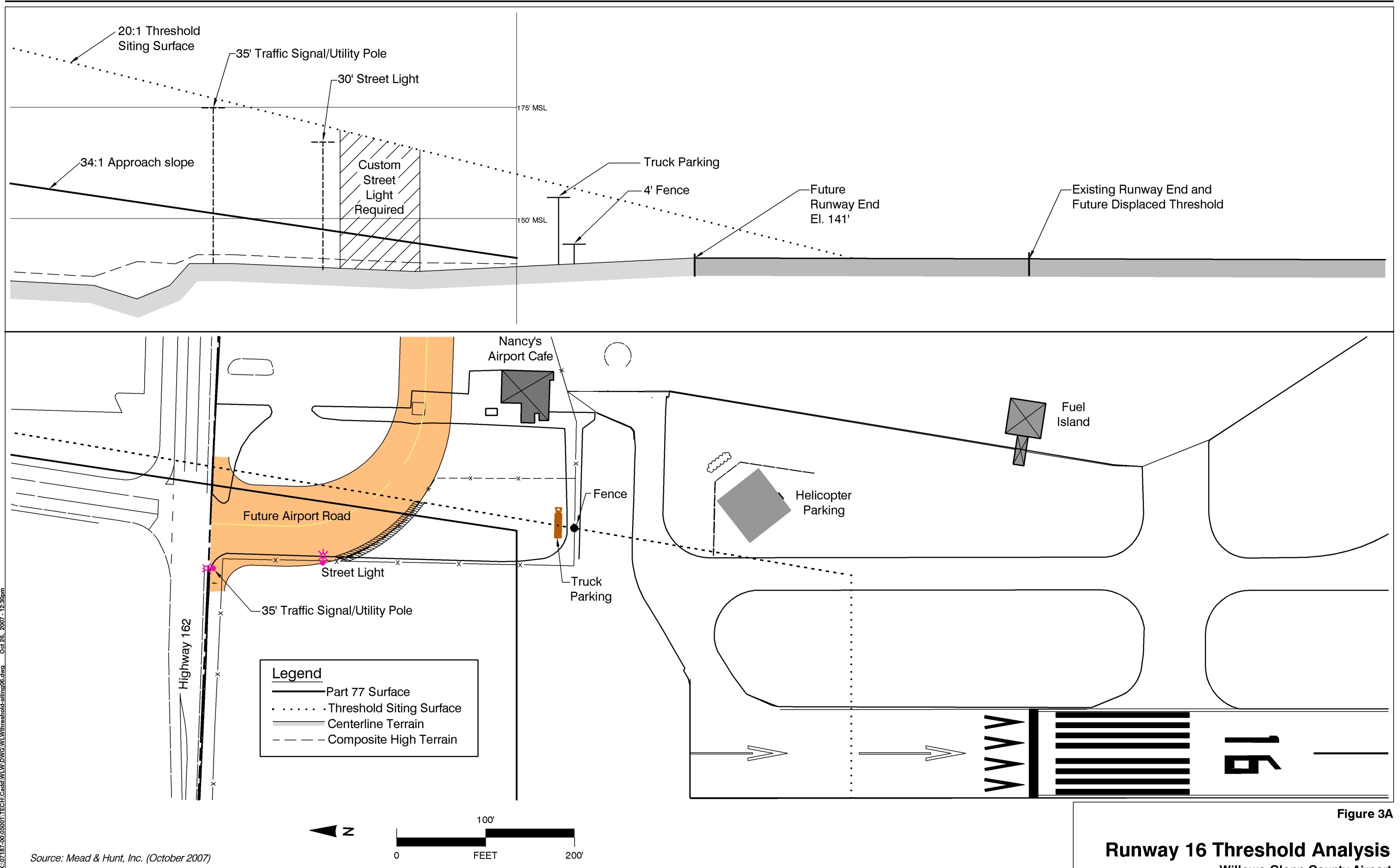
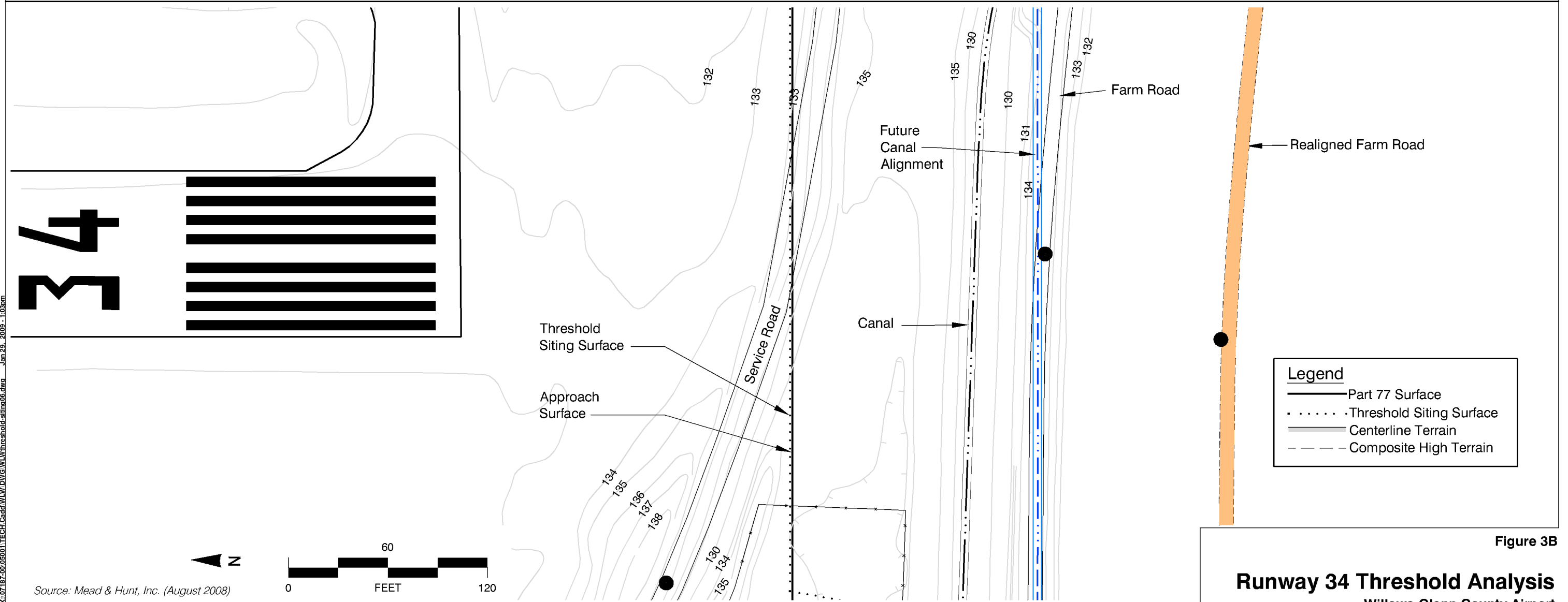
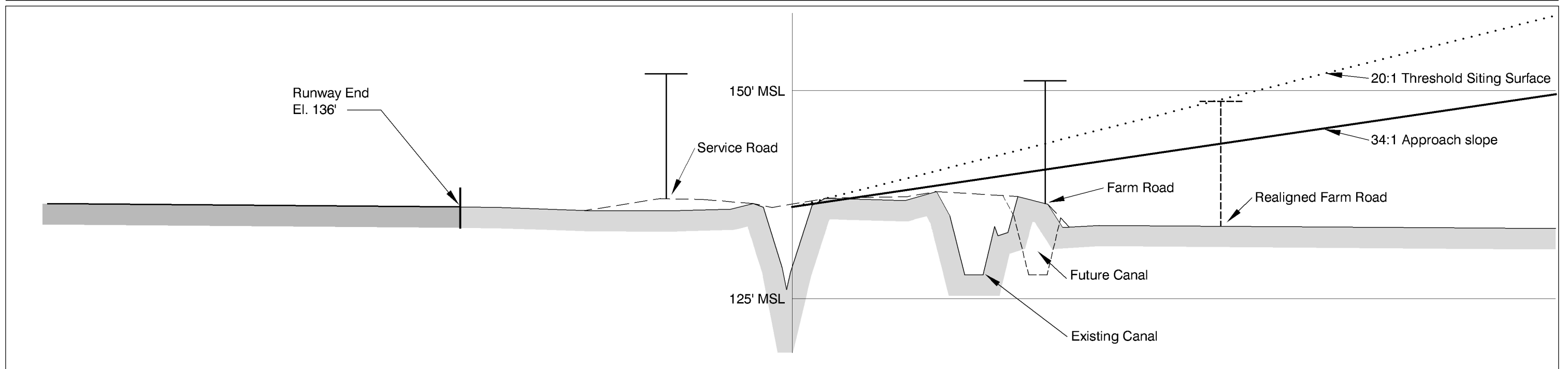


Figure 3A

Runway 16 Threshold Analysis
Willows-Glenn County Airport

Source: Mead & Hunt, Inc. (October 2007)

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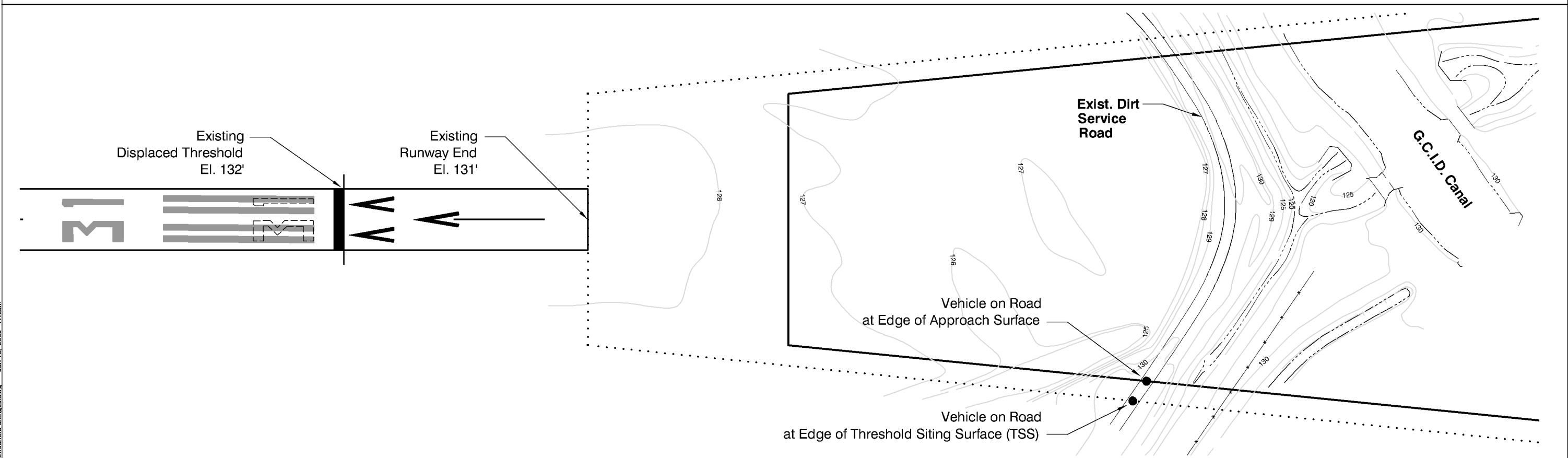
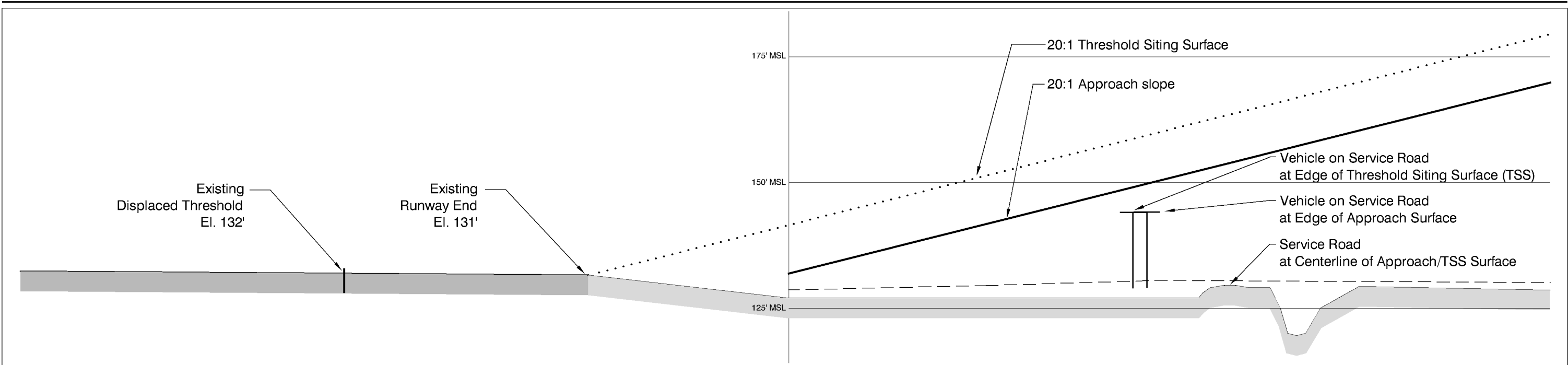


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Source: Mead & Hunt, Inc. (August 2008)

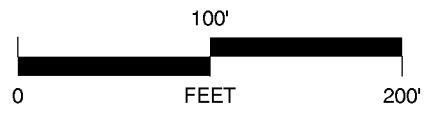
Figure 3B

Runway 34 Threshold Analysis
Willows-Glenn County Airport



Legend

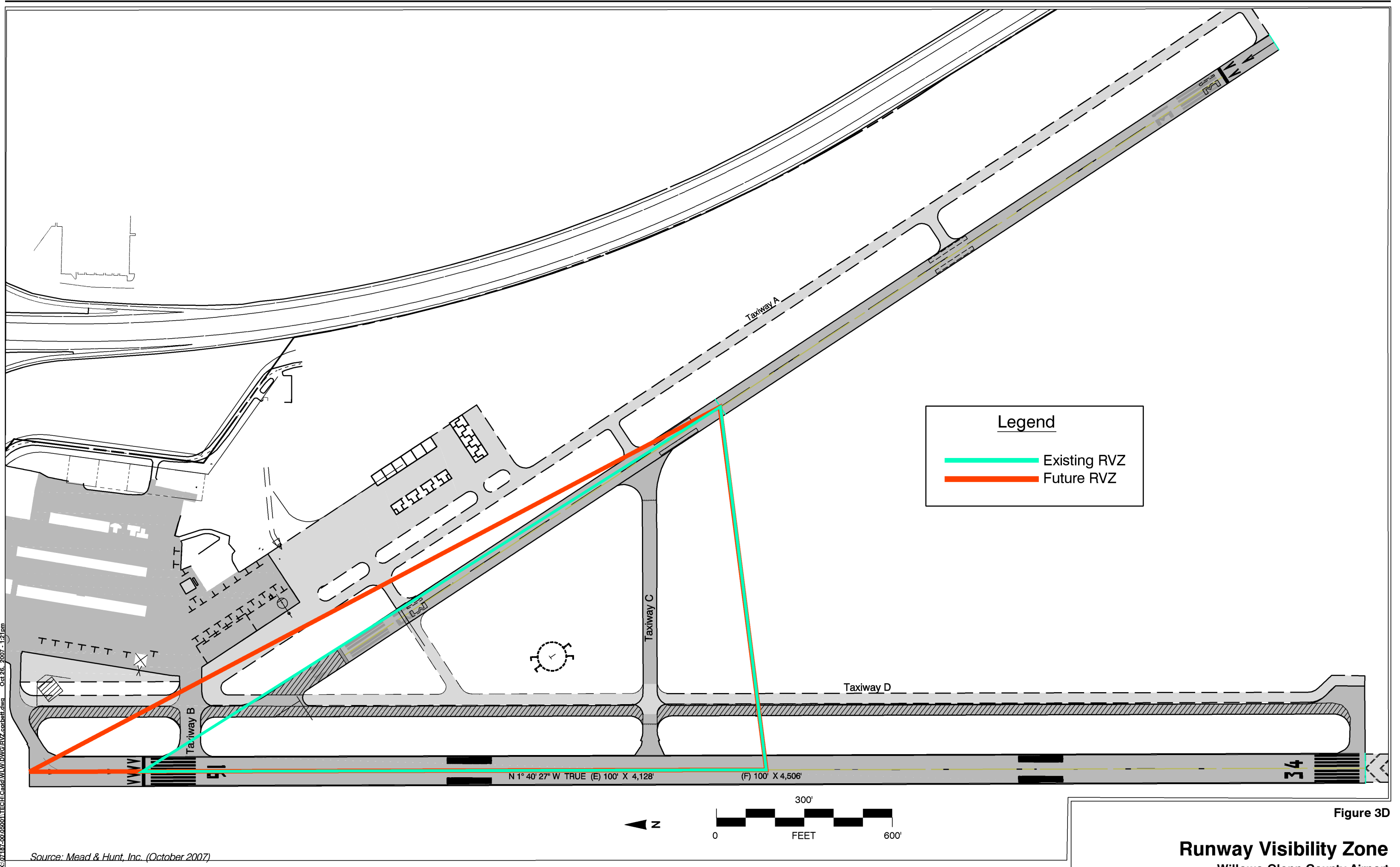
- Part 77 Surface
- Threshold Siting Surface
- Centerline Terrain
- - - Composite High Terrain



Source: Mead & Hunt, Inc. (August 2008)

Figure 3C
Runway 31 Threshold Analysis
 Willows-Glenn County Airport

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Source: Mead & Hunt, Inc. (October 2007)

Figure 3D

Runway Visibility Zone
Willows-Glenn County Airport