Appendix E1-4
LAX SPECIFIC PLAN AMENDMENT STUDY REPORT

Runway Visibility for North Airfield Concepts

May 2011

Prepared for:

Los Angeles World Airports
One World Way
Los Angeles, California 90045

Prepared by:

Ricondo & Associates, Inc.
1917 Palomar Oaks Way Suite 350
Carlsbad, CA 92008

RICONDO & ASSOCIATES

MEMORANDUM

Date: May 25, 2011

To: Mr. Tony Skidmore
Ms. Robin Ijams
CDM

From: Stephen Smith

Subject: RUNWAY VISIBILITY FOR NORTH AIRFIELD CONCEPTS

In February of 2010, an Academic Panel completed the *Los Angeles International Airport (LAX) North Airfield Safety Study* with the primary purpose of estimating the potential level of safety for the existing and prospective North Airfield configurations. As part of the study, the Academic Panel examined characteristics of airport geometric design that could impact the level of safety.

Although technologies, such as Airport Surface Detection Equipment - Model X (ASDE-X), Runway Status Lights and Airport Movement Area Safety System (AMASS) can warn pilots and Air Traffic Controllers of potential runway incursions, visual inspection down a departure runway by pilots remains the last line of defense. As such, the ability of taxiing aircraft to maneuver in such a way that pilots can observe the departure/arrival end of the active runway, a direct product of the geometric design of the crossing taxiways, could increase the level of safety for the Future North Airfield.

In the Federal Aviation Administration (FAA) Engineering Brief 75, *Incorporation of Runway Incursion Prevention into Taxiway and Apron Design*, the FAA provided preliminary guidance for planning and design of taxiway geometry to minimize the likelihood of runway incursions. One of the recommendations by the FAA includes the use of a right angle (90 degrees) crossing for taxiway and runway intersections. The intent behind this recommendation is to provide pilots the ability to see the departure/arrival end of a runway they are about to cross while at the holdline.

As conceptual configurations for the North Airfield were developed in conjunction with the LAX Specific Plan Amendment Study (SPAS), Ricondo & Associates, Inc. (R&A) replicated the aircraft maneuvering analysis conducted as part of the *Los Angeles International Airport North Airfield Safety Study* in order to determine the ability of a pilot to observe the departure/arrival end of Runway 6R-24L prior to crossing it from Runway 6L-24R for each North Airfield concept.

In addition to evaluating the visual range for each North Airfield concept, the associated taxi maneuvers were used to determine the tail path of each evaluated aircraft. From this, the tail penetration or clearance of the 6R-24L and 6L-24R Obstacle Free Zones (OFZ) could be determined.

1917 PALOMAR OAKS WAY, SUITE 350, CARLSBAD, CA 92008
TEL (760) 444-0106 • FAX (760) 602-8367

The techniques used to determine the visual range and OFZ penetrations were then combined to ascertain the minimum separation between Runway 6L-24R, the Centerfield Taxiway and Runway 6R-24L in order to provide adequate space for an A380 or smaller Airplane Design Group V (ADG-V) aircraft to hold at the crossing taxiway holdline at an angle allowing the left-seated pilot to see the departure/arrival end of Runway 24L while keeping the aircraft tail clear of the OFZs at all times.

The assumptions, methodology and results of the analysis are described below.

Assumptions

The Critical Sight Distance, the distance that a pilot can see down the active runway, is primarily dependent on five factors:

1. Visibility Angle (aircraft dependent)
2. Wheelbase (aircraft dependent)
3. Runway 6R-24L to Centerfield Taxiway Separation (concept dependent)
4. Centerfield Taxiway to Crossing Taxiway Intersection Geometry (concept dependent)
5. Method of Steering (pilot dependent)

Each of the five factors is described in the following sections.

Visibility Angle

Visibility Angle represents the maximum angle in a horizontal plane that a pilot can see while seated in a natural position. This angle can be found in the Airplane Manufacturer's *Airplane Characteristics for Airport Planning* manuals and varies based on aircraft type. A depiction of the Visibility Angle is provided in **Exhibit 1**. **Table 1** lists the Visibility Angle for the aircraft included in this analysis.

Wheelbase

Wheelbase is the distance from the nose gear to the midpoint of a line connecting the centers of the main carriages. A longer wheel base slows the rate at which the body of an aircraft rotates and can reduce the angle of an aircraft once it reaches the hold line. A depiction of the Wheelbase is provided in Exhibit 1. The Wheelbase for the aircraft included in this analysis can be found in Table 1 above.

Table 1

Visibility Angle by Aircraft

Aircraft	Visibility Angle (Deg.)	Wheel Base (ft.)
Airbus A380-800	121.00	109.1
Boeing B787-8	121.49	102.4
Boeing B777-300ER	125.00	97.9
Airbus A340-600	135.00	97.3
Boeing B747-8	145.00	84.0
Boeing B747-400ER	145.00	74.7

Source: Boeing, Airplane Characteristics for Airport Planning, Various Dates; Airbus, Airplane Characteristics for Airport Planning, Various Dates.
Prepared by: Ricondo & Associates, Inc., March 2010.

Runway 6R-24L to Centerfield Taxiway Separation

Runway to Centerfield Taxiway Separation ("runway-taxiway separation") determines the distance that aircraft have to maneuver prior to reaching the holdline. Larger separations increase this distance, allowing aircraft to hold closer to perpendicular to the runway holdline, producing a larger Critical Sight Distance. A depiction of the runway-taxiway separation component is provided in Exhibit 1. **Table 2** lists the runway-taxiway separations for each North Airfield concept.

Table 2

Runway 6R-24L to Centerfield Taxiway Separation by North Airfield Concept

Concept	Runway-Taxiway Separation (ft.)	Intersection Geometry
100' North	400	"Spiral"
200' North	400	"Spiral"
300' North	500	Standard
400' North	550	Standard

Source: Ricondo & Associates, Inc., March 2010.
Prepared by: Ricondo & Associates, Inc., March 2010.

Centerfield Taxiway to Crossing Taxiway Intersection Geometry

Two types of Centerfield Taxiway to Crossing Taxiway Intersection Geometries ("intersection geometry") were utilized for the North Airfield concepts, Standard Design and "Spiral" Design. Standard Design utilizes one arc with a radius of 170 ft., the FAA standard for ADG-VI taxiways,

which is tangent to both the Centerfield Taxiway and the Crossing Taxiway. The "Spiral" Design, similar to Taxiway H of the LAX South Airfield, uses two arcs, 500 ft. radius and 150 ft. radius, connected by a straight segment in order to reduce the deviation of an aircraft's tail towards Runway 6L-24R as it turns onto the crossing taxiway. This minimizes the opportunity for penetrations to the 24R OFZ, but also slows the turning rate of the aircraft, resulting in smaller Critical Sight Distances when at the holdline. A depiction of the two types of intersection geometries can be found in Exhibit 1.

Due to the Critical Sight Distance disadvantage of the "Spiral" Design, it was only utilized for the 100 North and 200 North Concepts. Table 2 lists the intersection geometries by each North Airfield concept.

Method of Steering

For the purposes of this analysis, two Methods of Steering ("turns") were chosen to approximate the way that pilots will negotiate the turn: Cockpit over Centerline and Judgmental Oversteer.

Cockpit over Centerline is generally preferred when designing taxiway intersections to minimize potential aircraft excursions from the taxiway and provide a more expeditious means of moving traffic. The Centerline is referencing the yellow line that is painted to represent the center path of the taxiway. On the other hand, Judgmental Oversteer, where a pilot may intentionally taxi past the centerline radius of a curve in order to keep the aircraft's main gear within the defined edges of the taxiway pavement during the turn, requires less pavement, but can produce more complex and slower taxi movements.

Relative to one another, Cockpit over Centerline produces more gradual turns, resulting in less deviation by the tail towards Runway 6L-24R, but smaller Critical Sight Distances due to the resulting lower angle at the holdline. Judgmental Oversteer produces a sharper turn, resulting in increased deviation by the tail towards Runway 6L-24R, but larger Critical Sight Distance as a result of reaching the holdline at a higher angle.

The FAA recognizes both types of steering in Advisory Circular 150/5300-13, *Airport Design*, Section 406 paragraphs (a) and (b), and recommends accommodating the Cockpit over Centerline turn when practicable.

Combined, these two types of turns tend to give values near the ends of the spectrum in terms of Critical Sight Distance (more likely with a Judgmental Oversteer; less likely with a Cockpit over Centerline turn) and OFZ Penetration (less likely with a Cockpit over Centerline turn; more likely with a Judgmental Oversteer turn).

Methodology

The following sections provide an overview of the methodology R&A employed to calculate the Critical Sight Distance and potential OFZ penetrations as a result of the runway-taxiway separation, intersection geometry and turn type for each North Airfield concept.

Critical Site Distance Calculation

PathPlanner A5©, a Computer-Aided Design (CAD) based aircraft tracking program developed by Simtra AeroTech AB, was used to simulate the aircraft taxi movements associated with each of the North Airfield concepts.

The Airplane Manufacturer's *Airplane Characteristics for Airport Planning* manuals were used to determine the Pilot's Eye Position, from which the Angle to the holdline and Critical Sight Distance were measured. A depiction of these measurements is shown in **Exhibit 2**. The Critical Sight Distance is measured along the entire Visibility Angle span that covers the runway. It stops where the Visibility Angle line intersects the centerline for Runway 6L-24R. Because operations at the airport are predominately West Flow (landings on Runway 24R and takeoffs from Runway 24L), the pilot seated in the left was the focal point for the Visibility Angle (starting from the center of the aircraft to the left). Note: In instances when the limits of the Visibility Angle do not intersect the Centerline of Runway 6R-24L, the Critical Sight Distance is assumed to be "Unlimited".

OFZ Penetration Analysis

In order to protect the transition of aircraft to and from the runway, each runway end (24R, 6L, 24L and 6R) has a separate OFZ. The clearing standards of the OFZ prohibit object penetrations, including taxiing and parked aircraft. As such, it is necessary to provide sufficient separation to prevent the tails of aircraft taxiing along the centerfield and associated crossing taxiways from penetrating the OFZ.[1]

Depicted in **Exhibit 3**, the OFZ is comprised of the Runway OFZ (ROFZ), Inner-approach OFZ and Inner-transitional OFZ. Each of the components of the OFZ is described below:

The ROFZ is a rectangular volume of airspace centered over the runway that extends 200 ft. beyond each end of the runway and is "D" ft. wide.

[1] FAA, AC 150/5300-13 *Airport Design*, January 3, 2011.

Having the same width as the ROFZ, the Inner-approach OFZ begins 200 ft. from the runway threshold and extends 200 ft. past the last unit of the approach lighting system. The Inner-approach OFZ has a slope of 50 (horizontal) to 1 (vertical).

The Inner-transitional OFZ extends along the sides of the runway. It rises vertically a distance of "H" from the edge of the ROFZ. Then, for CAT I runways, the Inner-transitional OFZ travels at a slope of 6 (horizontal) to 1 (vertical) to 150 ft. above the established airport elevation. For CAT II/III runways, the Inner-transitional OFZ slopes 5 (horizontal) to 1 (vertical) out to a distance "Y" from runway centerline, and then changes to a slope of 6 (horizontal) to 1 (vertical) to 150 ft. above the established airport elevation.

The "D", "H" and "Y" variables for each North Airfield runway end can be found in Exhibit 3. As seen in the accompanying table, the resulting OFZ dimensions for the 24R and 24L OFZs are most critical. As a result, penetrations or clearances will be determined relative to these OFZs.

To determine the OFZ penetration or clearance by taxiing aircraft, the perpendicular distance from the centerfield taxiway centerline to the most critical tail positions (from the PathPlanner© simulations) was measured. The maximum tail height of the evaluated aircraft was then plotted at this distance relative to a profile view of the 24R and 24L OFZs. For all North Airfield concepts, the Centerfield Taxiway was depressed at the maximum allowable 1.5% grade from runway pavement edge to taxiway pavement edge.

Results

This section describes the Critical Site Distance and OFZ penetrations associated with the Existing Airfield and the four proposed North Airfield concepts. In addition, this section provides an overview of the minimum runway-taxiway separations needed to provide enough space for an A380 or ADG-V aircraft to reach the crossing taxiway holdline at an angle that will provide the left-seated pilot the ability to see the end of Runway 24L while keeping the aircraft clear of the OFZ surfaces.

Baseline Scenario

Results for the Baseline Scenario (Existing North Airfield) were extracted from the *Los Angeles International Airport North Airfield Safety Study*. A summary of the results can be found in **Table 3**. As shown in Table 3, the existing North Airfield cannot accommodate an A380 while at the holdline at an angle that would provide the pilot, seated on the left side, the ability to see the end of Runway 24L.

Table 3

Baseline Scenario

Runway Exit	Critical Aircraft	Visibility Angle (Deg.)	Critical Sight Distance (ft.)
Taxiway Y	Boeing B737-700[1/]	134	Unlimited
Taxiway Z	Airbus A380-800	121	507
Taxiway AA	Airbus A380-800	121	696
Taxiway BB	N/A[2/]	N/A	Unlimited

Notes: 1/ Aircraft landing Runway 24R and exiting Taxiway Y are primarily limited to Southwest Airlines' Boeing B737s taxiing to Terminal 1.
2/ Aircraft landing Runway 24R and exiting Taxiway BB hold perpendicular to Runway 6R-24L. Any aircraft with a Visibility Angle equal to or greater than 90 degrees will have "Unlimited" Visibility. An A380 and longer ADG-V aircraft (B777-300ER, A340-600 and B747-400) holding at 90 degrees at Taxiway BB will penetrate the Category II/III OFZ for Runway 6L-24R.

Source: Barnett, Arnold, Michael Ball, George Donohue, George Hansen, Amedeo Odoni, and Antonio Trani, *Los Angeles International Airport North Airfield Safety Study*, February 19, 2010.
Prepared by: Ricondo & Associates, Inc., March 2011.

North Airfield Concepts

The Critical Sight Distance and 24R CAT II/III OFZ penetrations for each of the North Airfield concepts are described below. More detailed data, including Angle to the holdline and 24L CAT I OFZ penetrations are provided in **Table A-1**, which is attached at the end of this memorandum.

100' North

The 100' North concept has a Runway 6L-24R to Centerfield Taxiway separation of 400 ft. and a Centerfield Taxiway to Runway 6R-24L separation of 400 ft. None of the aircraft evaluated can see the end of Runway 24L while holding on the last crossing taxiway on the west end. Additionally, the tail of the A380-800, B777-300ER, B747-8 and B747-400ER penetrate the 24R CAT II/III OFZ using both turn types (Cockpit over Centerline and Judgmental Oversteer). The A380-800 also penetrates the 24L CAT I OFZ.

As a result of the gradual turn produced by the "Spiral" Design, the proximity of the Centerfield Taxiway to Runway 6R-24L and the large wingspan of the A380-800, it should be noted that upon reaching the holdline the left wingtip of an A380-800 penetrates the 6L-24R Runway Safety Area (RSA) by 16.6 ft. for a Cockpit over Centerline turn and 6.9 ft. for a Judgmental Oversteer turn.

Table 4 summarizes the Critical Sight Distance and Maximum Penetration (highest penetration value among the parallel, turn and/or holdline values) to the 24R CAT II/III and 24L CAT I OFZs associated with each aircraft. **Exhibits 4** through **15** depict the taxi maneuver, Critical Sight Distance and OFZ profile for each aircraft.

Table 4

100' North Summary

	Cockpit over Centerline			Judgmental Oversteer		
Aircraft	Critical Sight Distance (ft.)	Max. 24R OFZ Penetration (ft.)	Max. 24L OFZ Penetration (ft.)	Critical Sight Distance (ft.)	Max. 24R OFZ Penetration (ft.)	Max. 24L OFZ Penetration (ft.)
Airbus A380-800	428.8	18.7	3.7	480.6	19.6	1.9
Boeing B787-8	464.8	-	-	525.3	-	-
Boeing B777-300ER	488.7	0.2	-	564.9	1.1	-
Airbus A340-600	748.6	-	-	910.2	-	-
Boeing B747-8	1,652.3	2.5	-	2,432.6	3.4	-
Boeing B747-400ER	1,833.5	3.0	-	2,859.0	3.7	-

Source: HNTB, Los Angeles International Airport ALP, August 2010 (existing taxiways and facilities); Simtra Aerotech AB, PathPlanner A5, 2011 (aircraft wheels, wing and tail path and turn calculations); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs; holdline location; centerline locations); Ricondo & Associates, Inc., May 2011 (critical site and penetration calculations).
Prepared by: Ricondo & Associates, Inc., May 2011.

200' North

The 200' North concept has a Runway 6L-24R to Centerfield Taxiway Separation of 500 ft. and a Centerfield Taxiway to Runway 6R-24L separation of 400 ft. As the Runway 6R-24L to Centerfield Taxiway separation remains the same as the 100' North concept, the Critical Sight Distances and 24L CAT I OFZ penetrations are identical for all aircraft at the holdline. However, because the Runway 6L-24R to Centerfield Taxiway separation increased, the 24R CAT II/III OFZ penetration by all of the evaluated aircraft is eliminated.

Also a result of having identical Runway 6R-24L to Centerfield Taxiway separation as the 100' North Concept, the wingtip of an A380-800 penetrates the 6R-24L RSA by 16.6 ft. and 6.9 ft. for the Cockpit over Centerline and Judgmental Oversteer turns, respectively.

Table 5 summarizes the Critical Sight Distance and Maximum Penetration to the 24R CAT II/III and 24L CAT I OFZs associated with each aircraft. **Exhibits 16** through **27** depict the taxi maneuver, Critical Sight Distance and OFZ profile for each aircraft.

Table 5

200' North Summary

Aircraft	Cockpit over Centerline			Judgmental Oversteer		
	Critical Sight Distance (ft.)	Max. 24R OFZ Penetration (ft.)	Max. 24L OFZ Penetration (ft.)	Critical Sight Distance (ft.)	Max. 24R OFZ Penetration (ft.)	Max. 24L OFZ Penetration (ft.)
Airbus A380-800	428.8	-	3.7	480.6	-	1.9
Boeing B787-8	464.8	-	-	525.3	-	-
Boeing B777-300ER	488.7	-	-	564.9	-	-
Airbus A340-600	748.6	-	-	910.2	-	-
Boeing B747-8	1,652.3	-	-	2,432.6	-	-
Boeing B747-400ER	1,833.5	-	-	2,859.0	-	-

Source: HNTB, Los Angeles International Airport ALP, August 2010 (existing taxiways and facilities); Simtra Aerotech AB, PathPlanner A5, 2011 (aircraft wheels, wing and tail path and turn calculations); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs; holdline location; centerline locations); Ricondo & Associates, Inc., March 2011 (critical site and penetration calculations).
Prepared by: Ricondo & Associates, Inc., March 2011.

300' North

The 300' North concept has a Runway 6L-24R to Centerfield Taxiway Separation of 500 ft. and a Centerfield Taxiway to Runway 6R-24L separation of 500 ft. All of the aircraft evaluated can see the end of Runway 24L while holding at the holdline on the last crossing taxiway. However, the tail of an A380-800 penetrates the 24R CAT II/III OFZ using either turn type.

Table 6 summarizes the Critical Sight Distance and Maximum Penetration to the 24R CAT II/III and 24L CAT I OFZs associated with each aircraft. **Exhibits 28** through **39** depict the taxi maneuver, Critical Sight Distance and OFZ profile for each aircraft.

Table 6

300' North Summary

Aircraft	Cockpit over Centerline			Judgmental Oversteer		
	Critical Sight Distance (ft.)	Max. 24R OFZ Penetration (ft.)	Max. 24L OFZ Penetration (ft.)	Critical Sight Distance (ft.)	Max. 24R OFZ Penetration (ft.)	Max. 24L OFZ Penetration (ft.)
Airbus A380-800	Unlimited	1.5	-	Unlimited	3.2	-
Boeing B787-8	Unlimited	-	-	Unlimited	-	-
Boeing B777-300ER	Unlimited	-	-	Unlimited	-	-
Airbus A340-600	Unlimited	-	-	Unlimited	-	-
Boeing B747-8	Unlimited	-	-	Unlimited	-	-
Boeing B747-400ER	Unlimited	-	-	Unlimited	-	-

Source: HNTB, Los Angeles International Airport ALP, August 2010 (existing taxiways and facilities); Simtra Aerotech AB, PathPlanner A5, 2011 (aircraft wheels, wing and tail path and turn calculations); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs; holdline location; centerline locations); Ricondo & Associates, Inc., May 2011 (critical site and penetration calculations).
Prepared by: Ricondo & Associates, Inc., May 2011.

400' North

The 400' North concept has a Runway 6L-24R to Centerfield Taxiway Separation of 550 ft. and a Centerfield Taxiway to Runway 6R-24L separation of 550 ft. All of the aircraft evaluated allow the left seated pilot to see the end of Runway 24L while holding at the holdline on the last crossing taxiway. Additionally, the tails of all the evaluated aircraft remain clear of the 24R CAT II/III and 24L CAT I OFZs using either turn type.

Table 7 summarizes the assumed Critical Sight Distance and Maximum Penetration to the 24R CAT II/III and 24L CAT I OFZs associated with each aircraft. **Exhibits 40** through **51** depict the taxi maneuver, Critical Sight Distance and OFZ profile for each aircraft.

Minimum Runway to Runway Separations

In addition to determining the Critical Sight Distance for the North Airfield concepts, the techniques described above were used to determine the minimum separations between Runway 6L-24R, the Centerfield Taxiway and Runway 6R-24L in order to provide end of runway visibility while keeping the aircraft tail clear of the OFZ while at the crossing taxiway holdline. In all cases, R&A assumed only the standard intersection geometry.

As the demands of the A380-800 can vary significantly from other aircraft, it was evaluated separately from the other aircraft in this analysis.

Table 7

400' North

Aircraft	Cockpit over Centerline			Judgmental Oversteer		
	Critical Sight Distance (ft.)	Max. 24R OFZ Penetration (ft.)	Max. 24L OFZ Penetration (ft.)	Critical Sight Distance (ft.)	Max. 24R OFZ Penetration (ft.)	Max. 24L OFZ Penetration (ft.)
Airbus A380-800	Unlimited	-	-	Unlimited	-	-
Boeing B787-8	Unlimited	-	-	Unlimited	-	-
Boeing B777-300ER	Unlimited	-	-	Unlimited	-	-
Airbus A340-600	Unlimited	-	-	Unlimited	-	-
Boeing B747-8	Unlimited	-	-	Unlimited	-	-
Boeing B747-400ER	Unlimited	-	-	Unlimited	-	-

Source: HNTB, Los Angeles International Airport ALP, August 2010 (existing taxiways and facilities); Simtra Aerotech AB, PathPlanner A5, 2011 (aircraft wheels, wing and tail path and turn calculations); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs; holdline location; centerline locations); Ricondo & Associates, Inc., May 2011 (critical site and penetration calculations).
Prepared by: Ricondo & Associates, Inc., May 2011.

A380-800

Table 8 lists the minimum separation between Runway 6R-24L, the Centerfield Taxiway and Runway 6L-24R that allows the A380-800, for both turn types, to see the end of Runway 24L and remain clear of the 24R CAT II/III OFZ. As shown, a Cockpit over Centerline turn produces the larger separation of 464.7 ft. between Runway 6R-24L and the Centerfield Taxiway. Conversely, a Judgmental Oversteer turn produces the more critical Centerfield Taxiway to Runway 6L-24R separation of 514.9 ft. Combined, these two distances result in a minimum Runway to Runway separation of 979.6 ft. The aircraft movements and resulting OFZ profiles used to develop Table 8, below, are depicted in **Exhibits 52** and **53**.

Table 8

A380-800 Minimum Runway 6L-24R, Centerfield Taxiway and Runway 6R-24L Separations

Turn Type	Runway 6R-24L to Centerfield Taxiway (ft.)	Centerfield Taxiway to Runway 6L-24R (ft.)
Cockpit over Centerline	464.7	507.0
Judgmental Oversteer	457.7	514.9

Source: HNTB, Los Angeles International Airport ALP, August 2010 (existing taxiways and facilities); Simtra Aerotech AB, PathPlanner A5, 2011 (aircraft wheels, wing and tail path and turn calculations); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs; holdline location; centerline locations); Ricondo & Associates, Inc., May 2011 (critical site and penetration calculations).
Prepared by: Ricondo & Associates, Inc., May 2011.

Remaining Aircraft (B747-8 and ADG-V)

Of the remaining aircraft evaluated in this analysis, the B777-300ER is the most demanding aircraft in terms of Critical Sight Distance due to its low visibility angle from the cockpit and relatively long wheelbase. The B747-400ER is the most demanding aircraft in terms of tail swing due to its turning performance, wheelbase and tail height. As a result, the B777-300ER determines the minimum Runway 6R-24L to Centerfield Taxiway separation and the B747-400ER determines the minimum Centerfield Taxiway to Runway 6L-24R separation.

Table 9 details the minimum separation between Runway 6R-24L, the Centerfield Taxiway and Runway 6L-24R that allows the B777-300ER to see the end of Runway 24L and the B747-400ER to remain clear of the 24R CAT II/III OFZ.

Table 9

B747-8 and ADG-V Minimum Runway 6L-24R, Centerfield Taxiway and Runway 6R-24L Separations

Turn Type	Runway 6R-24L to Centerfield Taxiway (ft.)	Centerfield Taxiway to Runway 6L-24R (ft.)
Cockpit over Centerline	458.0	433.2
Judgmental Oversteer	449.8	440.4

Source: HNTB, Los Angeles International Airport ALP, August 2010 (existing taxiways and facilities); Simtra Aerotech AB, PathPlanner A5, 2011 (aircraft wheels, wing and tail path and turn calculations); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs; holdline location; centerline locations); Ricondo & Associates, Inc., May 2011 (critical site and penetration calculations).
Prepared by: Ricondo & Associates, Inc., May 2011.

As shown in Table 9, above, a Cockpit over Centerline turn produces the larger separation of 458.0 ft. between Runway 6R-24L and the Centerfield Taxiway. Conversely, a Judgmental Oversteer turn produces the more critical Centerfield Taxiway to Runway 6L-24R separation of 440.4 ft. Combined, these two distances result in a minimum Runway to Runway separation of 898.3 ft. The aircraft movements and resulting OFZ profiles used to develop Table 9, above, are depicted in **Exhibits 54** through **57**.

Minimum FAA Runway to Runway Separations

This section describes the minimum separations between each runway and the centerline taxiway based on the results described above and the following objectives:

1. Provide runway end visibility for all ADG-V aircraft at Runway 6R-24L holdline prior to crossing the runway;

2. Meet FAA runway to taxiway separation standards between Runway 6R-24L and the Centerfield Taxiway for ADG-V with approach visibility at or above a half a mile;
3. Meet FAA runway to taxiway separation standards between Runway 6L-24R and the Centerfield Taxiway for ADG-V with approach visibility below a half a mile.

Runway 6R-24L to Centerfield Taxiway

As depicted in Exhibit 54, approximately 460 feet is needed between Runway 6R-24L and the Centerfield Taxiway to provide enough room for all ADG-V aircraft to maneuver and position at the holdline in a way that provides a visible angle ample enough for pilot to see the end of Runway 24L. The FAA runway to taxiway separation standard for an ADG-V aircraft with visibility at or above a half mile is 400 feet. A separation distance of 460 feet exceeds this standard.

Centerfield Taxiway to Runway 6L-24R

Although the ADG-V aircraft evaluated in this analysis require only 440.3 ft. between the Centerfield Taxiway and Runway 6L-24R to clear the 24R CAT II/III OFZ, this does not meet the FAA runway to taxiway separation standard for ADG-V aircraft with runway visibility less than a half mile of 500 ft. Therefore, in order to meet objective #3, the minimum separation between Runway 6R-24L and the Centerfield Taxiway is 500 feet.

Exhibit 58 depicts the summation of the above mentioned minimum runway to taxiway dimensions necessary to meet the three stated objectives. This concept results in a total separation of 960 ft., requiring the relocation the Runway 6R-24L 260 feet north of its existing location.

Conclusion

Of the North Airfield Concepts (100' North, 200' North, 300' North and 400' North), only the 400' North Concept allows the pilots of all the evaluated aircraft to see the end of Runway 24L upon reaching the holdline while remaining clear of the 24R and 24L OFZs during the maneuver. However, when the A380-800 is excluded, the 300' North Concept can meet the same objectives for the remaining aircraft.

Based on the Minimum Runway to Runway Separation analysis, the Critical Sight Distance and OFZ demands of the A380-800 require a minimum separation of approximately 980 ft. between Runways 6L-24R and 6R-24L. When the A380-800 is excluded, the minimum separation requirement can be reduced to 900 feet between the two runways. This, however, results in a separation of 440 ft. between the Centerfield Taxiway and Runway 6L-24R, which does not meet the FAA runway to taxiway standard of 500 ft. for runways with approach visibility below a half a mile. Thus, the separation between Runways 6L-24R and 6R-24L increases by 60 ft. to 960 ft.

Enclosures: Table A-1; Exhibits 1 through 58
cc: 08-14-0466 #341F
Read File
z:\lawa\lax north runway alternatives\runway visibility\resources\spas_runway visibility range_v5.docx

1917 PALOMAR OAKS WAY, SUITE 350, CARLSBAD, CA 92008
TEL (760) 444-0106 • FAX (760) 602-8367

Table A-1 ***Los Angeles International Airport***

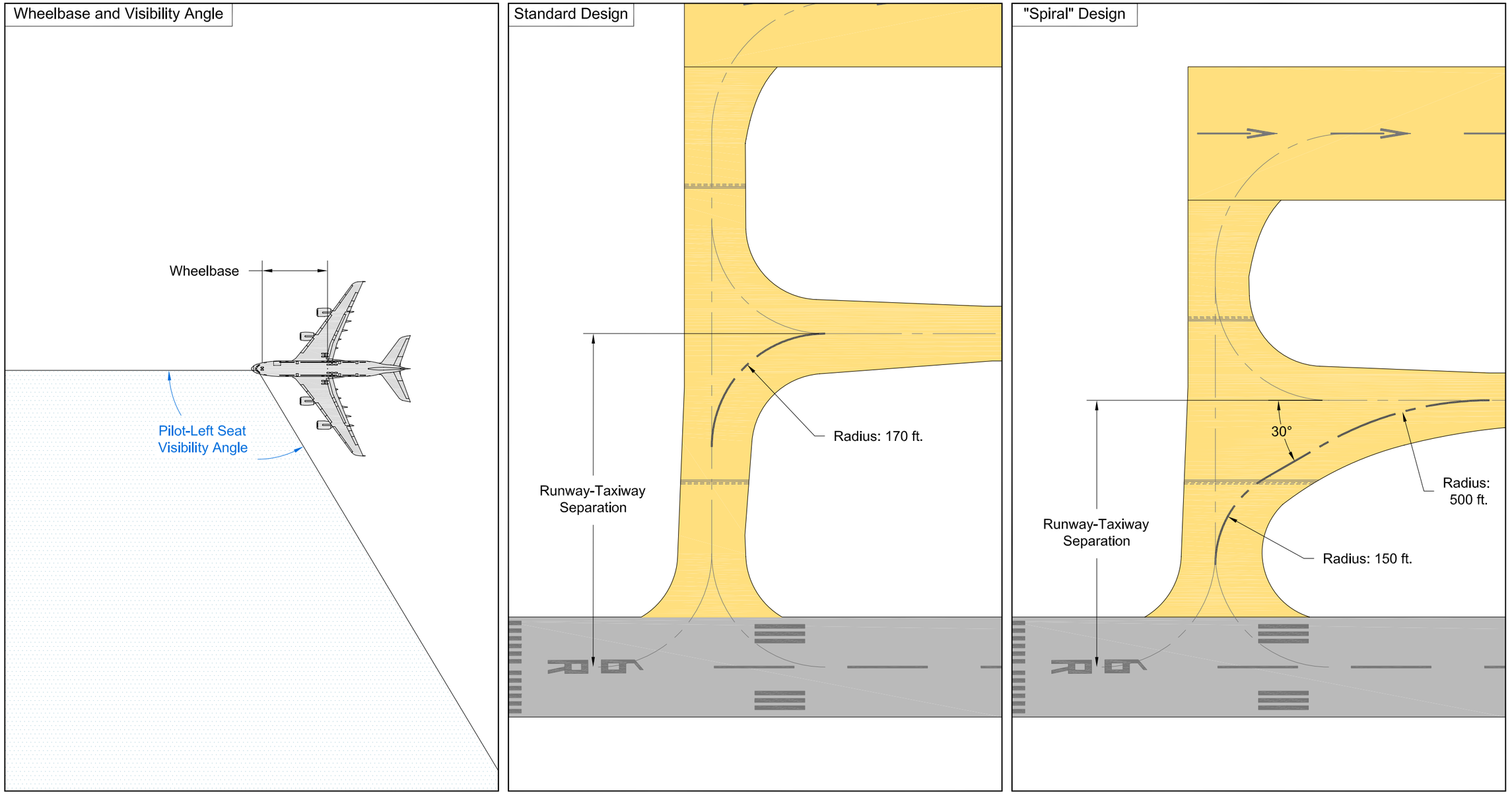
Critical Sight Distance and OFZ Penetration by North Airfield Concept

Concept		Measurement	Aircraft					
			Airbus A380-800	Boeing B787-8	Boeing B777-300ER	Airbus A340-600	Boeing B747-8	Boeing B747-400ER
100 North with Spiral Intersection Design	Cockpit over Center	Aircraft Angle to Holdline (Deg.)	25.3	27.0	24.7	24.2	25.1	26.0
		Critical Sight Distance (ft.)	428.8	464.8	488.7	748.6	1,652.3	1,833.5
		24R CAT II/III OFZ Penetration while Parallel (ft.)	16.6	-	-	-	0.2	0.8
		24R CAT II/III OFZ Penetration from Tail Swing (ft.)	18.7	-	0.2	-	2.5	3.0
		24R CAT II/III OFZ Penetration while Holding (ft.)	13.7	-	-	-	-	-
		24L CAT I OFZ Penetration while Parallel (ft.)	1.3	-	-	-	-	-
		24L CAT I OFZ Penetration from Tail Swing (ft.)	-	-	-	-	-	-
		24L CAT I OFZ Penetration while Holding (ft.)	3.7	-	-	-	-	-
	Judgmental Oversteer	Aircraft Angle to Holdline (Deg.)	28.3	30.0	28.2	27.7	28.2	29.2
		Critical Sight Distance (ft.)	480.6	525.3	564.9	910.2	2,432.6	2,859.0
		24R CAT II/III OFZ Penetration while Parallel (ft.)	16.6	-	-	-	0.2	0.8
		24R CAT II/III OFZ Penetration from Tail Swing (ft.)	19.6	-	1.1	-	3.4	3.7
		24R CAT II/III OFZ Penetration while Holding (ft.)	15.8	-	-	-	0.3	-
		24L CAT I OFZ Penetration while Parallel (ft.)	1.3	-	-	-	-	-
		24L CAT I OFZ Penetration from Tail Swing (ft.)	-	-	-	-	-	-
		24L CAT I OFZ Penetration while Holding (ft.)	1.9	-	-	-	-	-
200 North with Spiral Intersection Design	Cockpit over Center	Aircraft Angle to Holdline (Deg.)	25.3	27.0	24.7	24.2	25.1	26.0
		Critical Sight Distance (ft.)	428.8	464.8	488.7	748.6	1,652.3	1,833.5
		24R CAT II/III OFZ Penetration while Parallel (ft.)	-	-	-	-	-	-
		24R CAT II/III OFZ Penetration from Tail Swing (ft.)	-	-	-	-	-	-
		24R CAT II/III OFZ Penetration while Holding (ft.)	-	-	-	-	-	-
		24L CAT I OFZ Penetration while Parallel (ft.)	1.3	-	-	-	-	-
		24L CAT I OFZ Penetration from Tail Swing (ft.)	-	-	-	-	-	-
		24L CAT I OFZ Penetration while Holding (ft.)	3.7	-	-	-	-	-
	Judgmental Oversteer	Aircraft Angle to Holdline (Deg.)	28.3	30.0	28.2	27.7	28.2	29.2
		Critical Sight Distance (ft.)	480.6	525.3	564.9	910.2	2,432.6	2,859.0
		24R CAT II/III OFZ Penetration while Parallel (ft.)	-	-	-	-	-	-
		24R CAT II/III OFZ Penetration from Tail Swing (ft.)	-	-	-	-	-	-
		24R CAT II/III OFZ Penetration while Holding (ft.)	-	-	-	-	-	-
		24L CAT I OFZ Penetration while Parallel (ft.)	1.3	-	-	-	-	-
		24L CAT I OFZ Penetration from Tail Swing (ft.)	-	-	-	-	-	-
		24L CAT I OFZ Penetration while Holding (ft.)	1.9	-	-	-	-	-
300 North with Standard Intersection Design	Cockpit over Center	Aircraft Angle to Holdline (Deg.)	66.7	72.7	64.5	62.3	65.0	68.5
		Critical Sight Distance (ft.)	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
		24R CAT II/III OFZ Penetration while Parallel (ft.)	-	-	-	-	-	-
		24R CAT II/III OFZ Penetration from Tail Swing (ft.)	1.5	-	-	-	-	-
		24R CAT II/III OFZ Penetration while Holding (ft.)	-	-	-	-	-	-
		24L CAT I OFZ Penetration while Parallel (ft.)	-	-	-	-	-	-
		24L CAT I OFZ Penetration from Tail Swing (ft.)	-	-	-	-	-	-
		24L CAT I OFZ Penetration while Holding (ft.)	-	-	-	-	-	-
	Judgmental Oversteer	Aircraft Angle to Holdline (Deg.)	69.9	76.1	67.8	65.6	67.6	71.2
		Critical Sight Distance (ft.)	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
		24R CAT II/III OFZ Penetration while Parallel (ft.)	-	-	-	-	-	-
		24R CAT II/III OFZ Penetration from Tail Swing (ft.)	3.2	-	-	-	-	-
		24R CAT II/III OFZ Penetration while Holding (ft.)	-	-	-	-	-	-
		24L CAT I OFZ Penetration while Parallel (ft.)	-	-	-	-	-	-
		24L CAT I OFZ Penetration from Tail Swing (ft.)	-	-	-	-	-	-
		24L CAT I OFZ Penetration while Holding (ft.)	-	-	-	-	-	-
400 North with Standard Intersection Design	Cockpit over Center	Aircraft Angle to Holdline (Deg.)	75.4	80.4	73.3	71.3	74.2	77.4
		Critical Sight Distance (ft.)	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
		24R CAT II/III OFZ Penetration while Parallel (ft.)	-	-	-	-	-	-
		24R CAT II/III OFZ Penetration from Tail Swing (ft.)	-	-	-	-	-	-
		24R CAT II/III OFZ Penetration while Holding (ft.)	-	-	-	-	-	-
		24L CAT I OFZ Penetration while Parallel (ft.)	-	-	-	-	-	-
		24L CAT I OFZ Penetration from Tail Swing (ft.)	-	-	-	-	-	-
		24L CAT I OFZ Penetration while Holding (ft.)	-	-	-	-	-	-
	Judgmental Oversteer	Aircraft Angle to Holdline (Deg.)	84.9	90.0	82.6	79.9	82.2	86.4
		Critical Sight Distance (ft.)	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
		24R CAT II/III OFZ Penetration while Parallel (ft.)	-	-	-	-	-	-
		24R CAT II/III OFZ Penetration from Tail Swing (ft.)	-	-	-	-	-	-
		24R CAT II/III OFZ Penetration while Holding (ft.)	-	-	-	-	-	-
		24L CAT I OFZ Penetration while Parallel (ft.)	-	-	-	-	-	-
		24L CAT I OFZ Penetration from Tail Swing (ft.)	-	-	-	-	-	-
		24L CAT I OFZ Penetration while Holding (ft.)	-	-	-	-	-	-

Notes: 1/ For all alternatives, the Centerfield Taxiway is depressed at 1.5% from runway pavement edge to taxiway pavement edge.

Source: Simtra AeroTech, PathPlanner A5, 2010; Airbus Airplane Characteristics for Airport Planning; FAA AC 150/5300-13 Change 16, Airport Design, January 3, 2011; Los Angeles International Airport ALP, HNTB, August 2010; Los Angeles International Airport North Airfield Safety Study, Preliminary Report, February 19, 2010; Ricondo & Associates, Inc. May 25, 2011

Prepared by: Ricondo & Associates, Inc.



Source: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location and centerline locations); Ricondo & Associates, Inc., March 2011 (new airfield pavement).
Prepared by: Ricondo & Associates, Inc., March 2011.

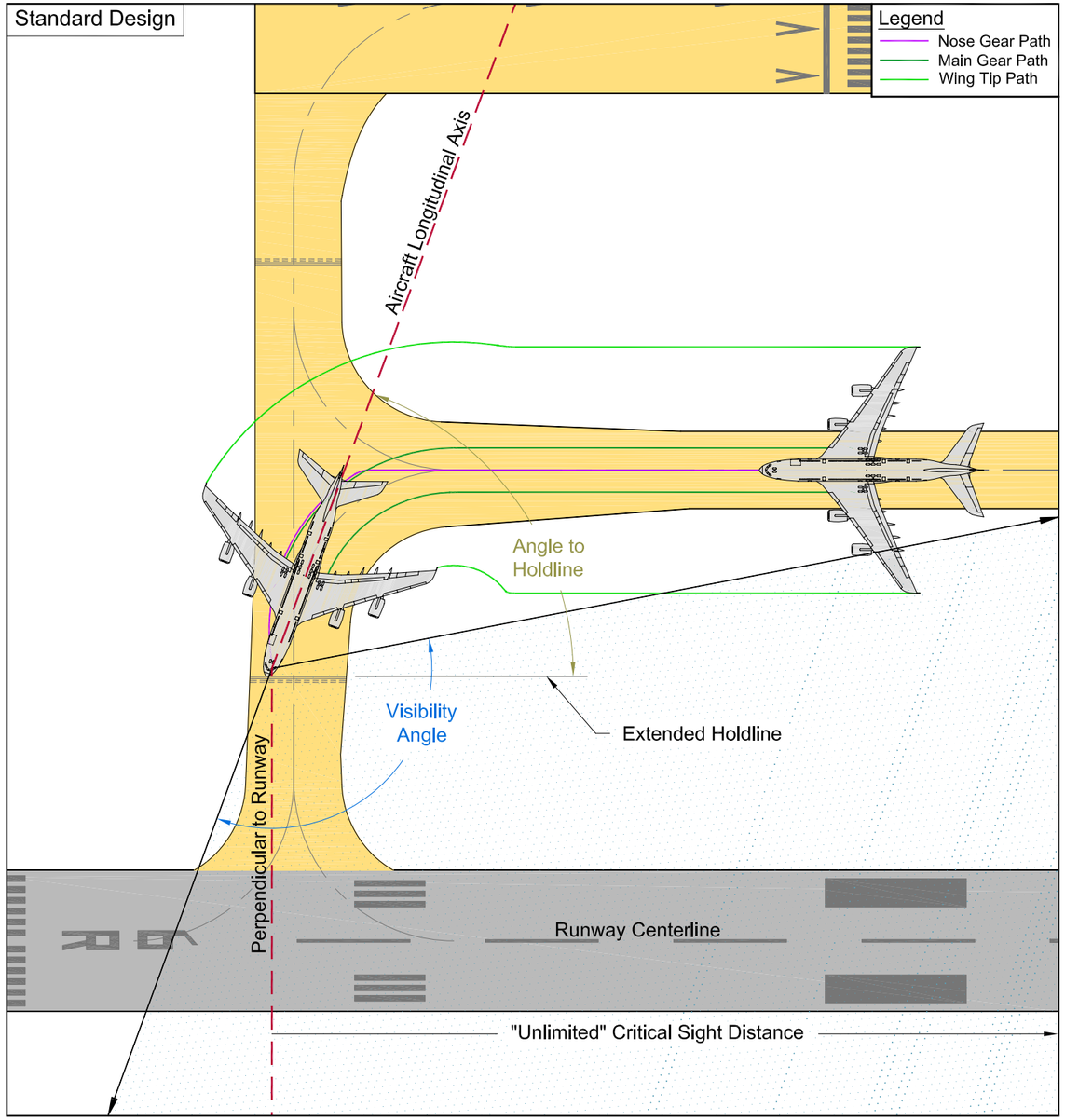
Exhibit 1

0 150 ft.

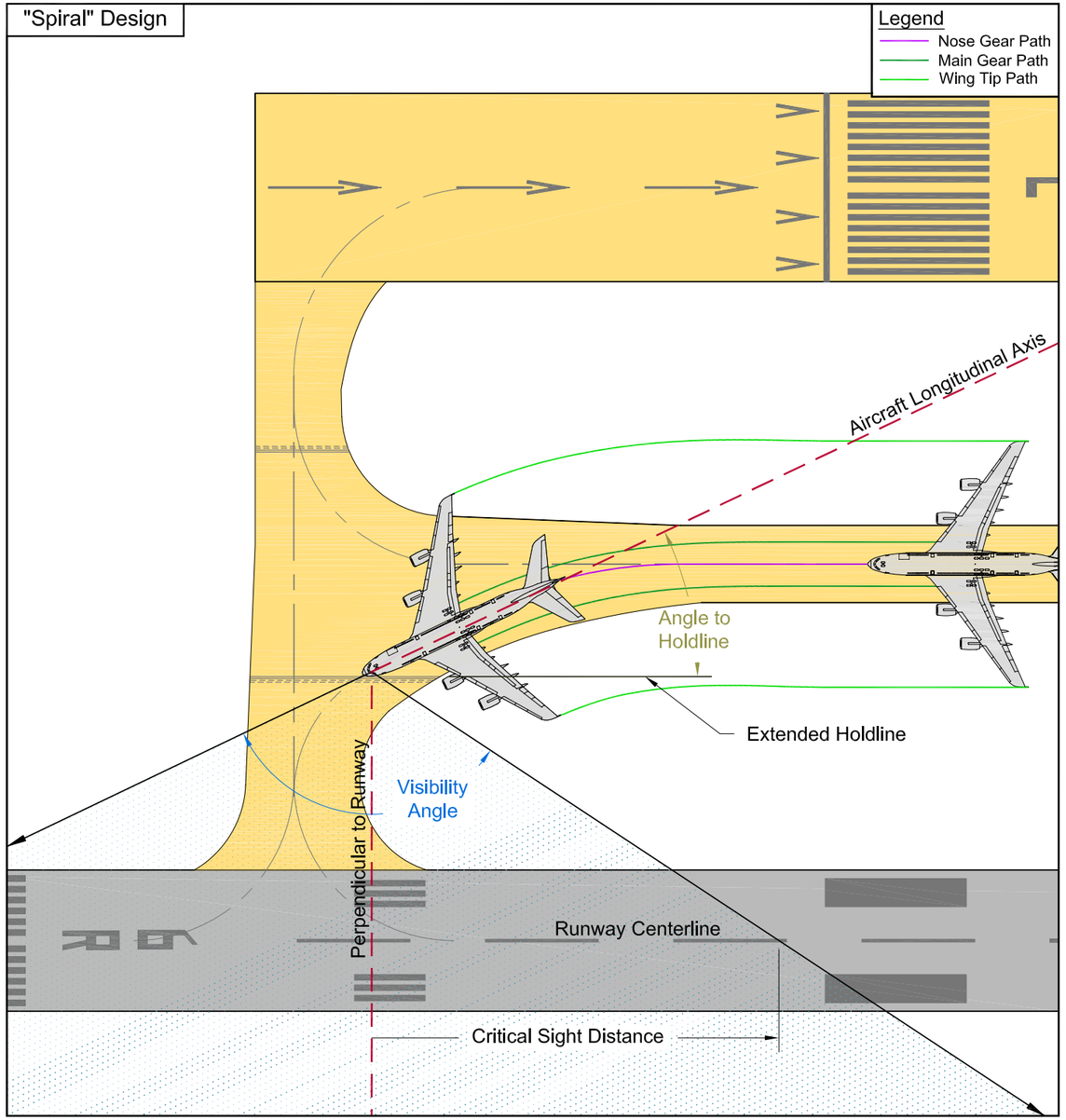
Visibility Angle and Intersection Geometry Variables

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 01_Assumptions.dwg_Layout: Layout1_May 25, 2011, 3:34pm

Standard Design



"Spiral" Design



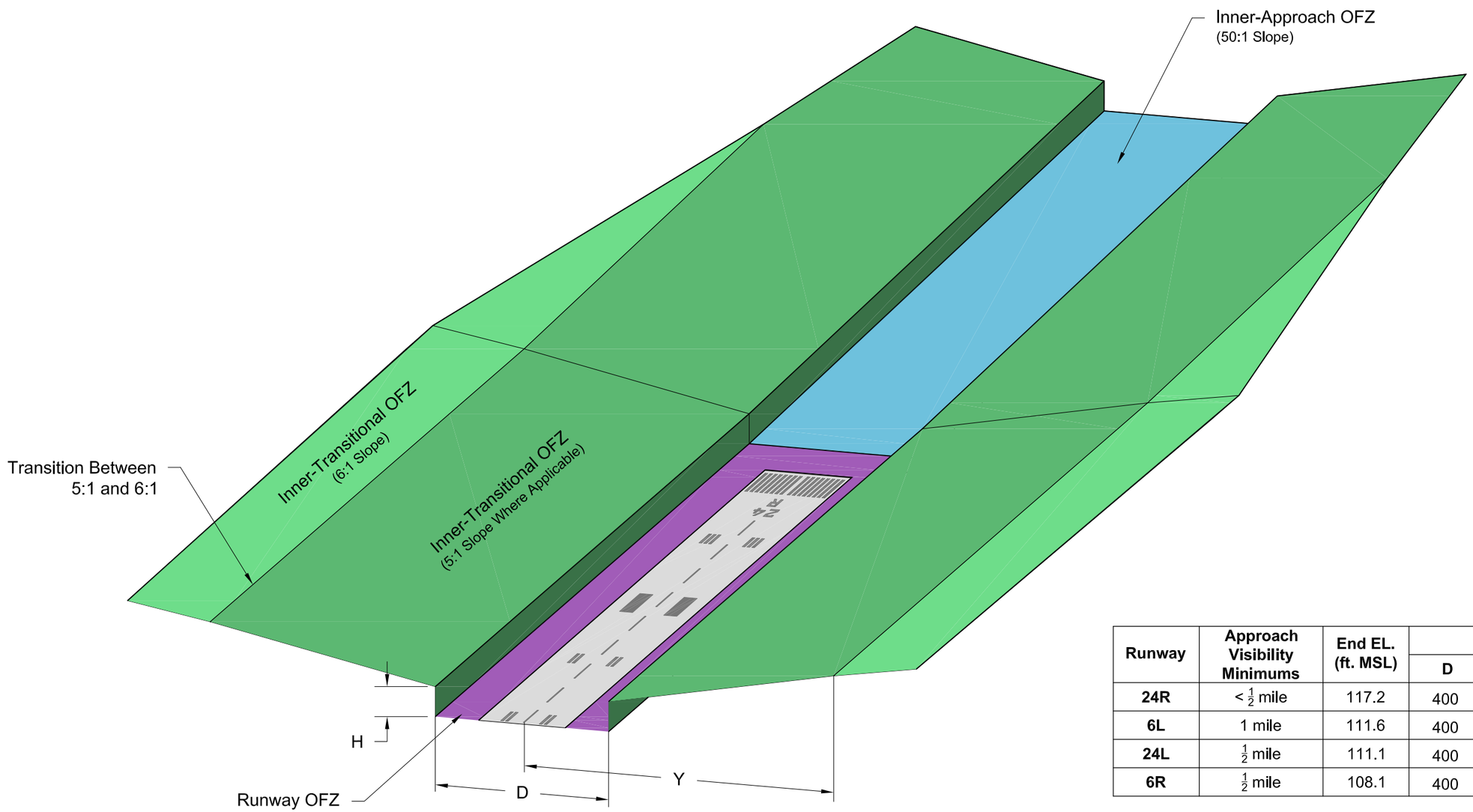
Source: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations);
FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location and centerline locations); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 2

0 150 ft.

Critical Sight Distance Variables

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 02_Critical Sight Distance Components.dwg_Layout: 02_May 25, 2011, 3:34pm



Runway	Approach Visibility Minimums	End EL. (ft. MSL)	OFZ (ft.)		
			D	H	Y
24R	< ½ mile	117.2	400	18.7	719.8
6L	1 mile	111.6	400	36.1	n/a
24L	½ mile	111.1	400	40.6	n/a
6R	½ mile	108.1	400	40.7	n/a

Source: FAA, AC 150/5300-13 *Airport Design*, January 3, 2011 (OFZ); HNTB Corporation, August 2010 (runway elevations and approach minimums).
Prepared by: Ricondo & Associates, Inc., March 2011.

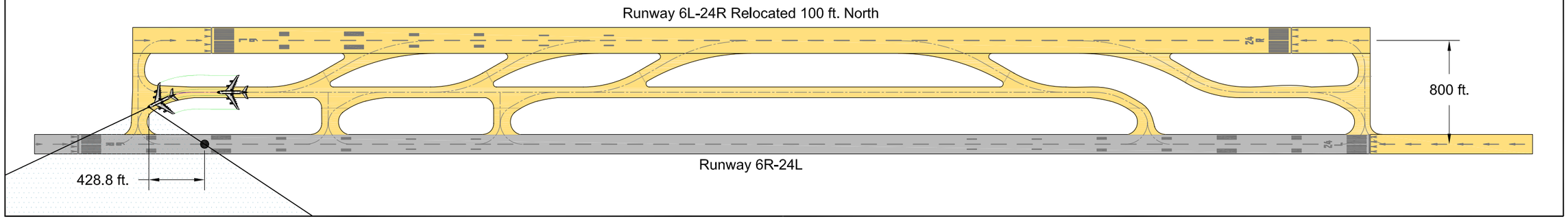
Exhibit 3

0 250 ft.

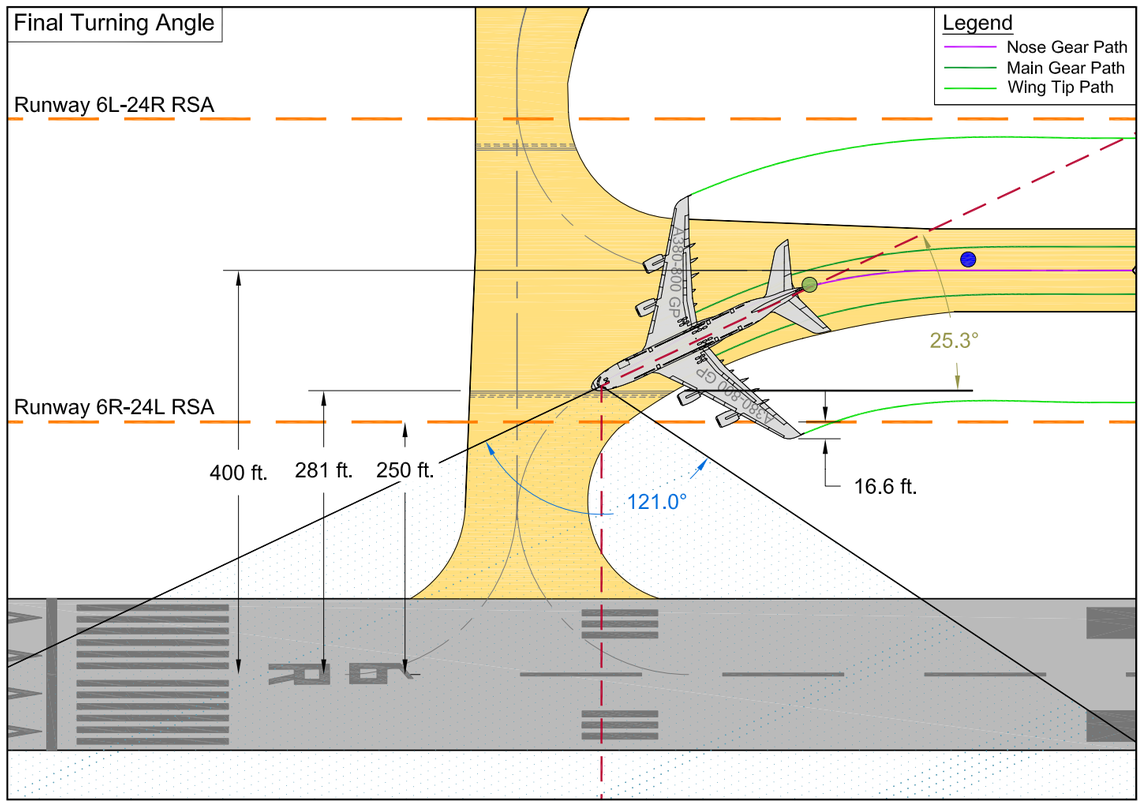
Obstacle Free Zone

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 03_OFZ.dwg_Layout: 03_May 25, 2011, 3:34pm

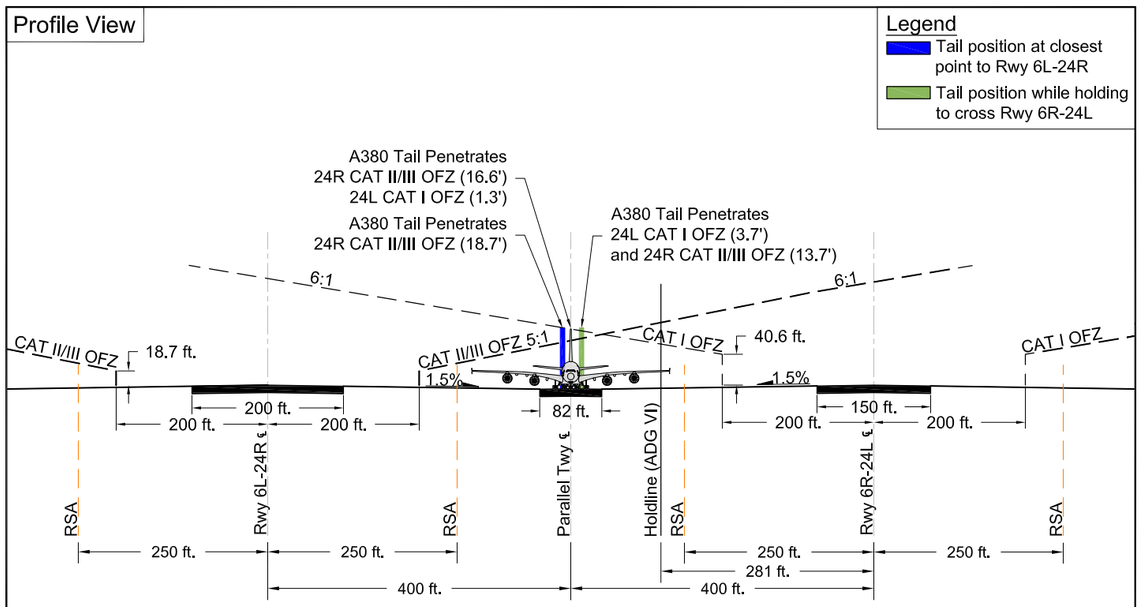
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

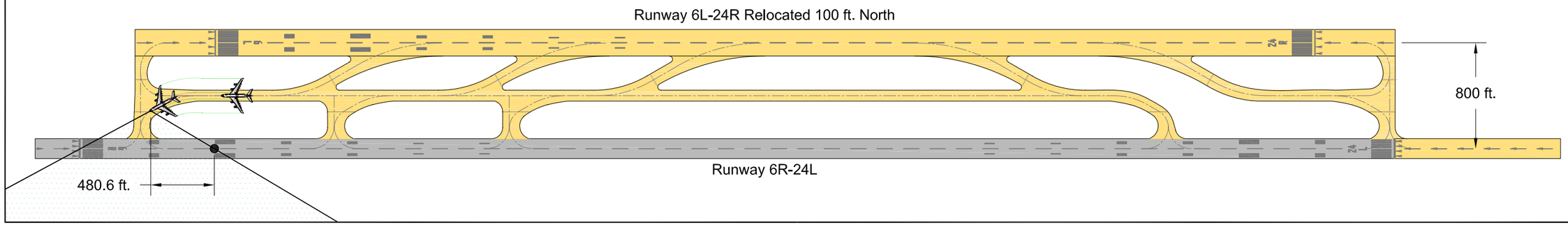
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Airbus, Airplane Characteristics for Airport Planning, March 2005 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 4

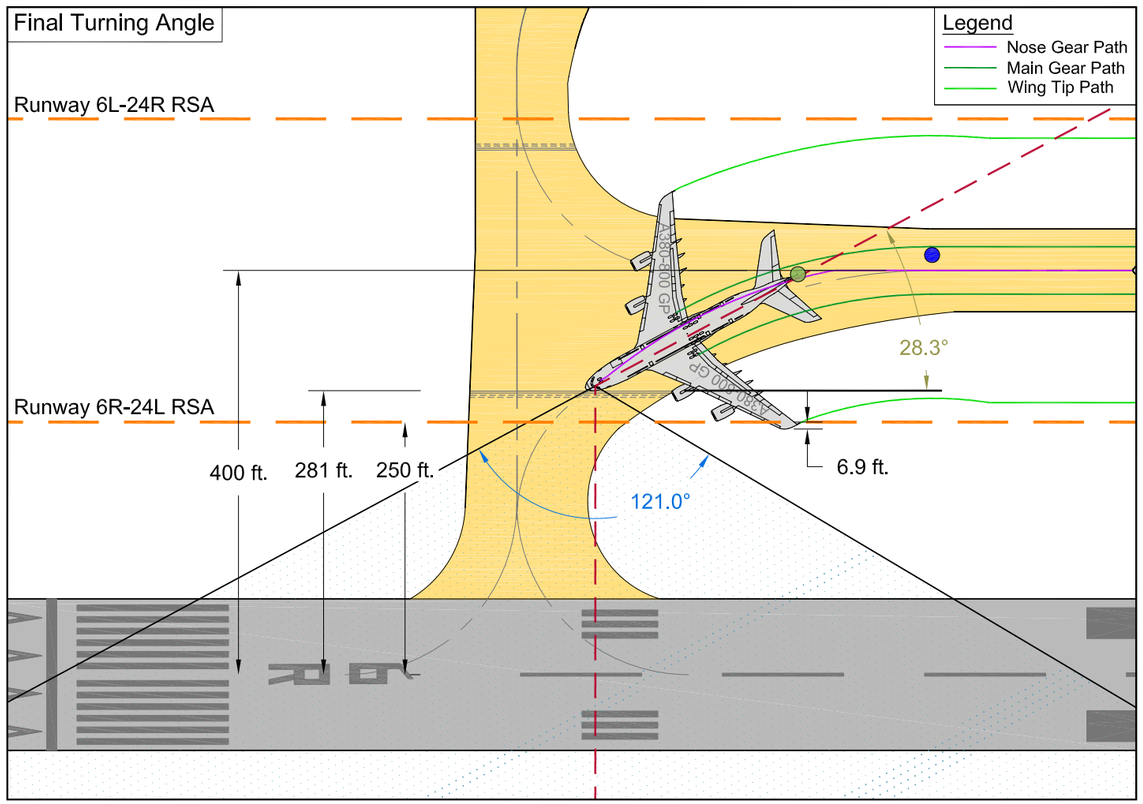
Runway 6L-24R Relocated 100 ft. North
Airbus A380-800 Critical Sight Distance (Spiral + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 04-15_100 North_v2.dwg_Layout: 04_May 25, 2011, 3:17pm

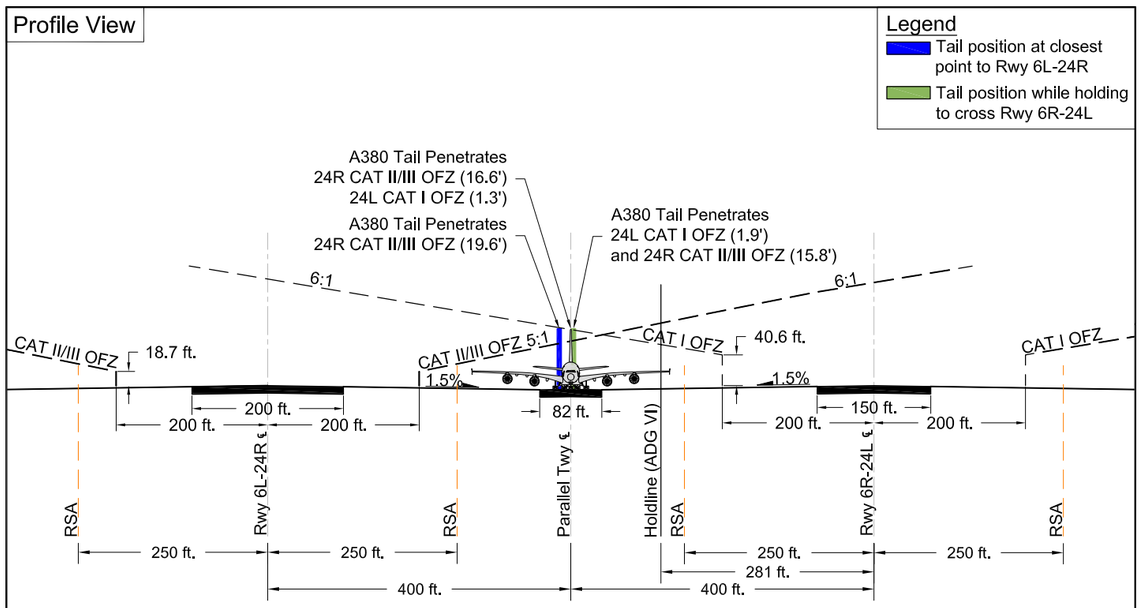
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

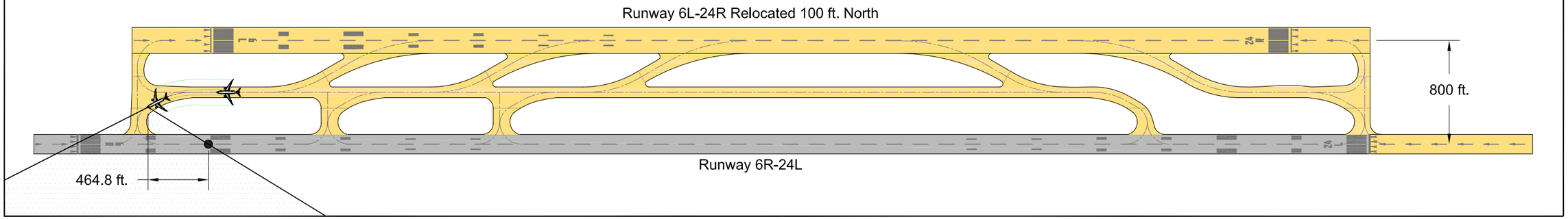
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Airbus, Airplane Characteristics for Airport Planning, March 2005 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., May 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., May 2011.

Exhibit 5

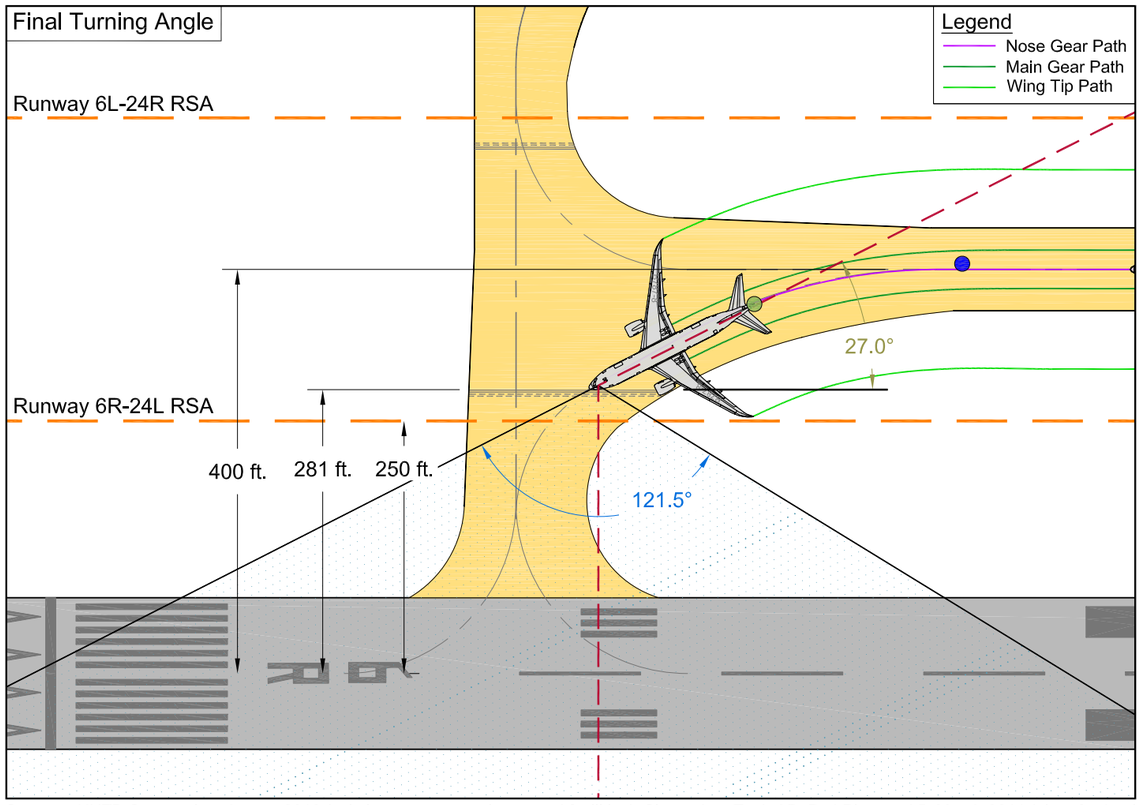
Runway 6L-24R Relocated 100 ft. North
Airbus A380-800 Critical Sight Distance (Spiral + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 04-15_100 North_v2.dwg_Layout: 05_May 25, 2011, 3:19pm

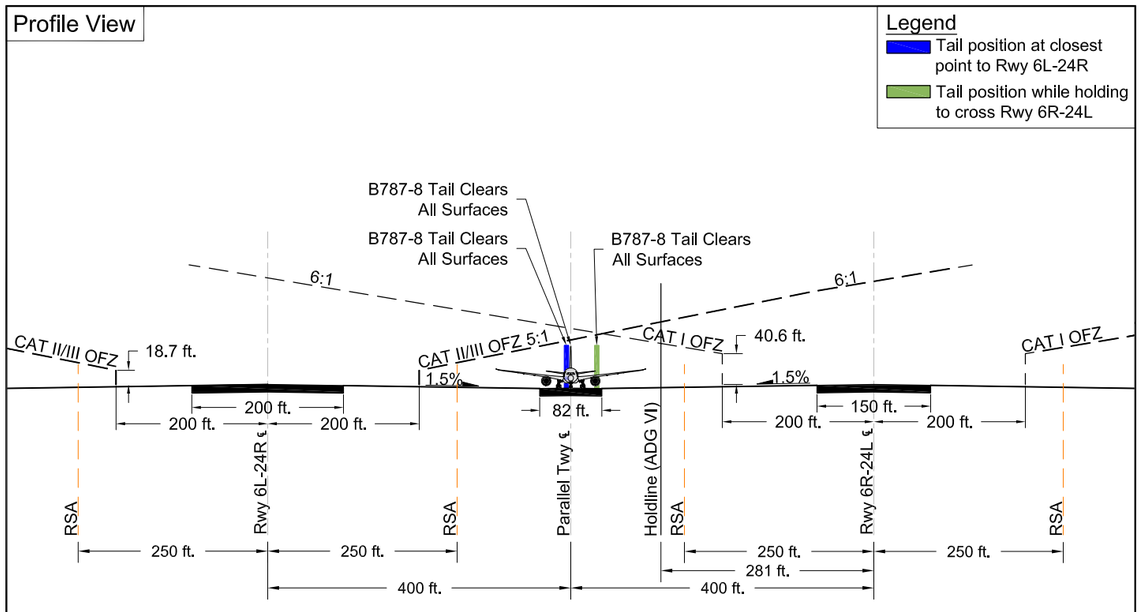
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

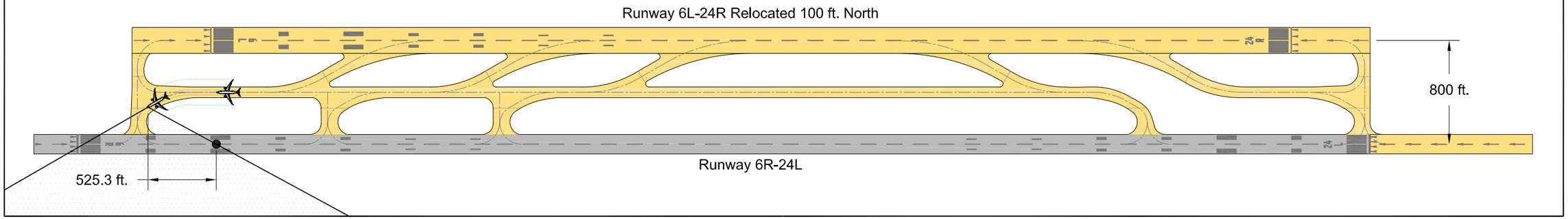
Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, December 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

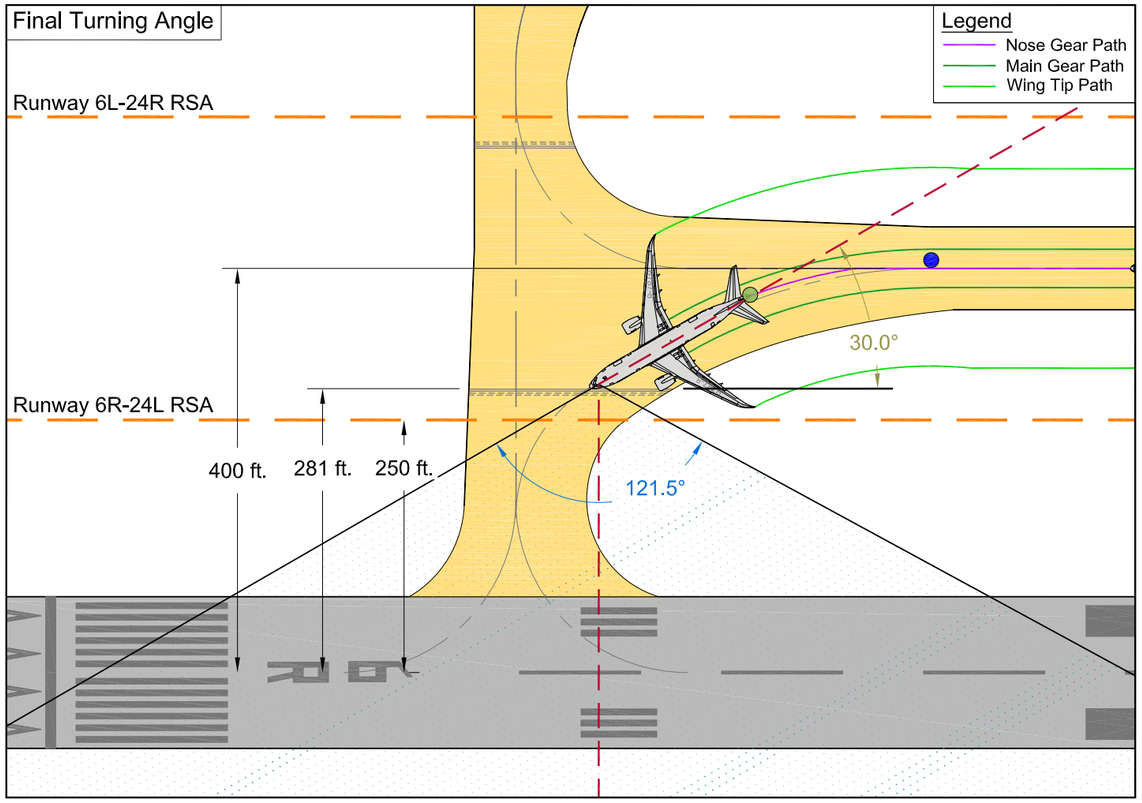
Exhibit 6

Runway 6L-24R Relocated 100 ft. North
Boeing B787-8 Critical Sight Distance (Spiral + Cockpit over Centerline)

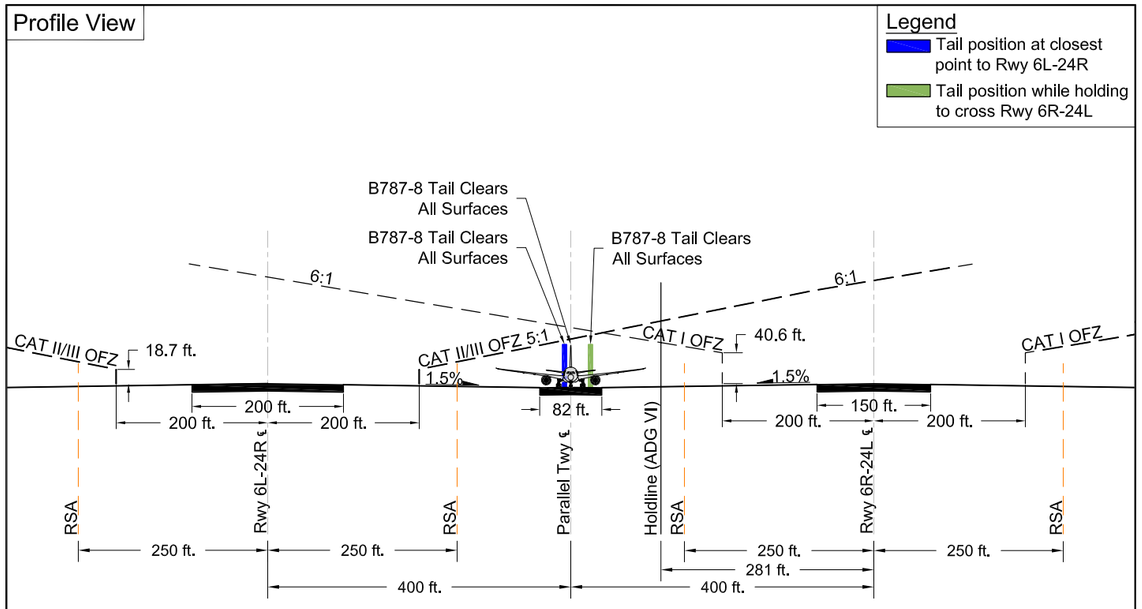
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

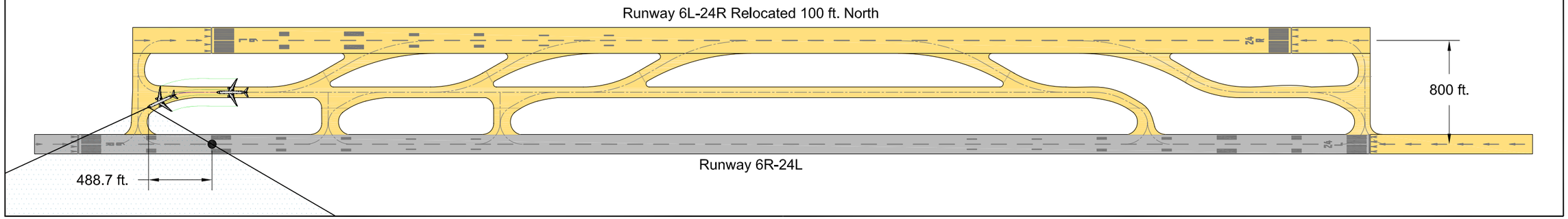
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, December 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 7

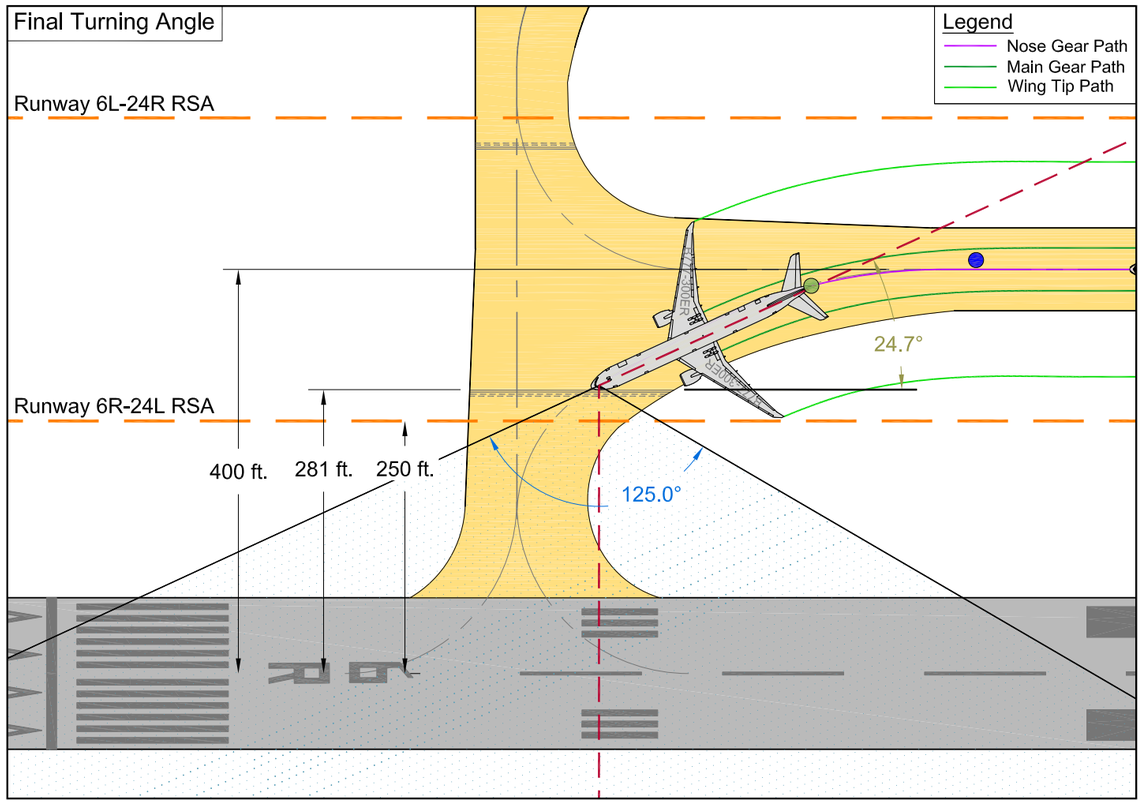
Runway 6L-24R Relocated 100 ft. North
Boeing B787-8 Critical Sight Distance (Spiral + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 04-15_100 North_v2.dwg_Layout: 07_May 25, 2011, 3:18pm

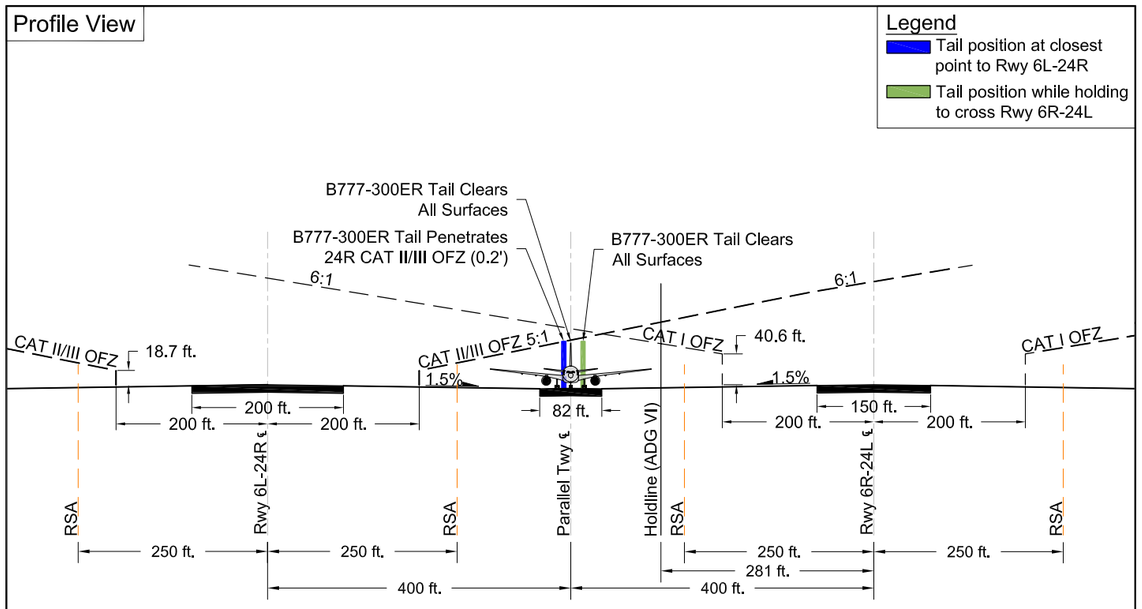
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

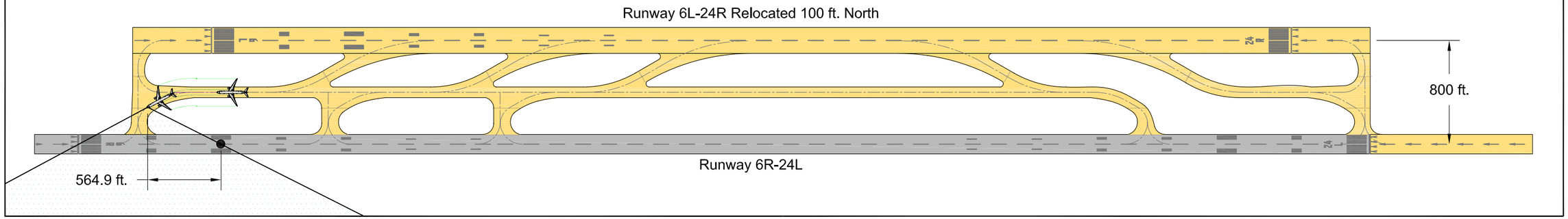
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, May 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 8

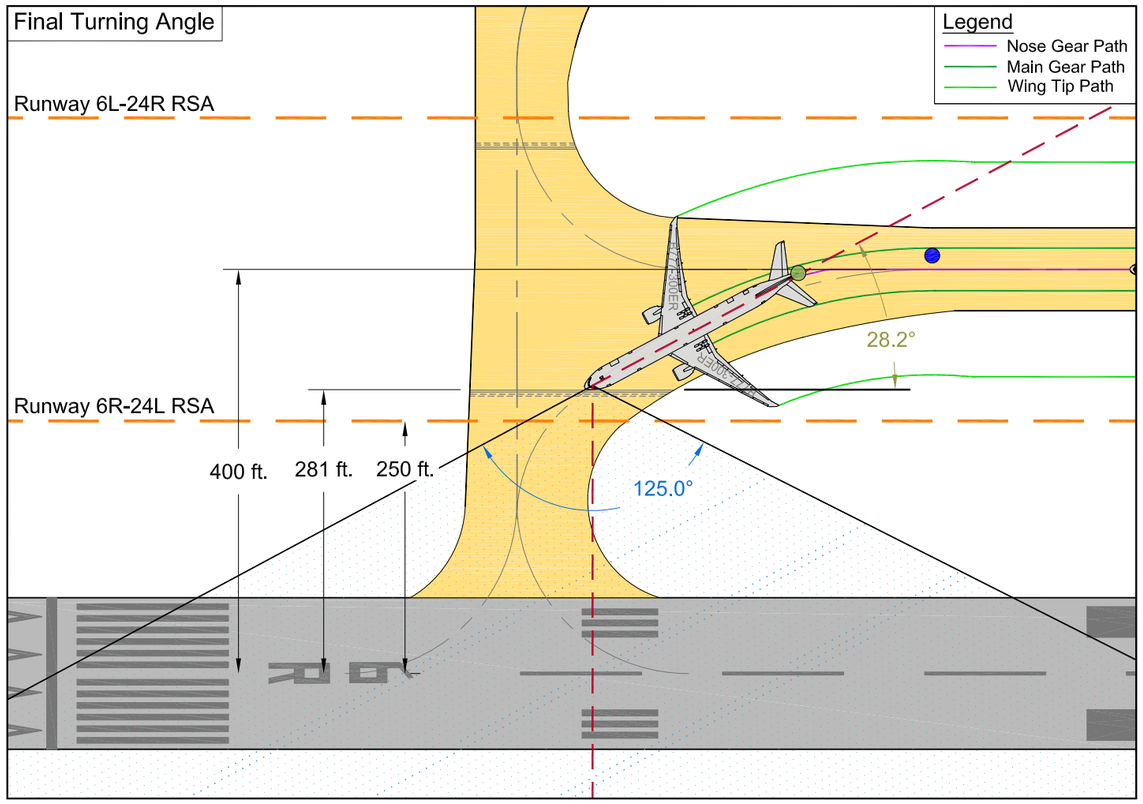
Runway 6L-24R Relocated 100 ft. North
Boeing B777-300ER Critical Sight Distance (Spiral + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 04-15_100 North_v2.dwg_Layout: 08_May 25, 2011, 3:18pm

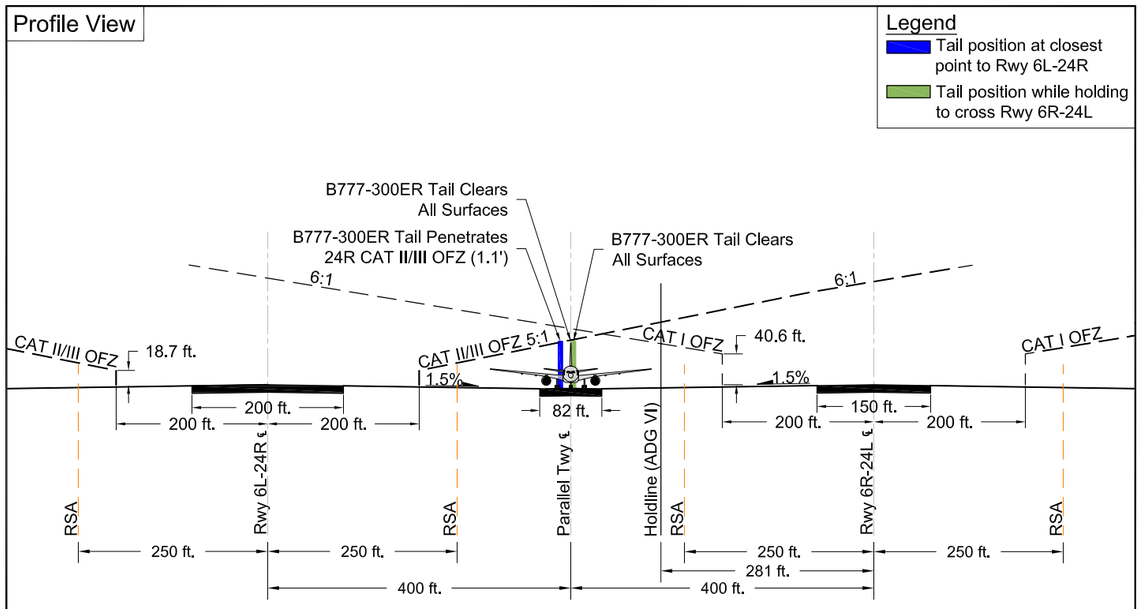
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

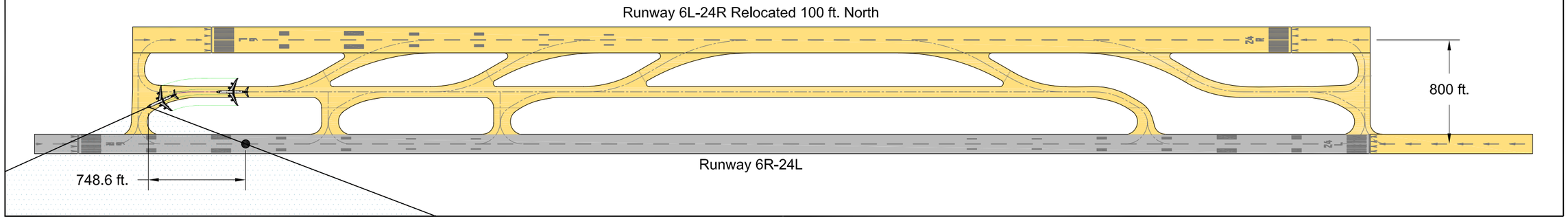
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, May 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 9

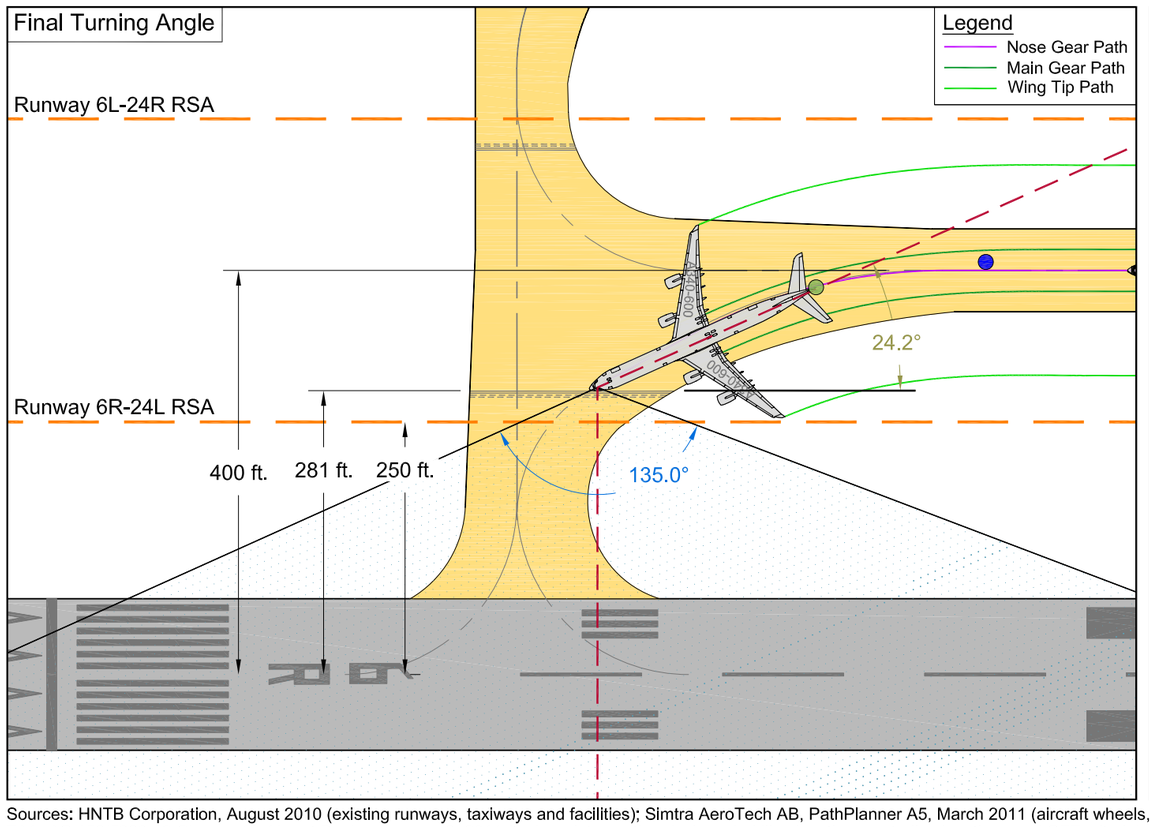
Runway 6L-24R Relocated 100 ft. North
Boeing B777-300ER Critical Sight Distance (Spiral + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 04-15_100 North_v2.dwg_Layout: 09_May 25, 2011, 3:18pm

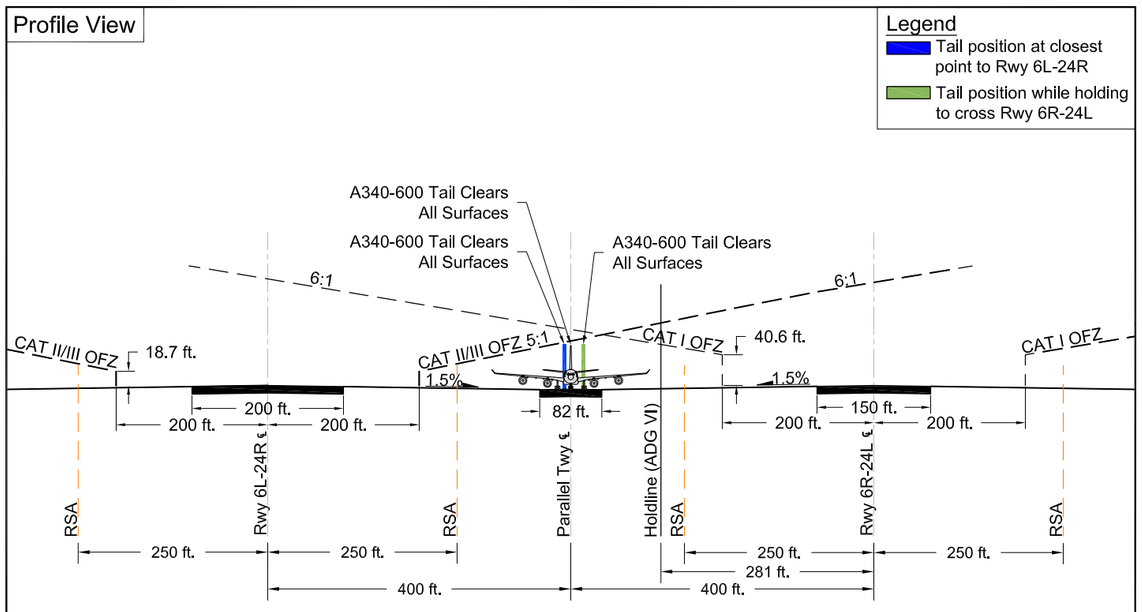
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

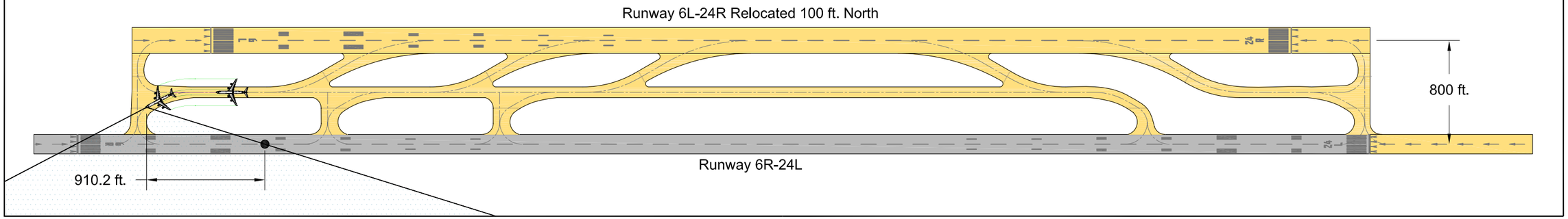
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Airbus, Airplane Characteristics for Airport Planning, April 2001 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 10

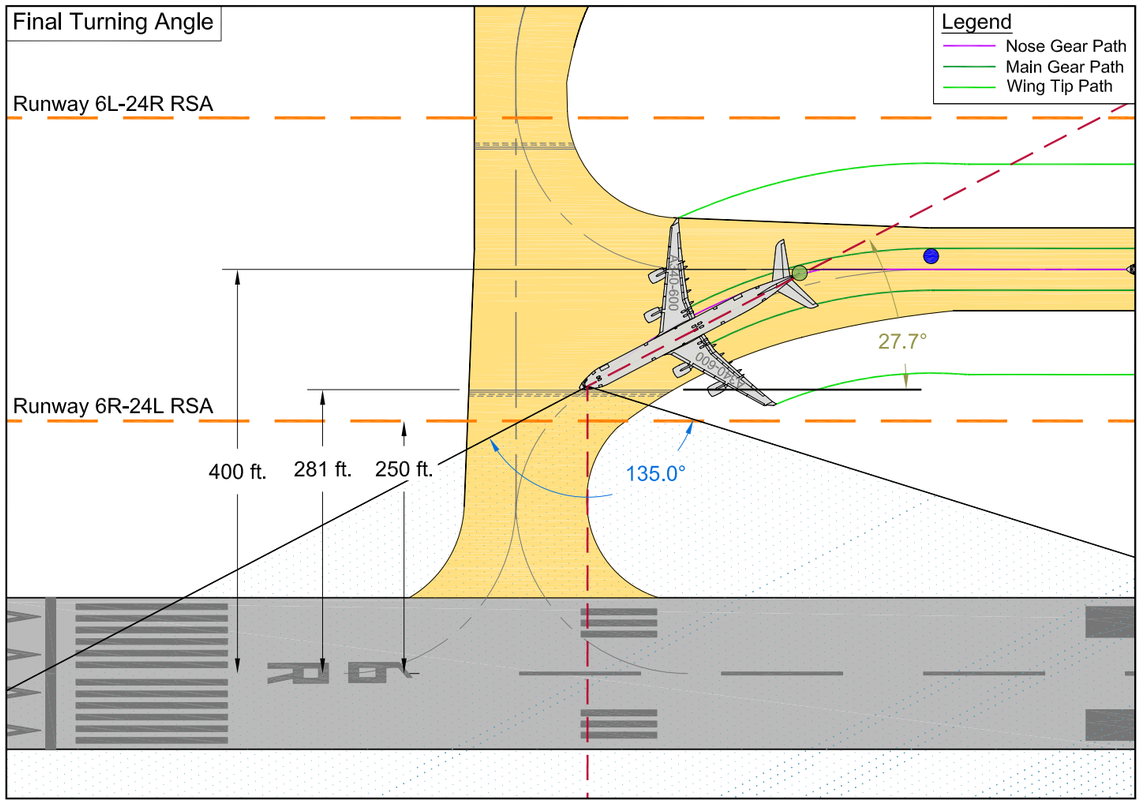
Runway 6L-24R Relocated 100 ft. North
Airbus A340-600 Critical Sight Distance (Spiral + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 04-15_100 North_v2.dwg_Layout: 10_May 25, 2011, 3:18pm

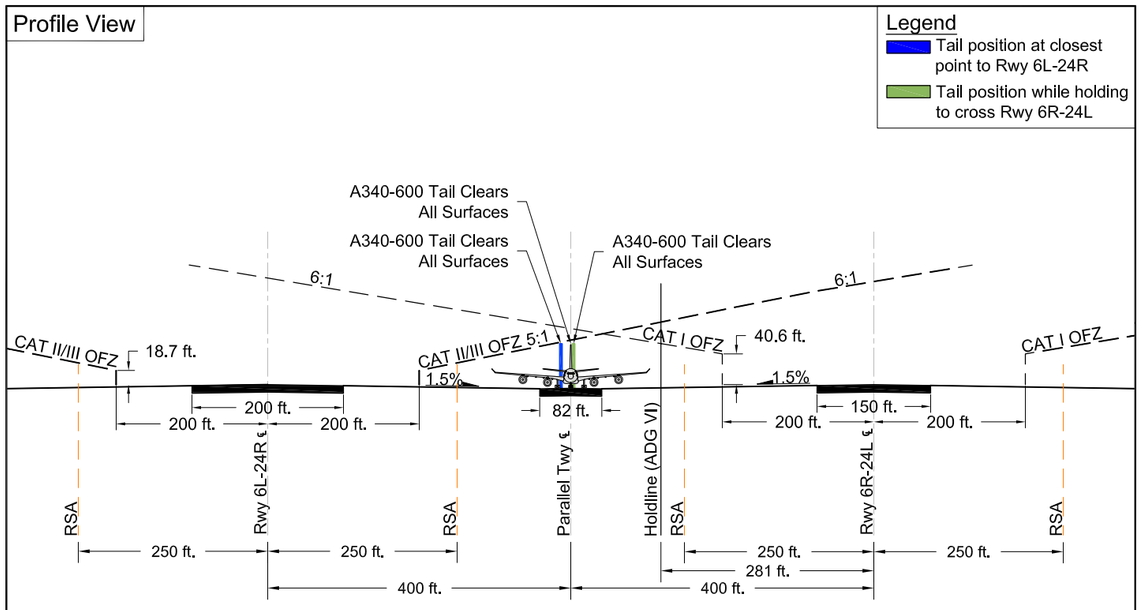
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

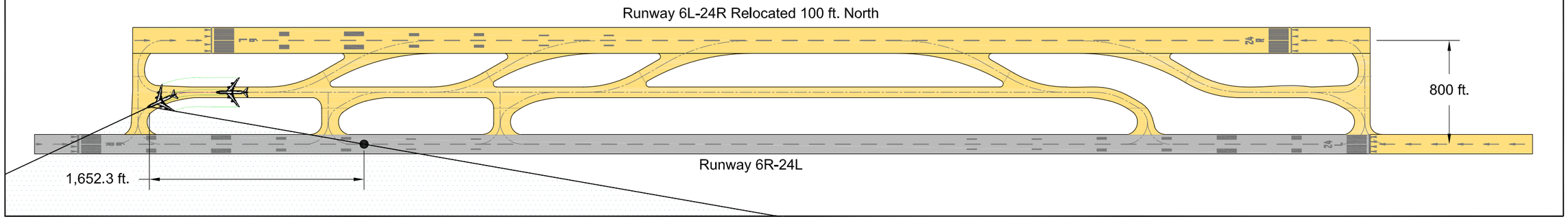
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Airbus, Airplane Characteristics for Airport Planning, April 2001 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 11

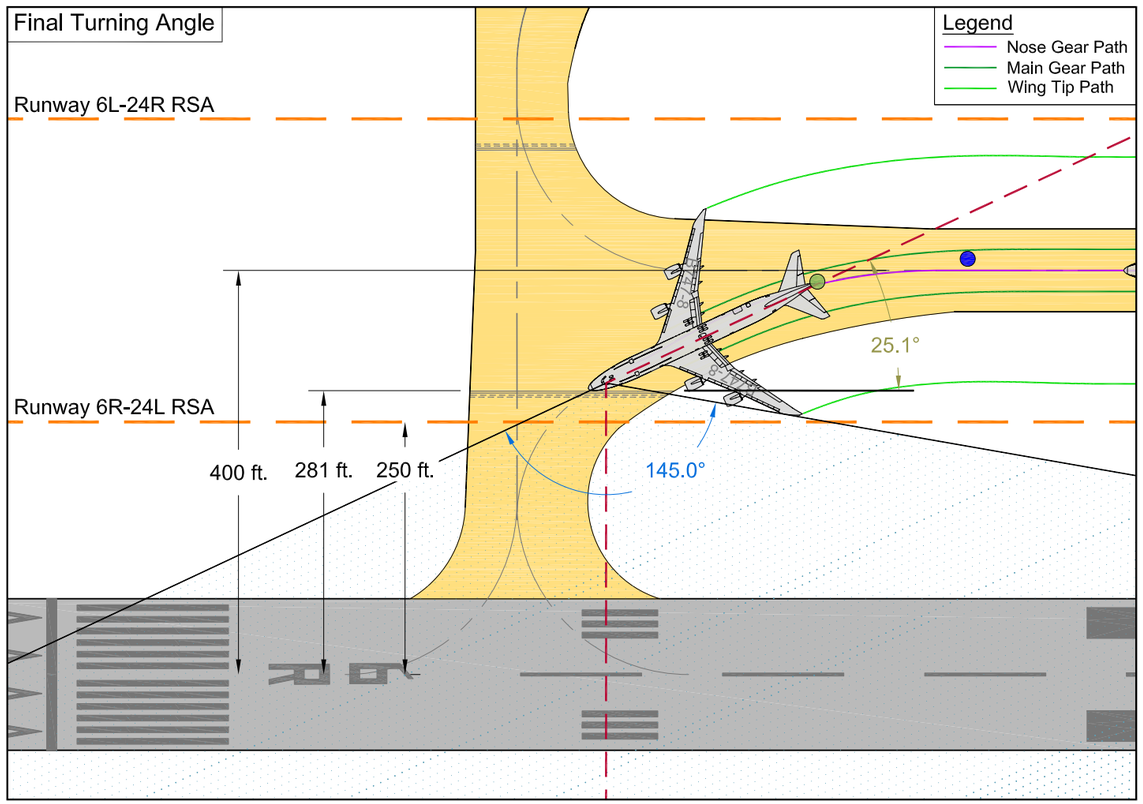
Runway 6L-24R Relocated 100 ft. North
Airbus A340-600 Critical Sight Distance (Spiral + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 04-15_100 North_v2.dwg_Layout: 11_May 25, 2011, 3:18pm

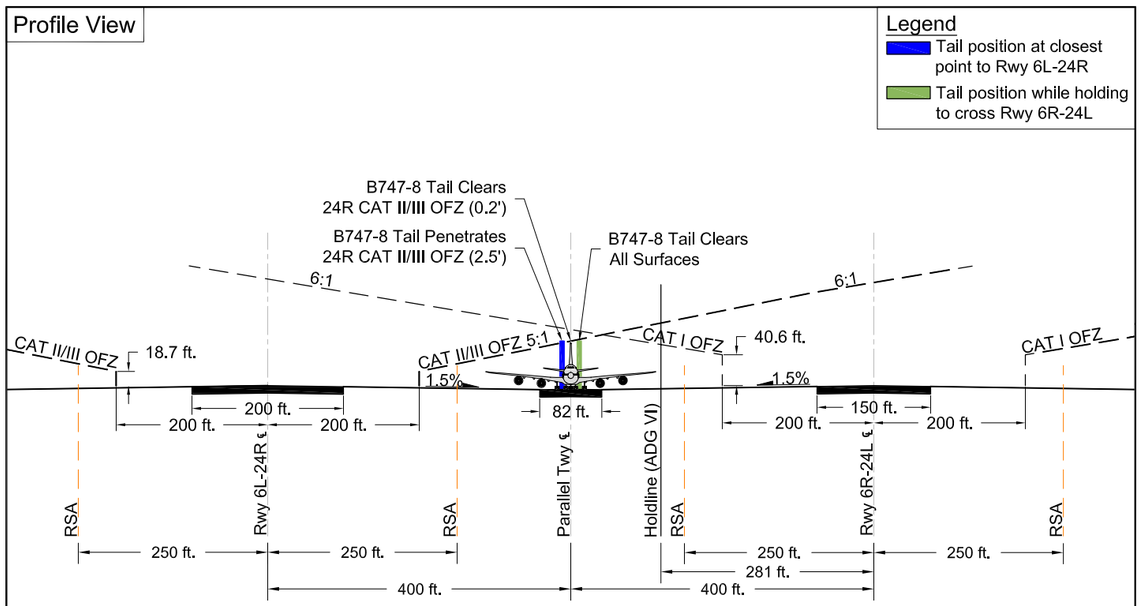
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

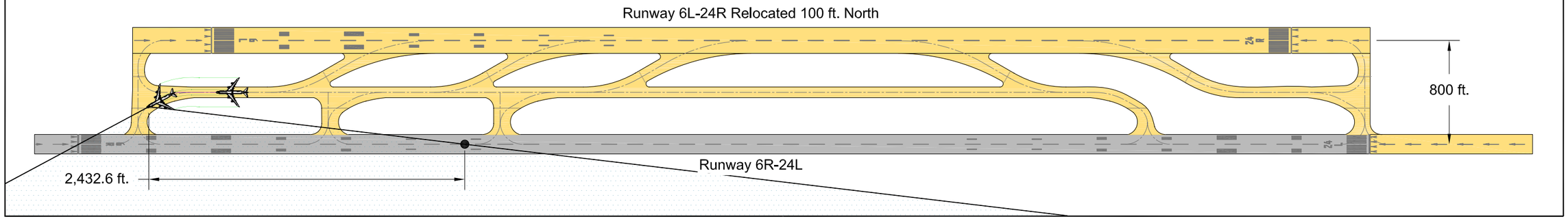
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, March 2011 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 12

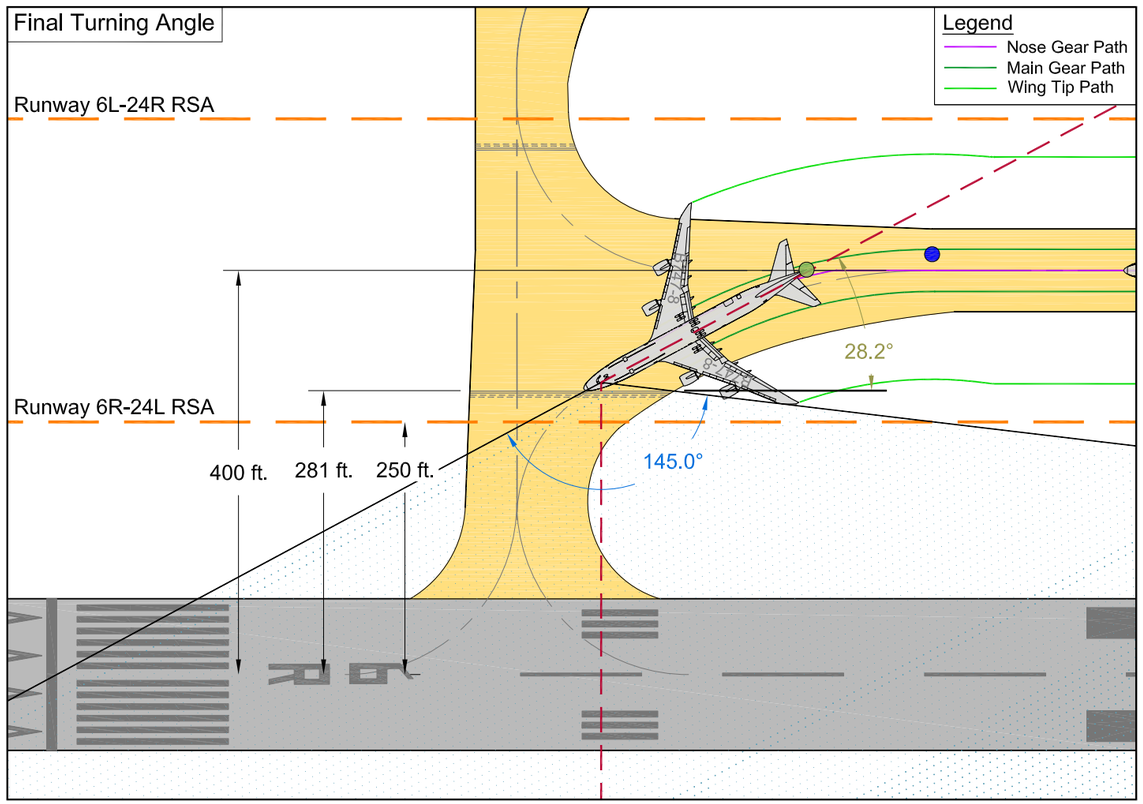
Runway 6L-24R Relocated 100 ft. North
Boeing B747-8 Critical Sight Distance (Spiral + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 04-15_100 North_v2.dwg_Layout: 12_May 25, 2011, 3:19pm

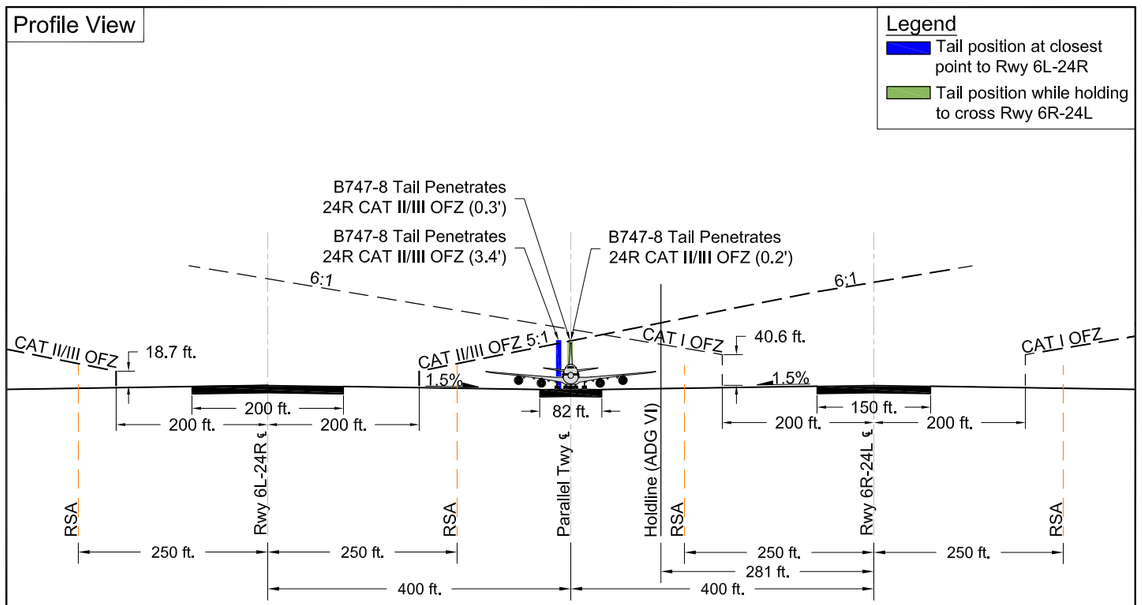
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

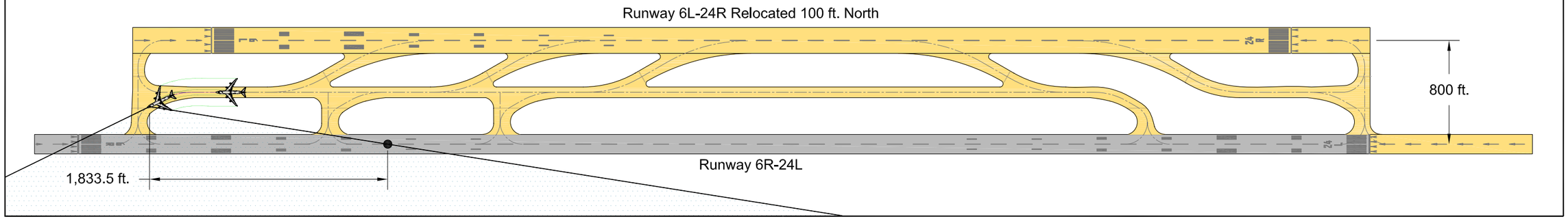
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, March 2011 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 13

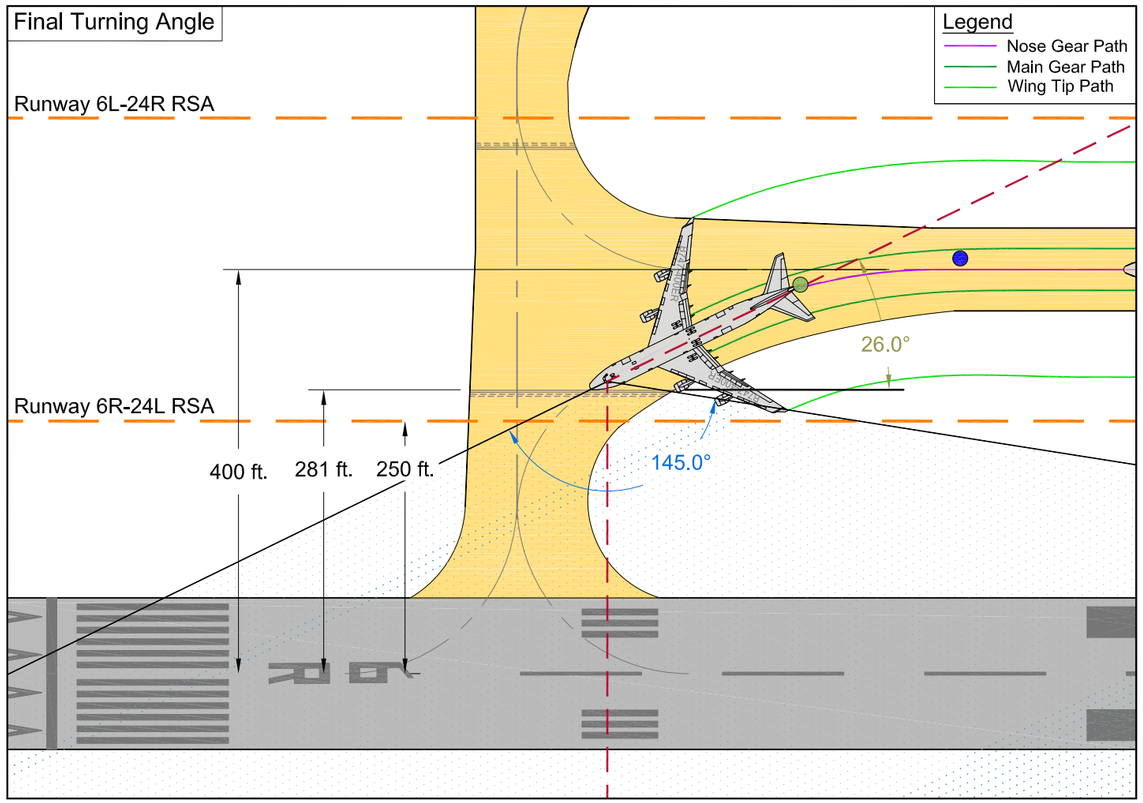
Runway 6L-24R Relocated 100 ft. North
Boeing B747-8 Critical Sight Distance (Spiral + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 04-15_100 North_v2.dwg_Layout: 13_May 25, 2011, 3:20pm

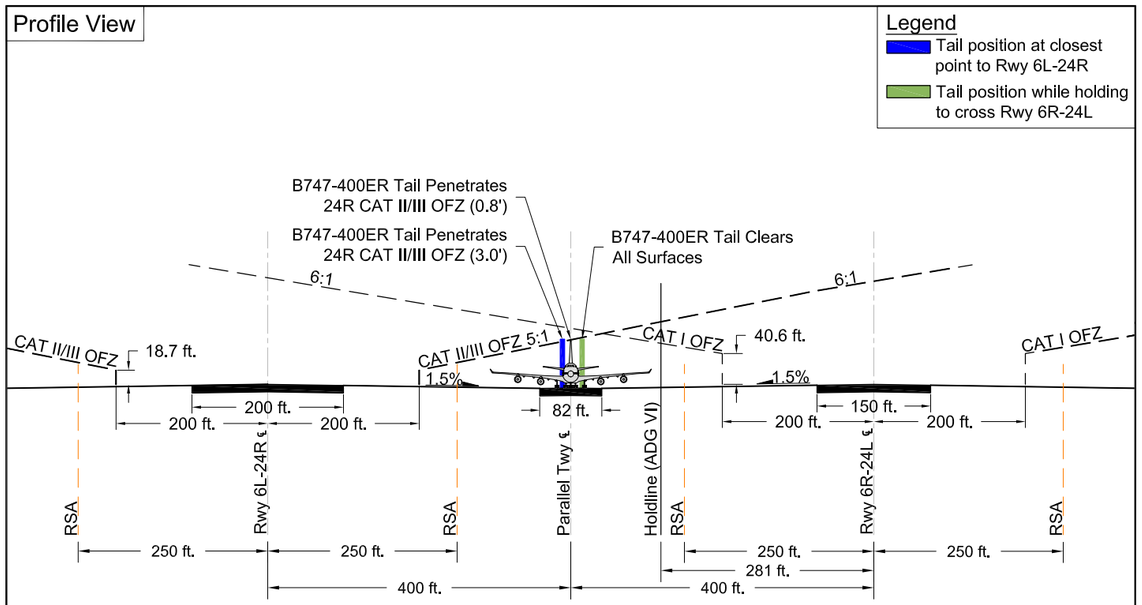
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

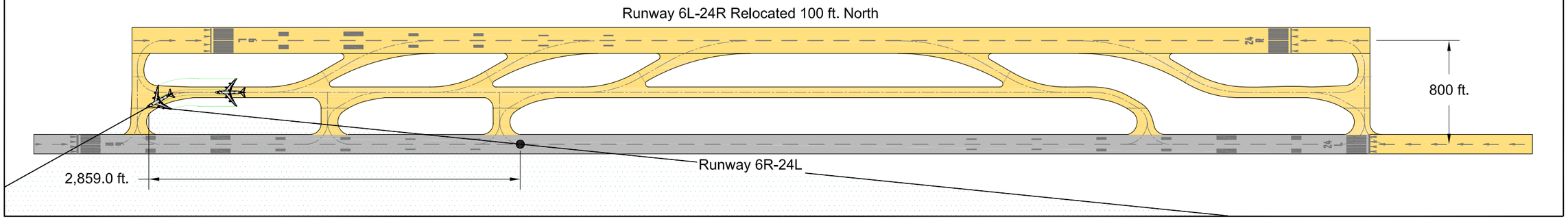
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, June 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 14

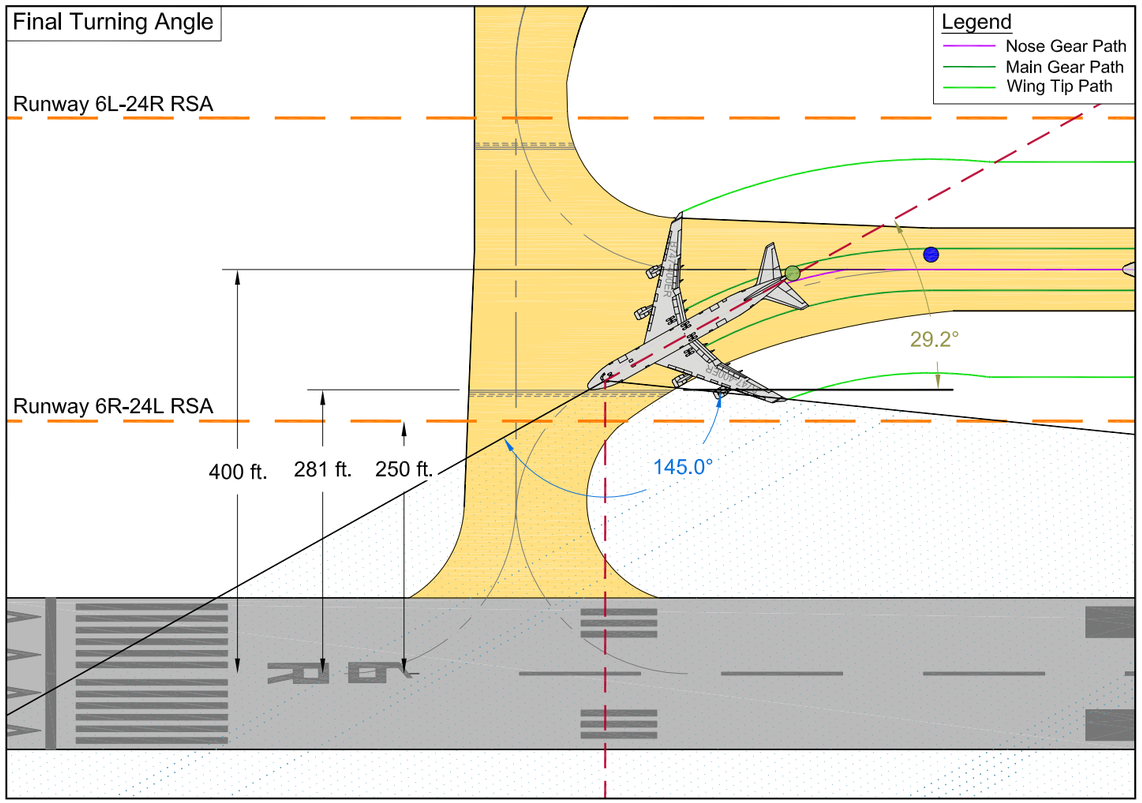
Runway 6L-24R Relocated 100 ft. North
Boeing B747-400ER Critical Sight Distance (Spiral + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 04-15_100 North_v2.dwg_Layout: 14_May 25, 2011, 3:20pm

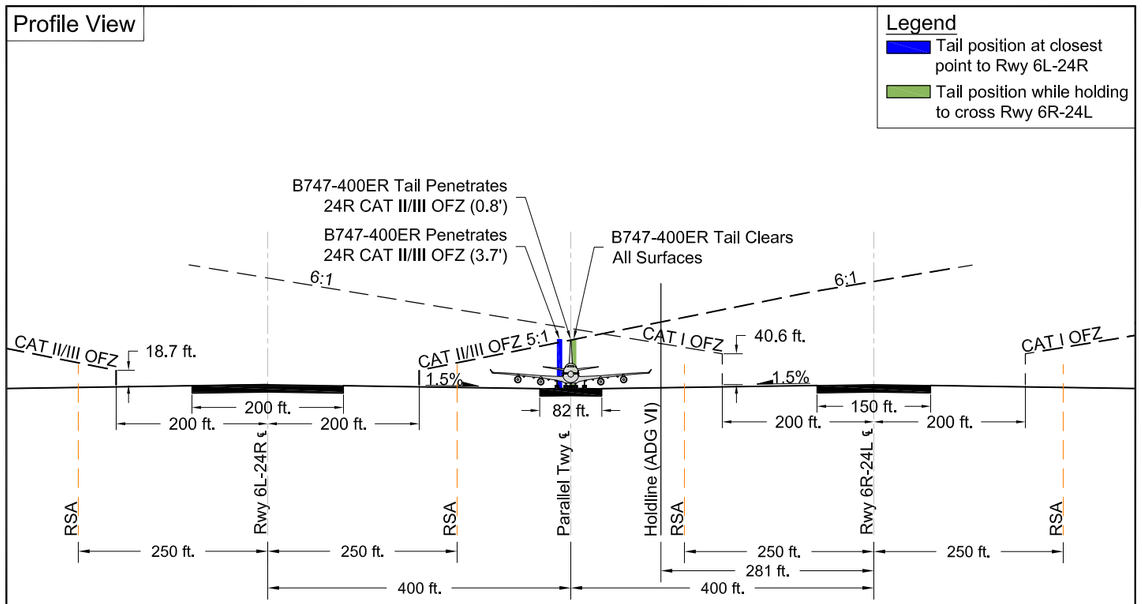
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

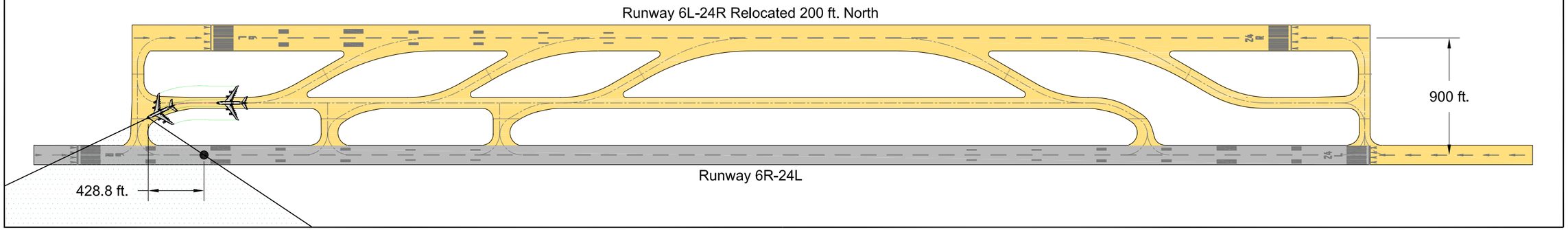
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, June 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 15

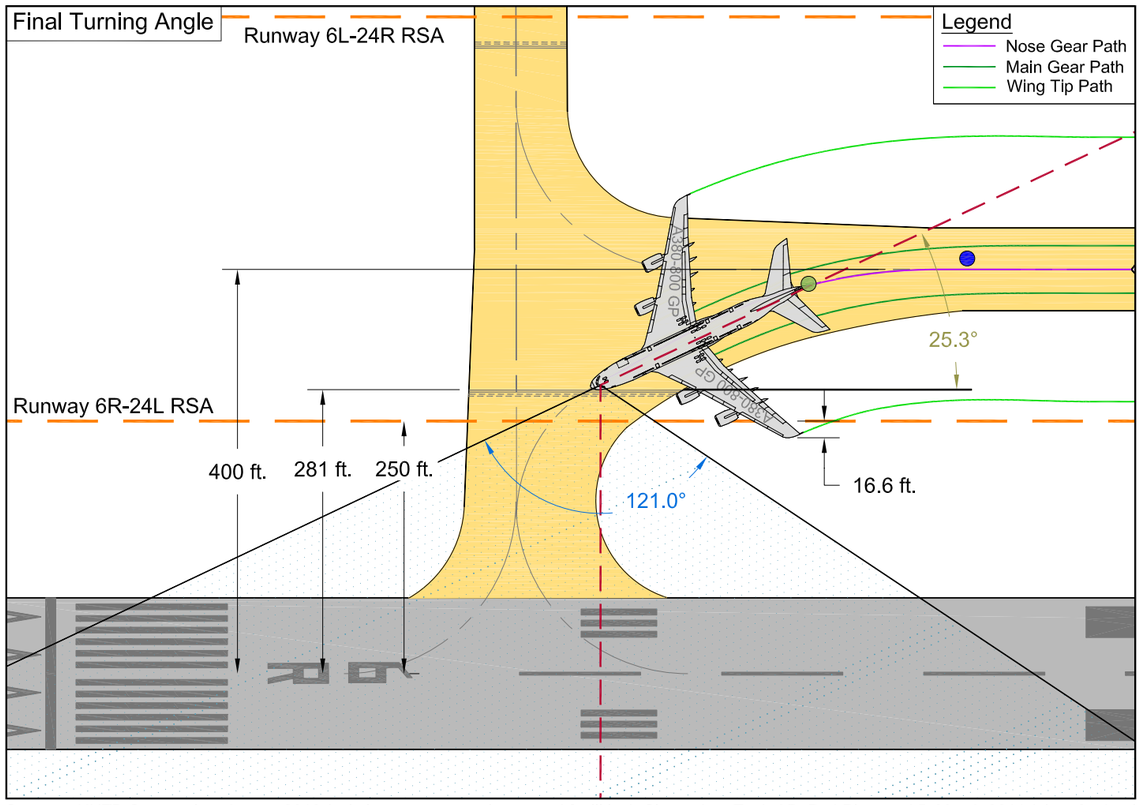
Runway 6L-24R Relocated 100 ft. North
Boeing B747-400ER Critical Sight Distance (Spiral + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 04-15_100 North_v2.dwg_Layout: 15_May 25, 2011, 3:20pm

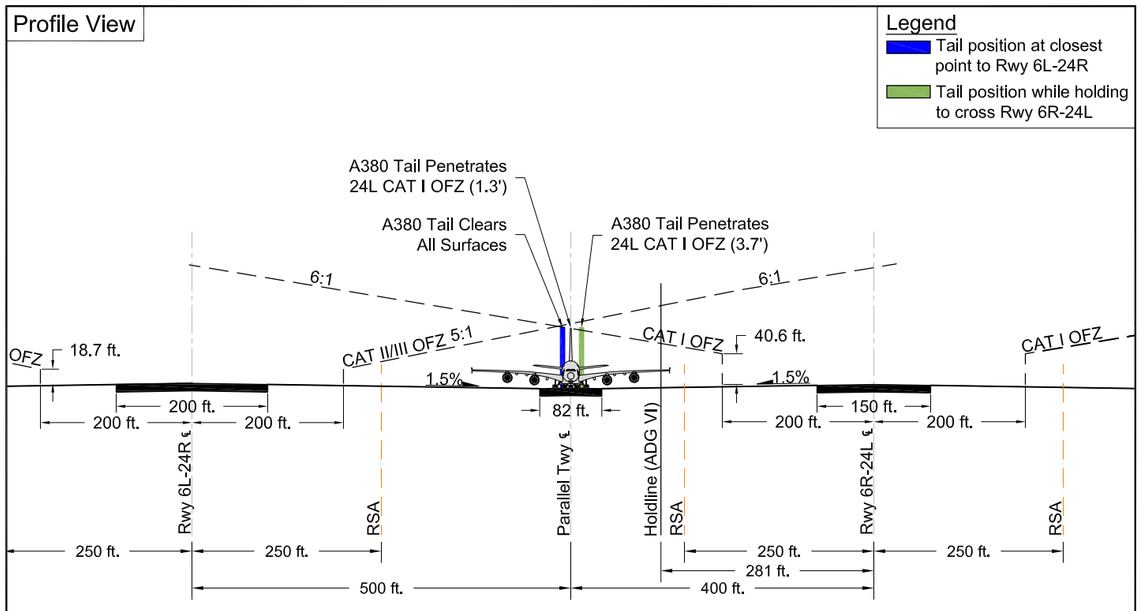
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

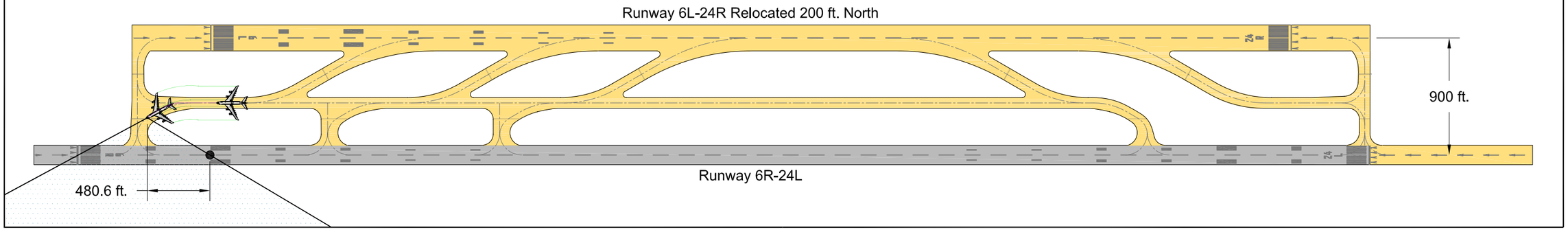
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Airbus, Airplane Characteristics for Airport Planning, March 2005 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 16

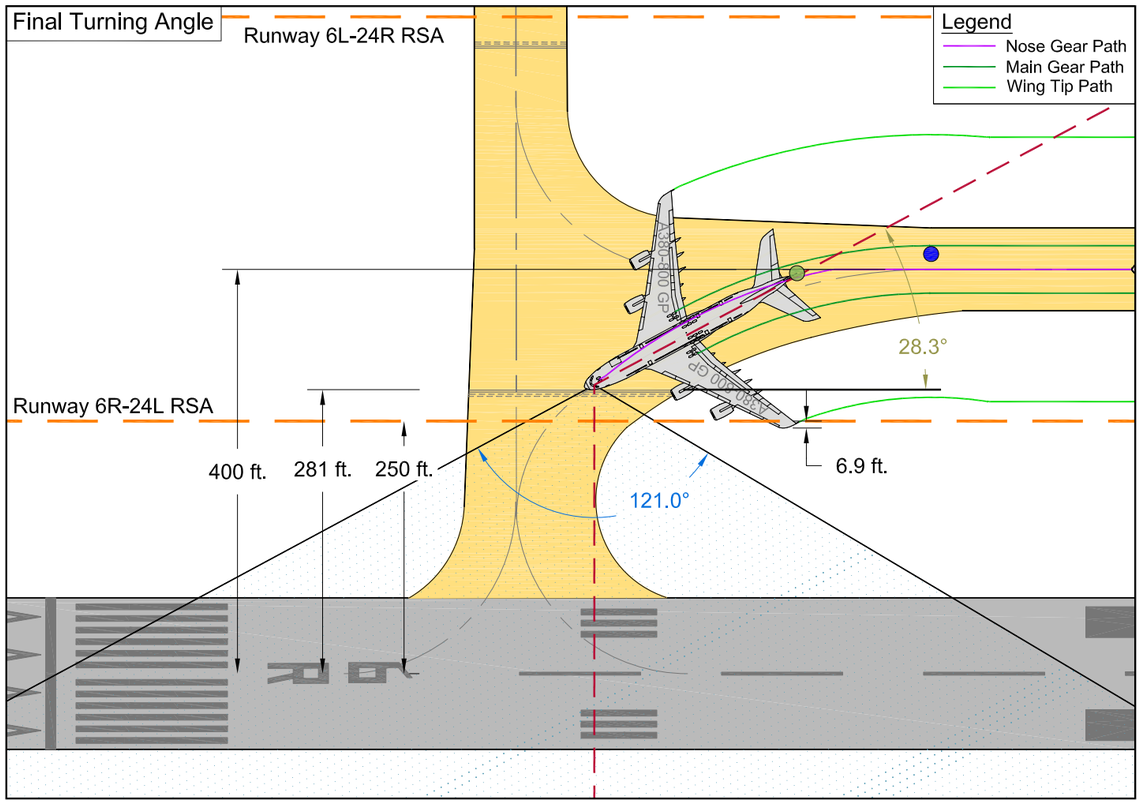
Runway 6L-24R Relocated 200 ft. North
Airbus A380-800 Critical Sight Distance (Spiral + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 16-27_200 North_v2.dwg_Layout: 16_May 25, 2011, 3:20pm

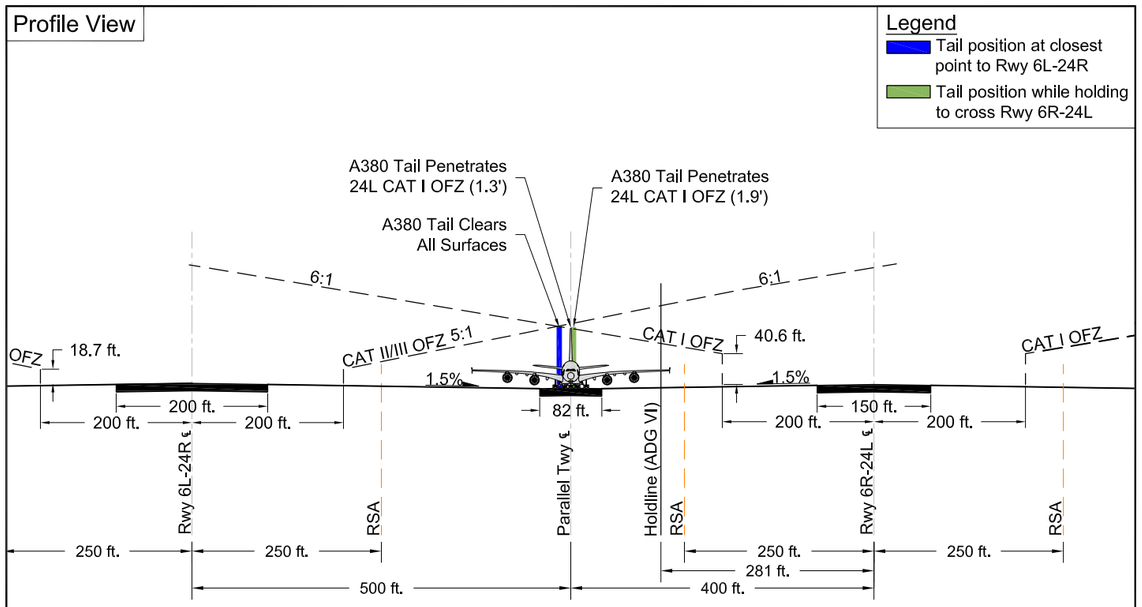
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

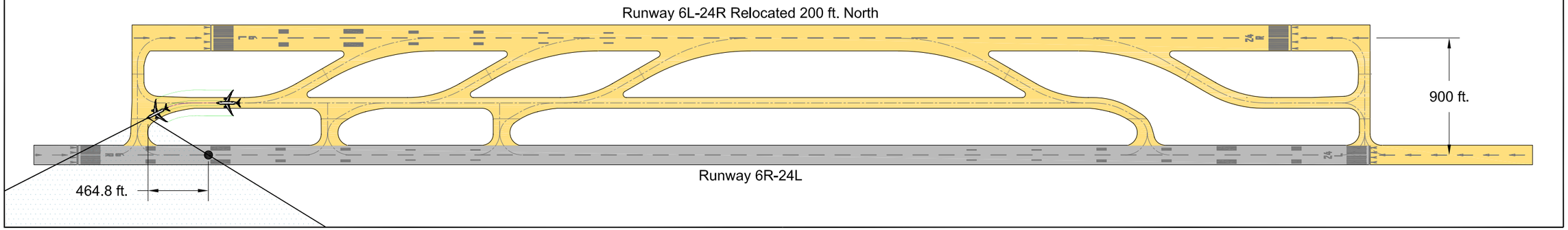
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Airbus, Airplane Characteristics for Airport Planning, March 2005 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 17

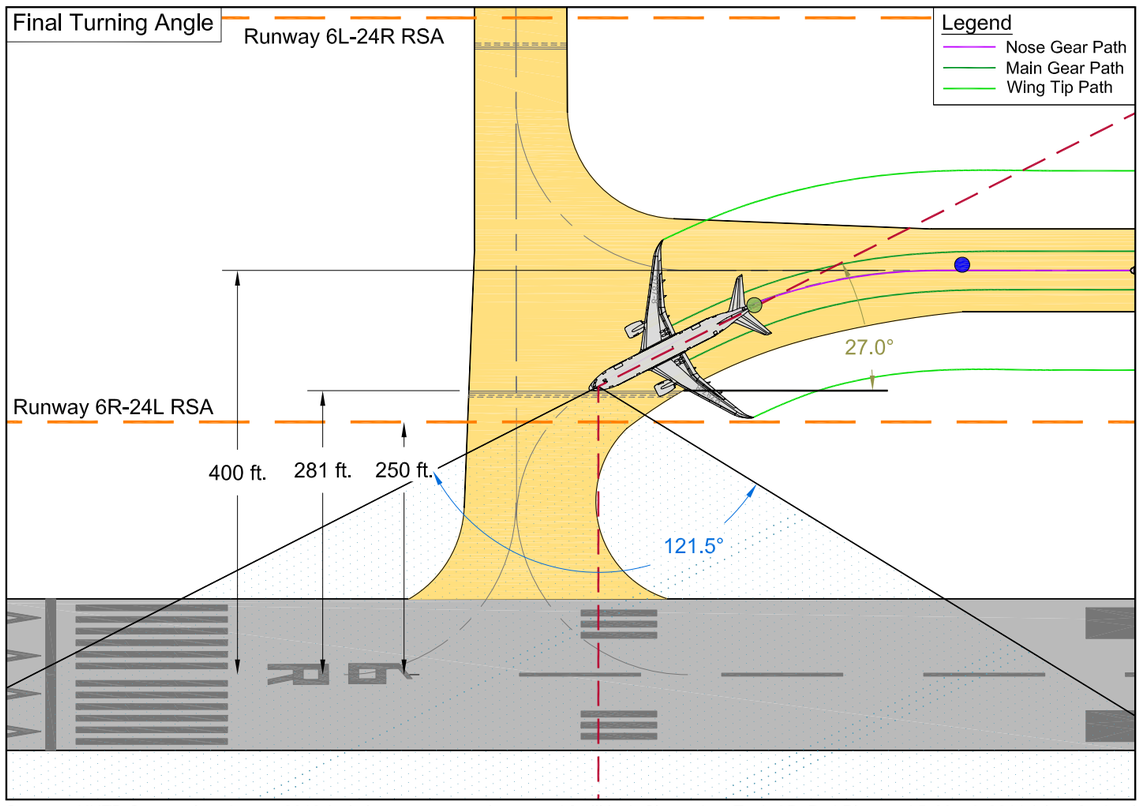
Runway 6L-24R Relocated 200 ft. North
Airbus A380-800 Critical Sight Distance (Spiral + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 16-27_200 North_v2.dwg_Layout: 17_May 25, 2011, 3:21pm

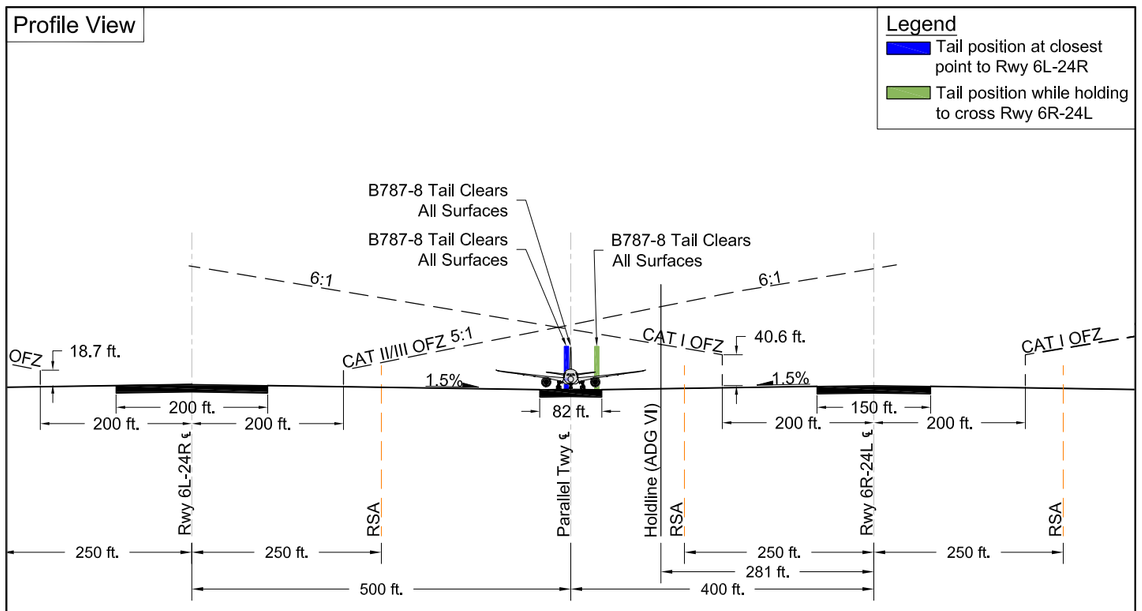
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

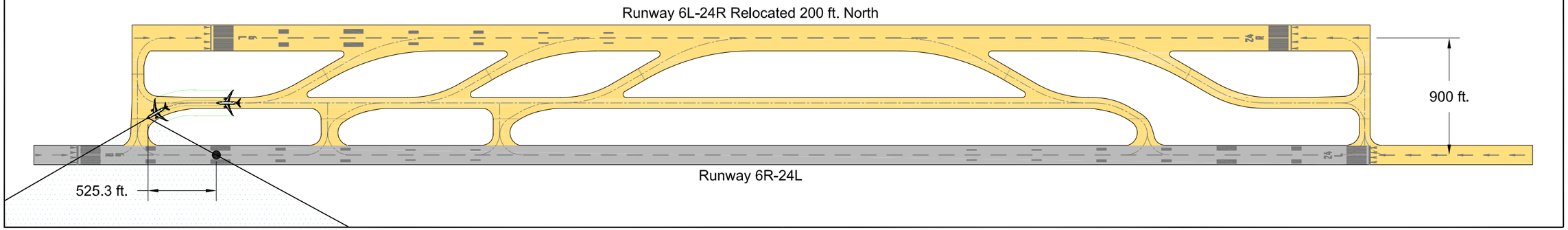
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, December 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 18

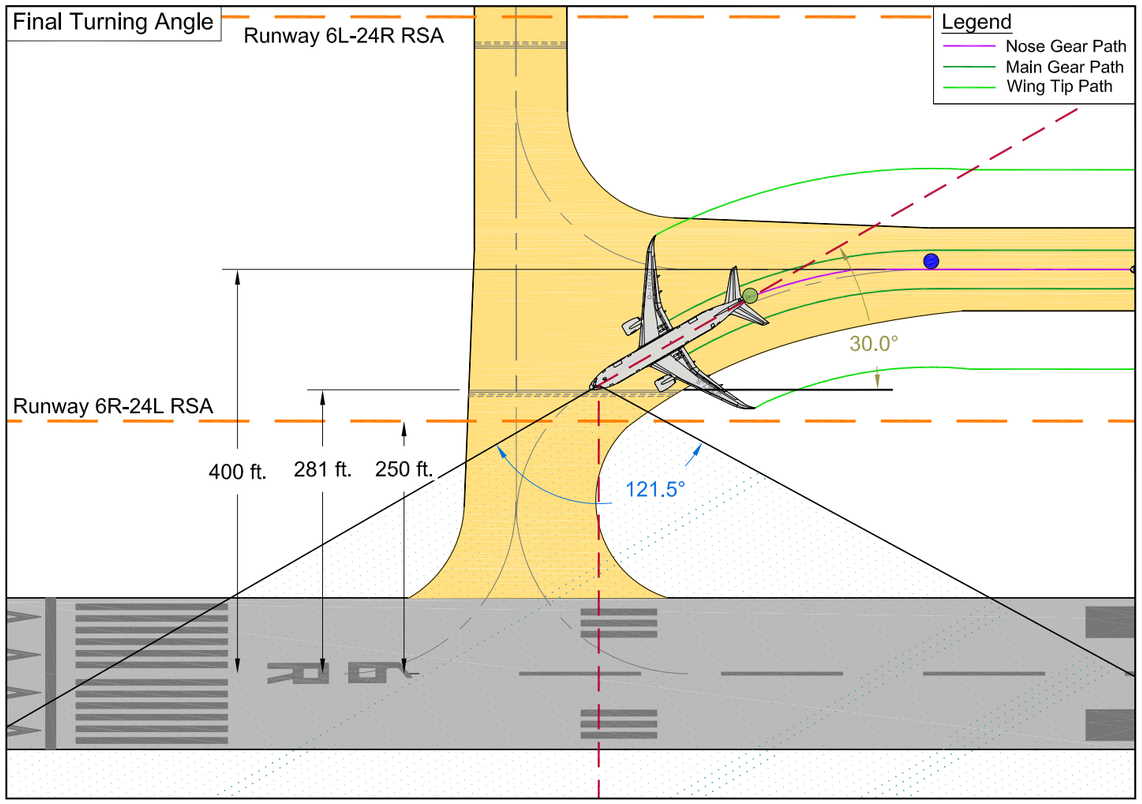
Runway 6L-24R Relocated 200 ft. North
Boeing B787-8 Critical Sight Distance (Spiral Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 16-27_200 North_v2.dwg_Layout: 18_May 25, 2011, 3:21pm

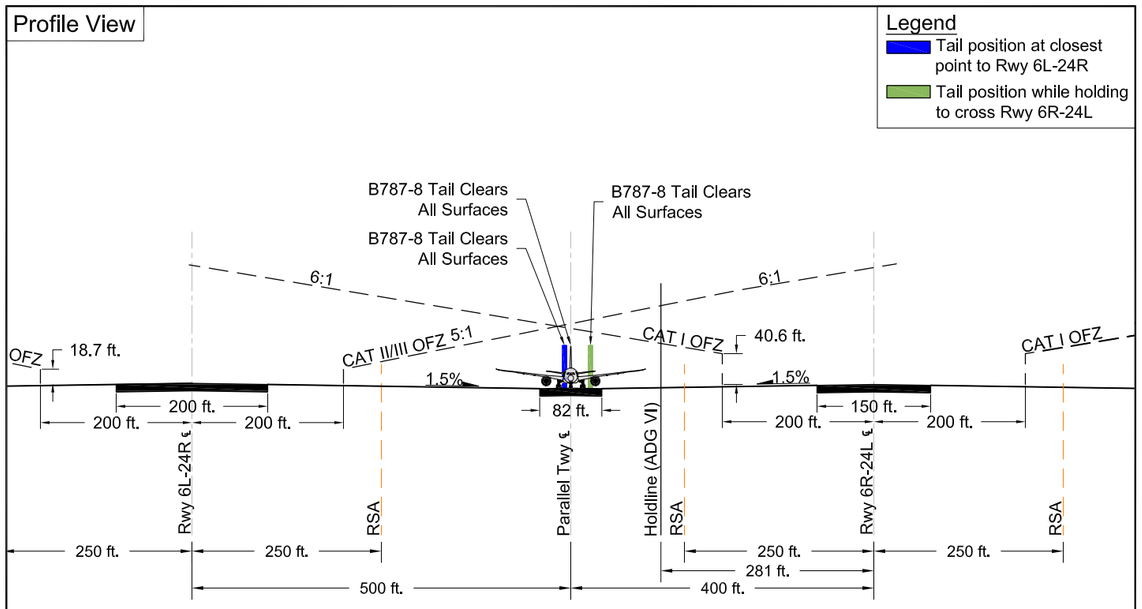
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

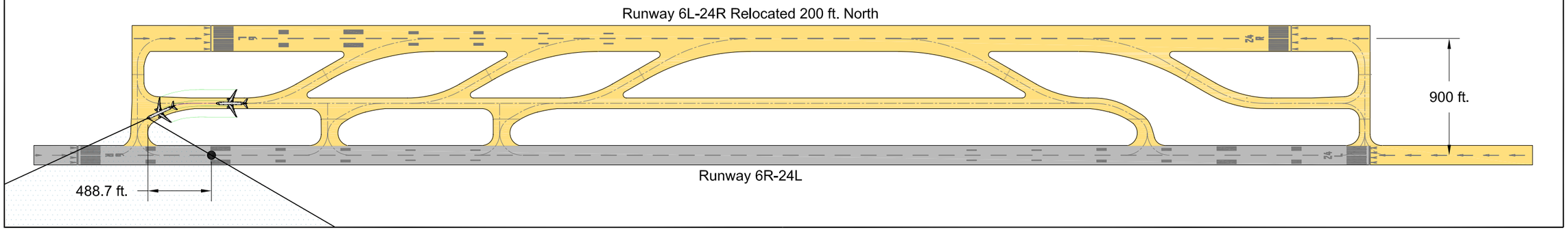
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, December 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 19

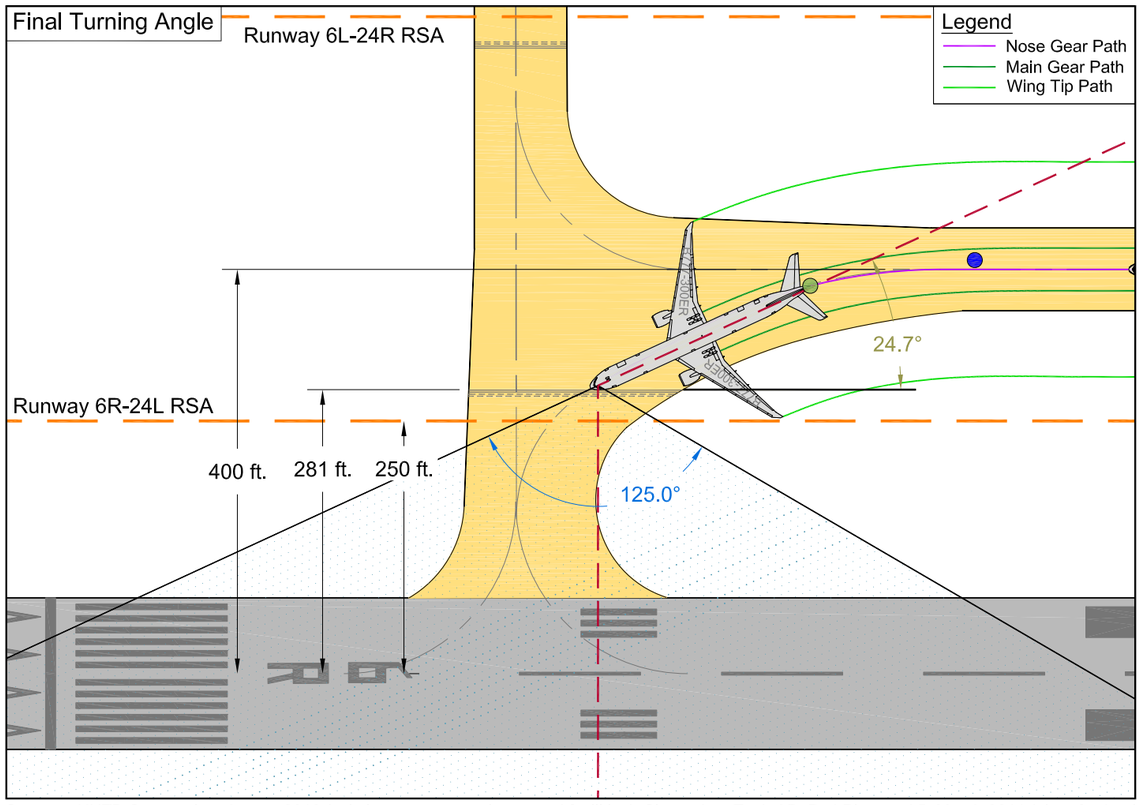
Runway 6L-24R Relocated 200 ft. North
Boeing B787-8 Critical Sight Distance (Spiral + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 16-27_200 North_v2.dwg_Layout: 19_May 25, 2011, 3:21pm

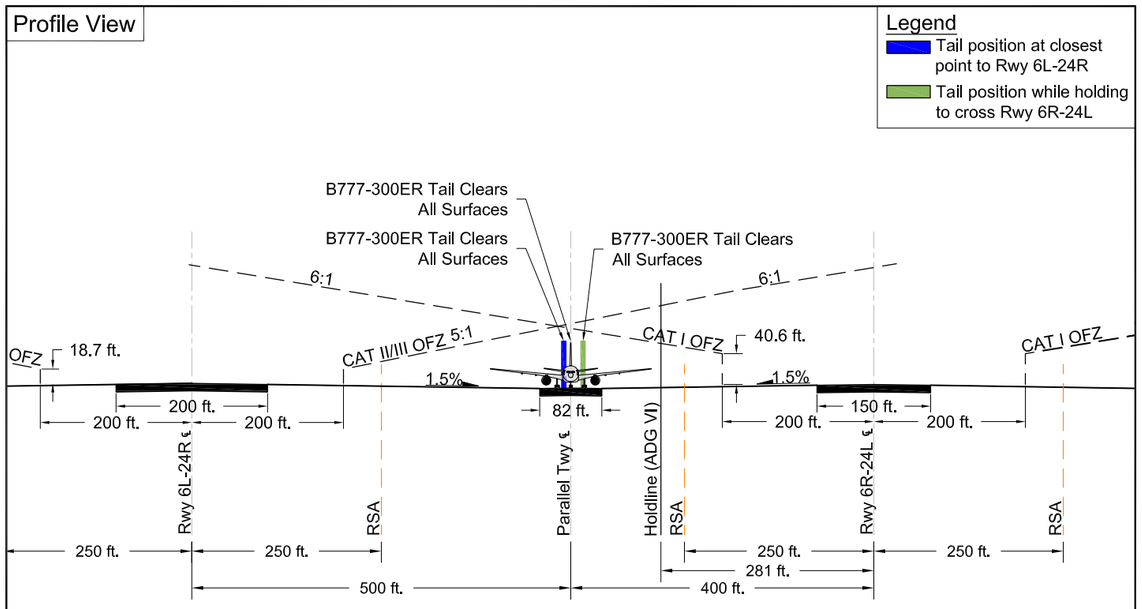
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

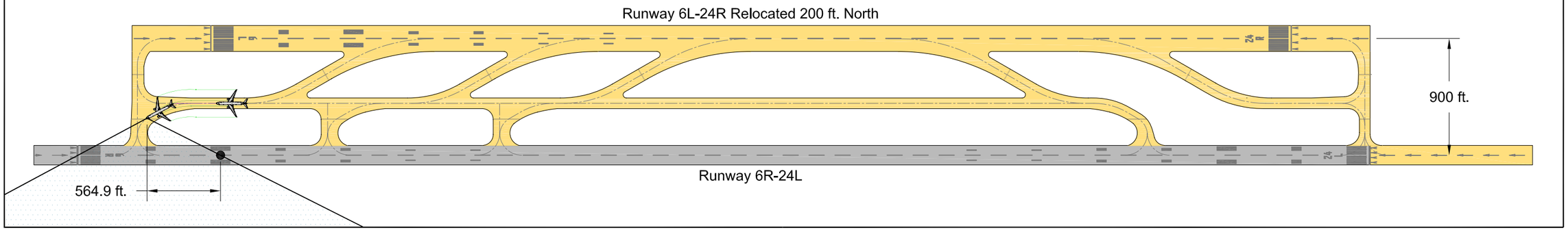
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, May 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 20

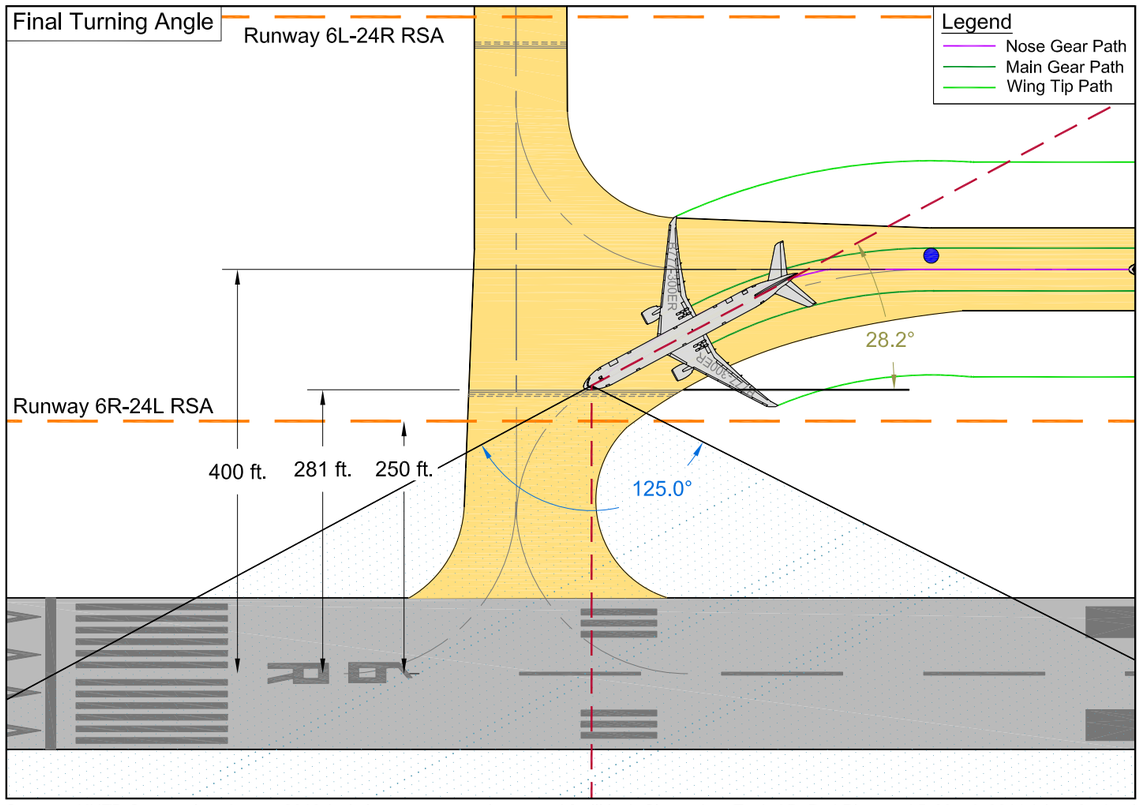
Runway 6L-24R Relocated 200 ft. North
Boeing B777-300ER Critical Sight Distance (Spiral + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 16-27_200 North_v2.dwg_Layout: 20_May 25, 2011, 3:22pm

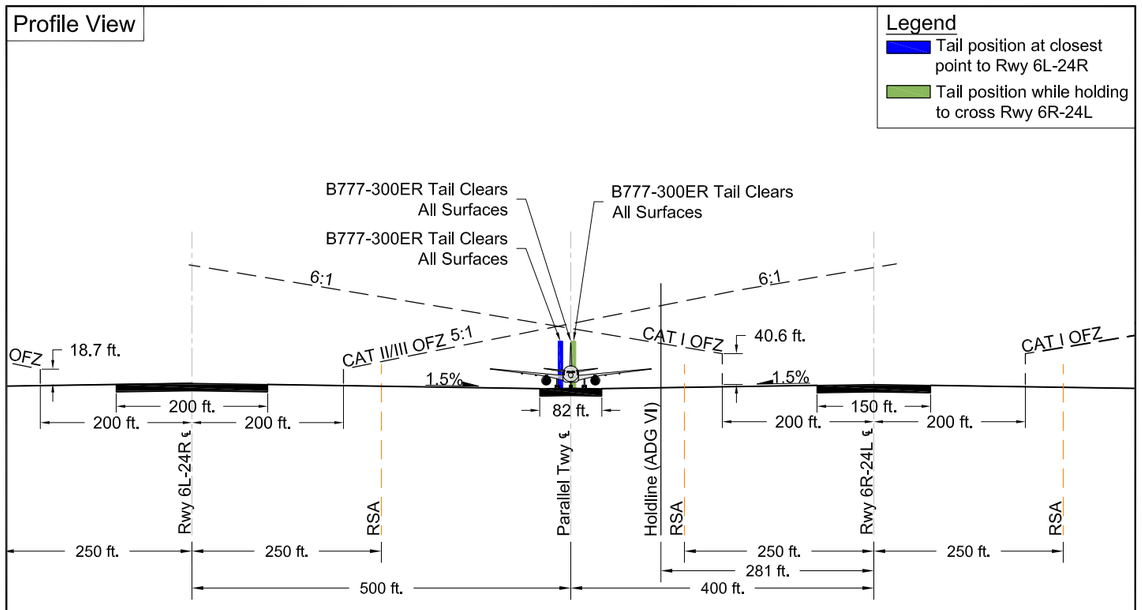
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

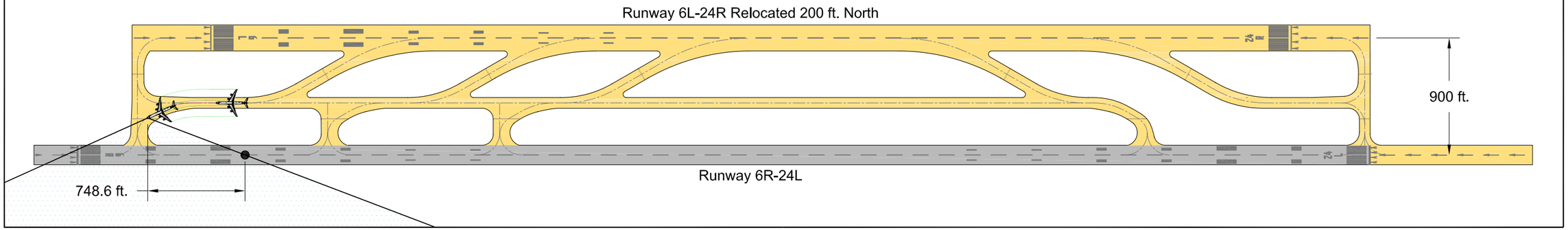
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, May 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 21

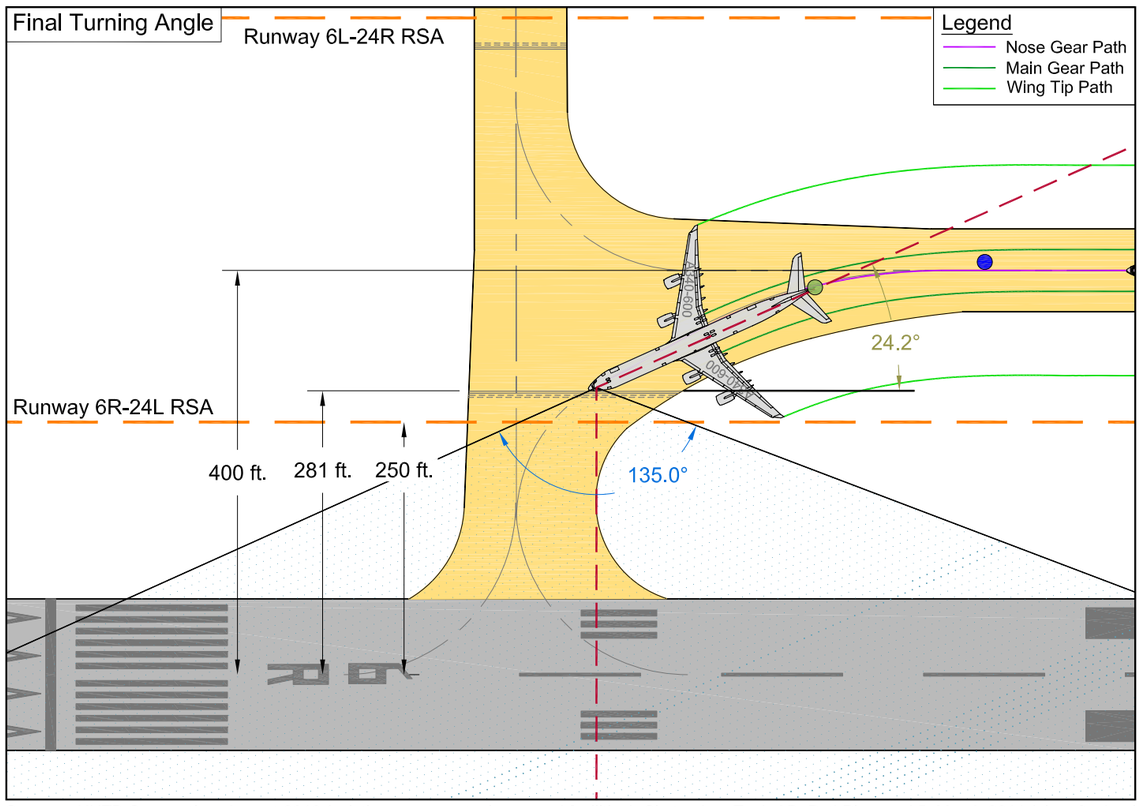
Runway 6L-24R Relocated 200 ft. North
Boeing B777-300ER Critical Sight Distance (Spiral + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 16-27_200 North_v2.dwg_Layout: 21_May 25, 2011, 3:22pm

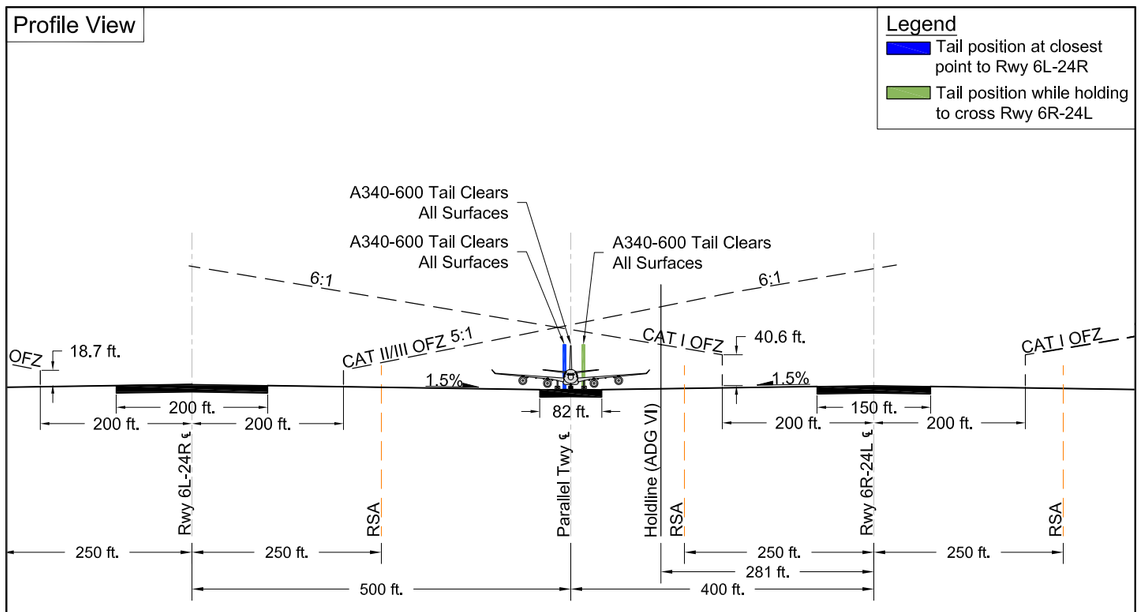
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

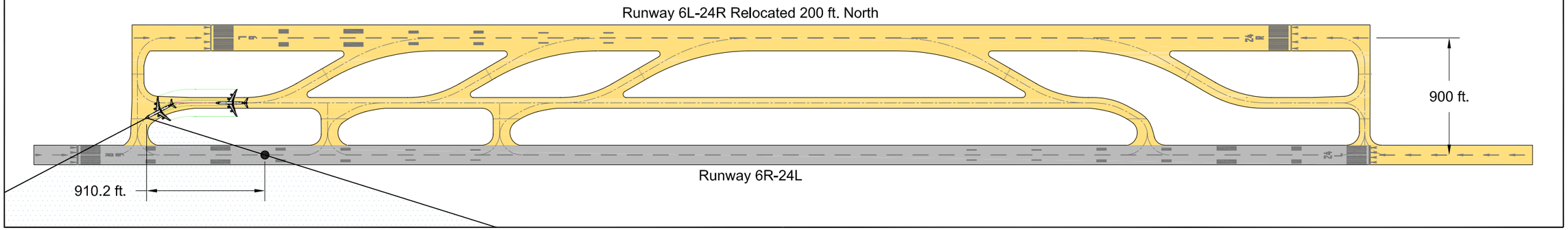
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Airbus, Airplane Characteristics for Airport Planning, April 2001 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 22

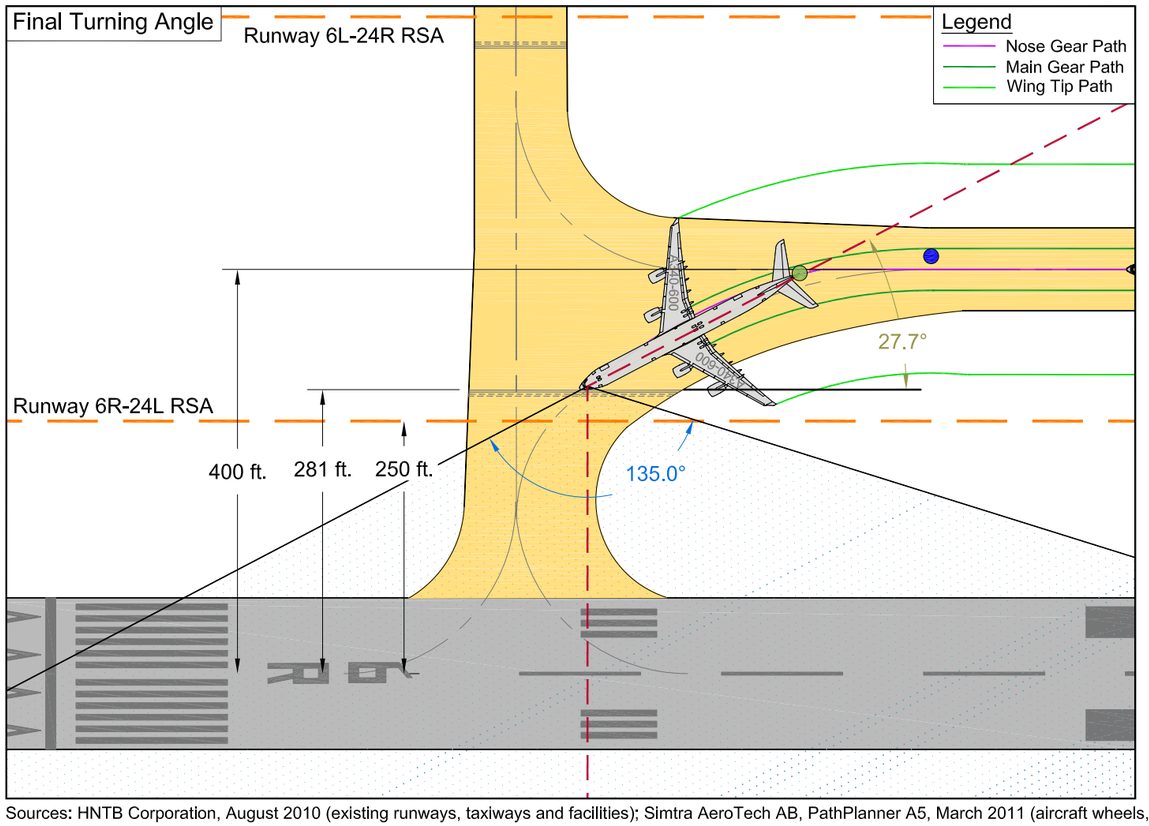
Runway 6L-24R Relocated 200 ft. North
Airbus A340-600 Critical Sight Distance (Spiral + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 16-27_200 North_v2.dwg_Layout: 22_May 25, 2011, 3:22pm

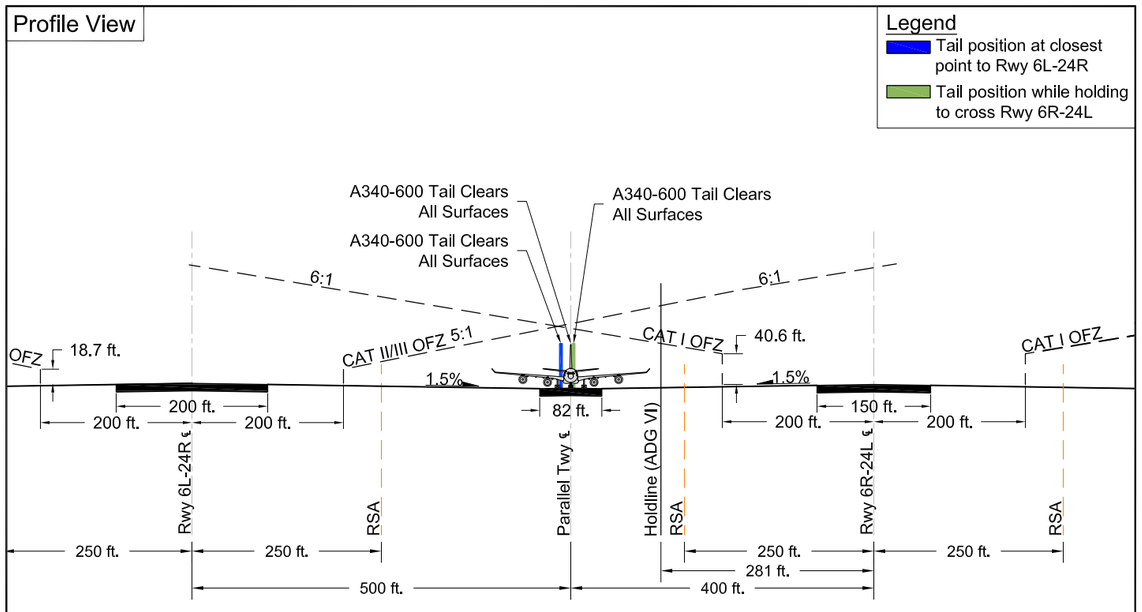
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

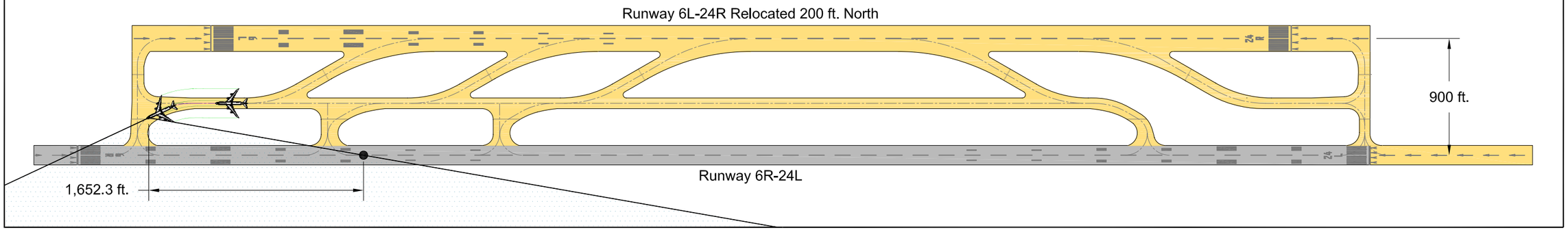
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Airbus, Airplane Characteristics for Airport Planning, April 2001 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 23

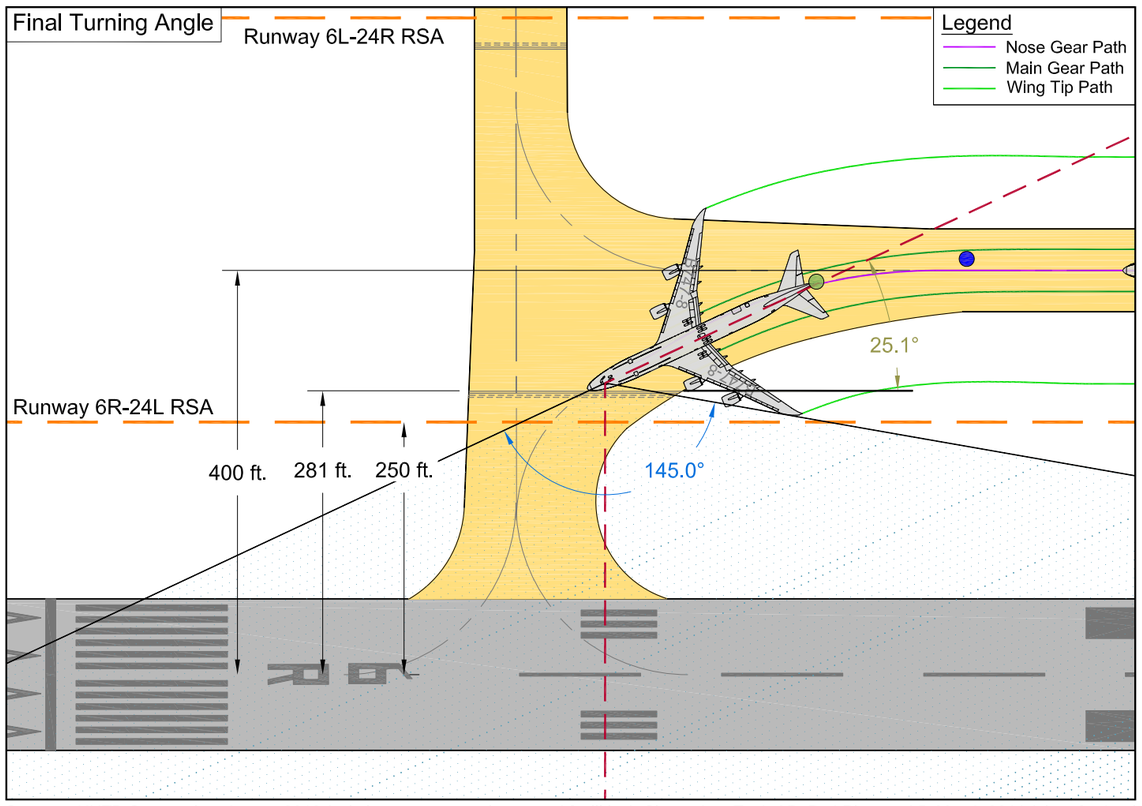
Runway 6L-24R Relocated 200 ft. North
Airbus A340-600 Critical Sight Distance (Spiral + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 16-27_200 North_v2.dwg_Layout: 23_May 25, 2011, 3:22pm

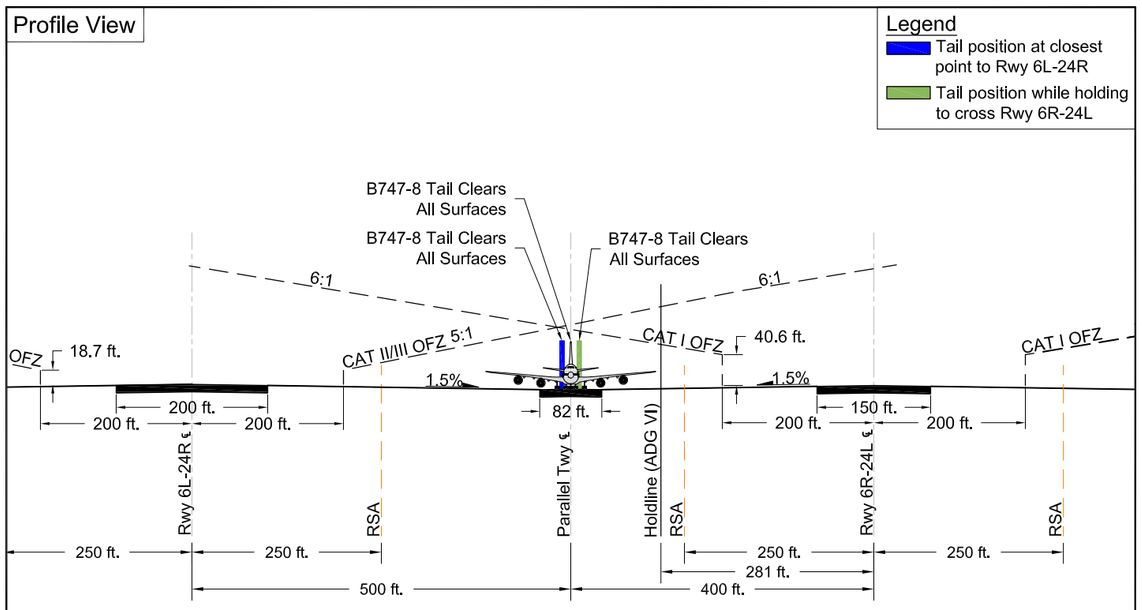
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

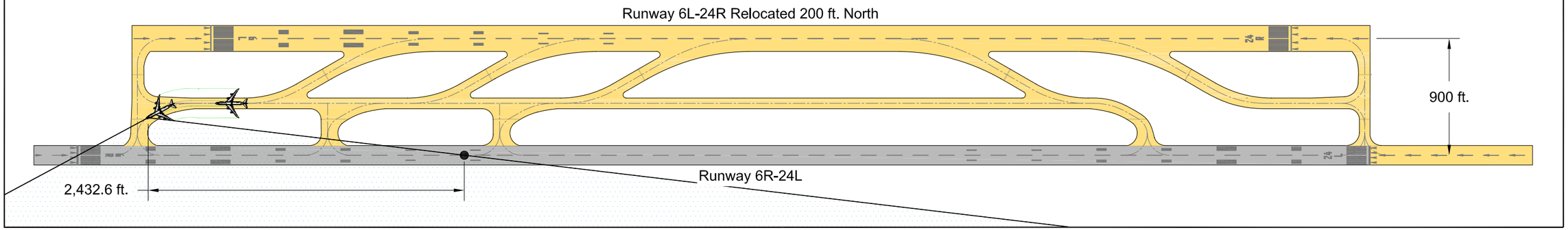
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, March 2011 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 24

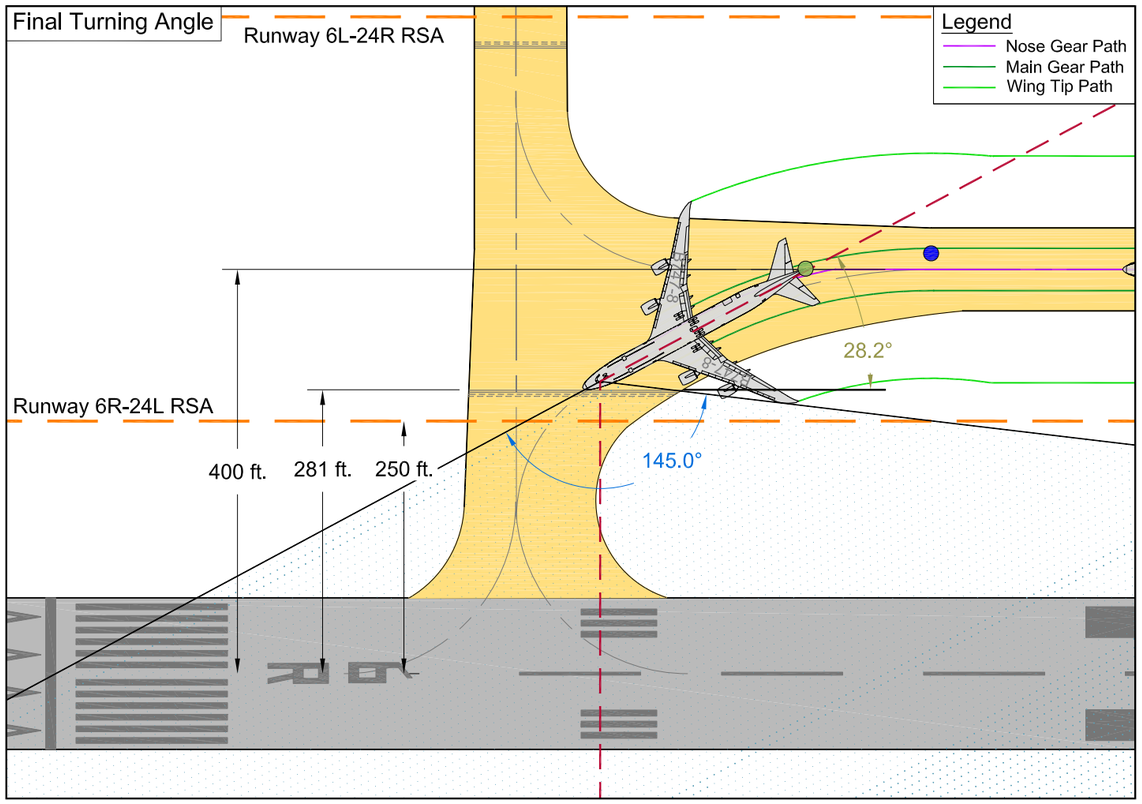
Runway 6L-24R Relocated 200 ft. North
Boeing B747-8 Critical Sight Distance (Spiral + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 16-27_200 North_v2.dwg_Layout: 24_May 25, 2011, 3:22pm

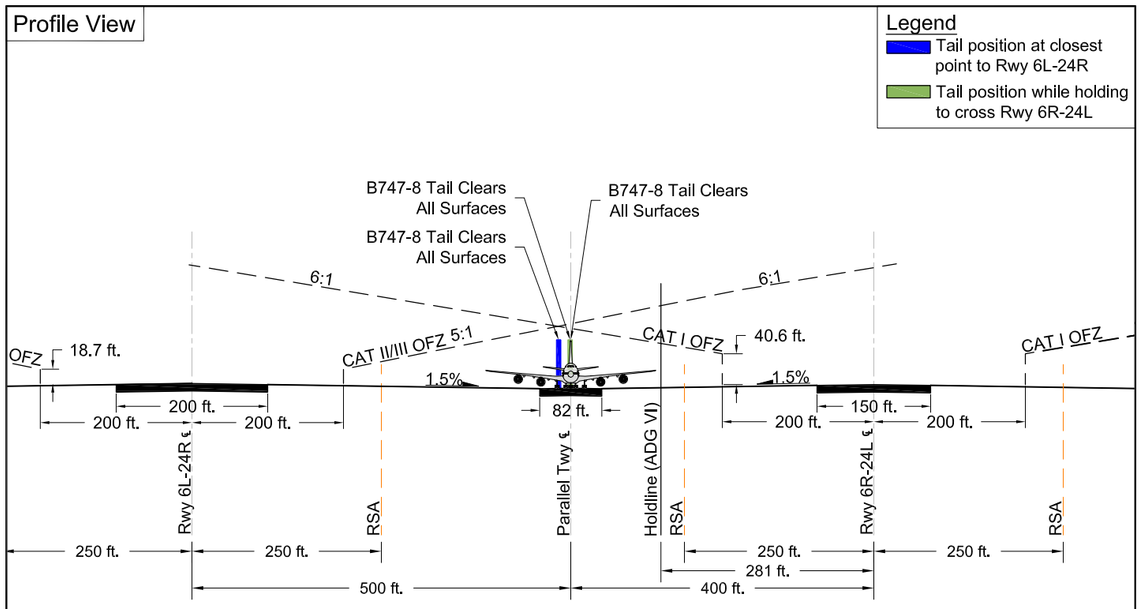
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

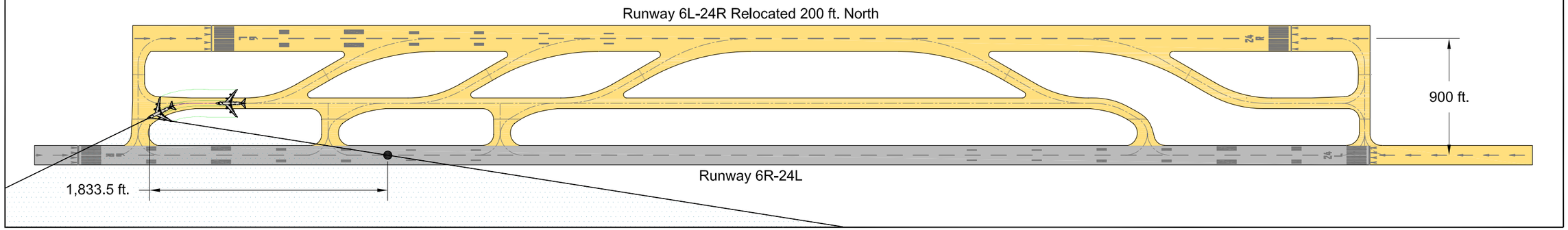
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, March 2011 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 25

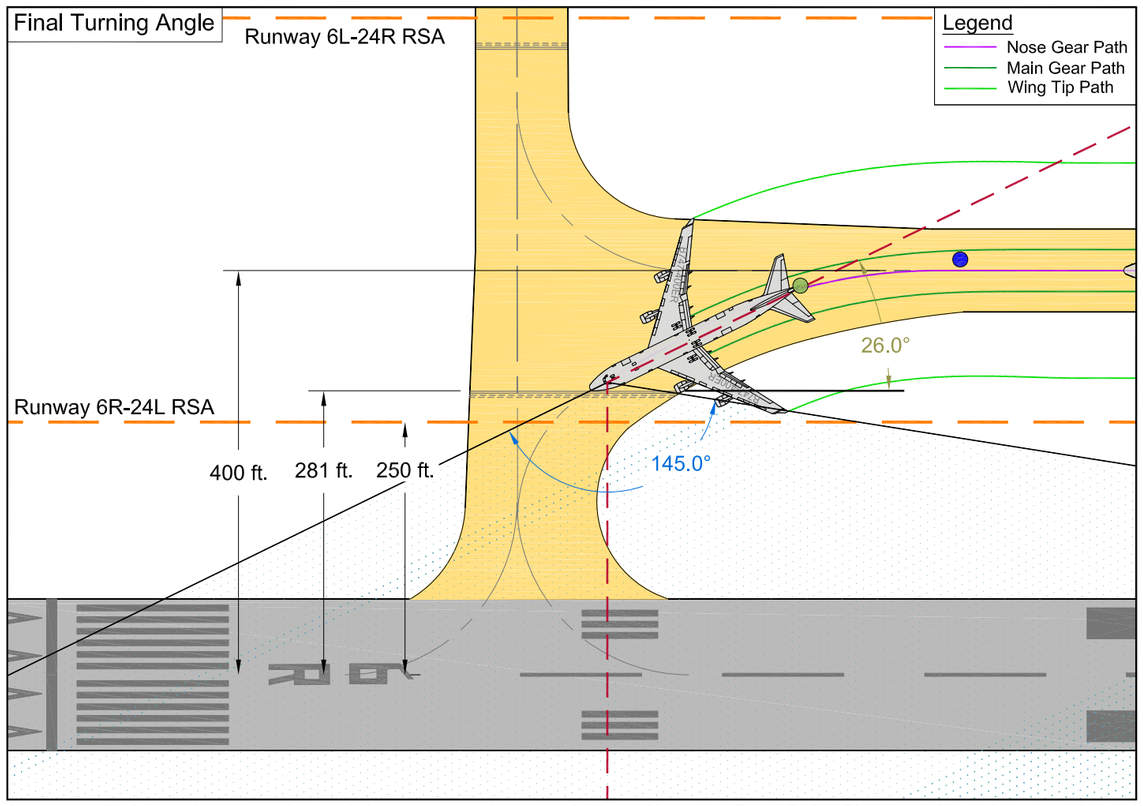
Runway 6L-24R Relocated 200 ft. North
Boeing B747-8 Critical Sight Distance (Spiral + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 16-27_200 North_v2.dwg_Layout: 25_May 25, 2011, 3:23pm

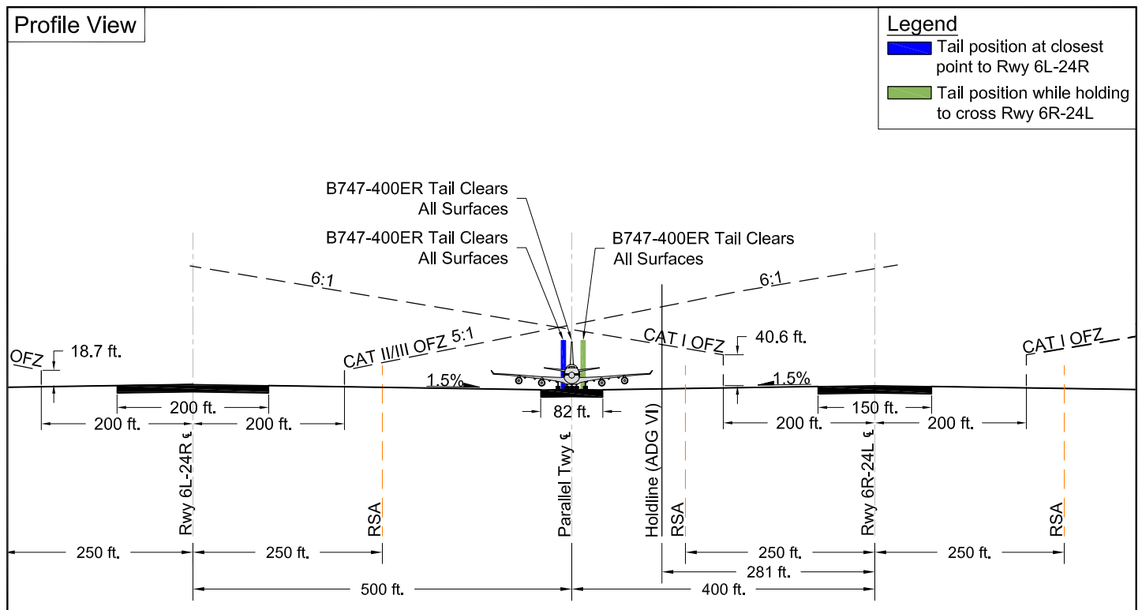
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

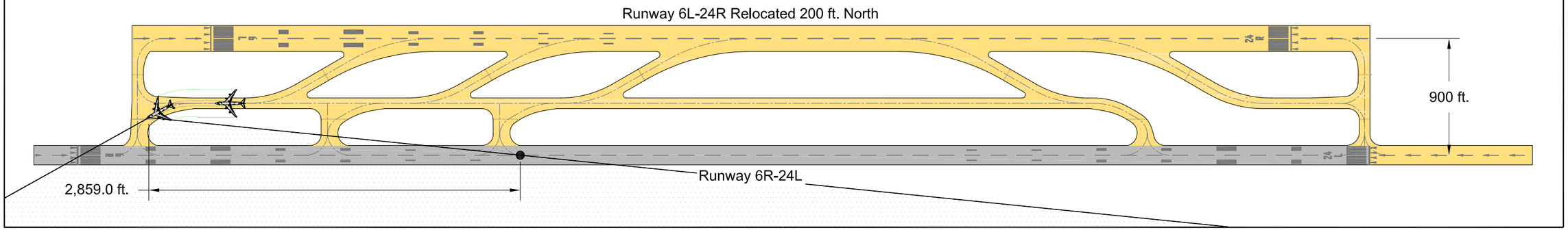
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, June 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 26

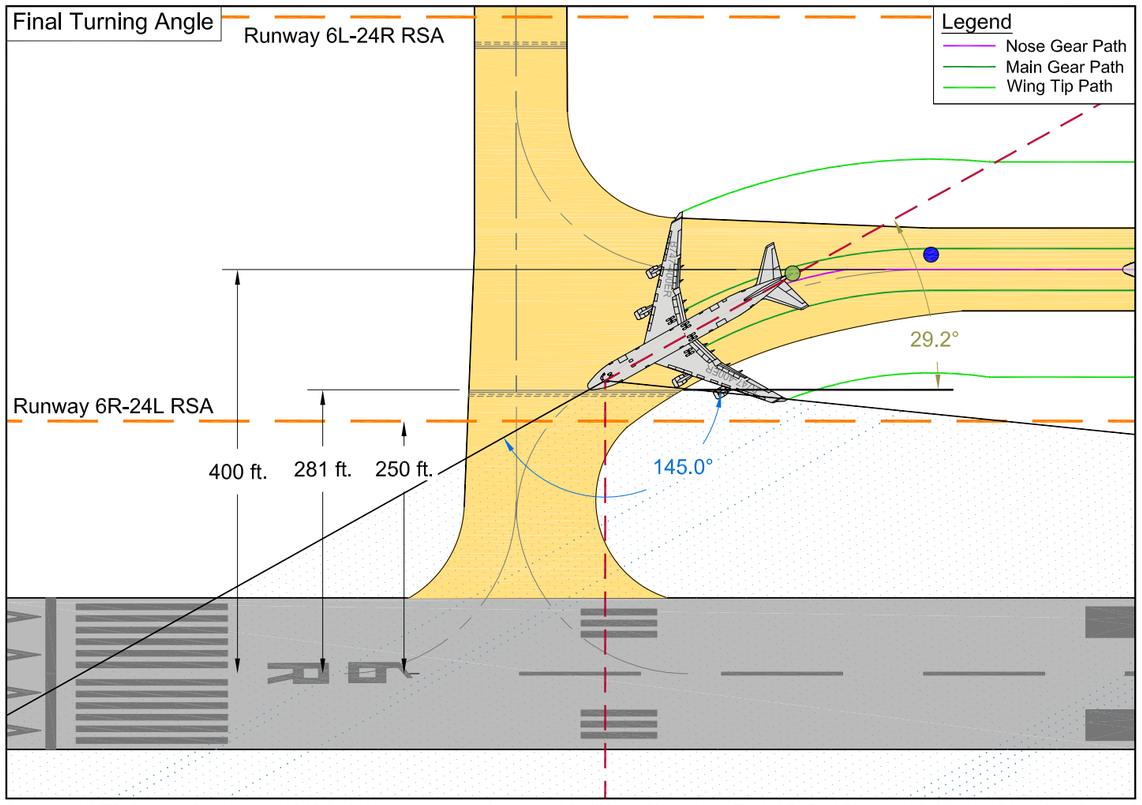
Runway 6L-24R Relocated 200 ft. North
Boeing B747-400ER Critical Sight Distance (Spiral + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 16-27_200 North_v2.dwg_Layout: 26_May 25, 2011, 3:23pm

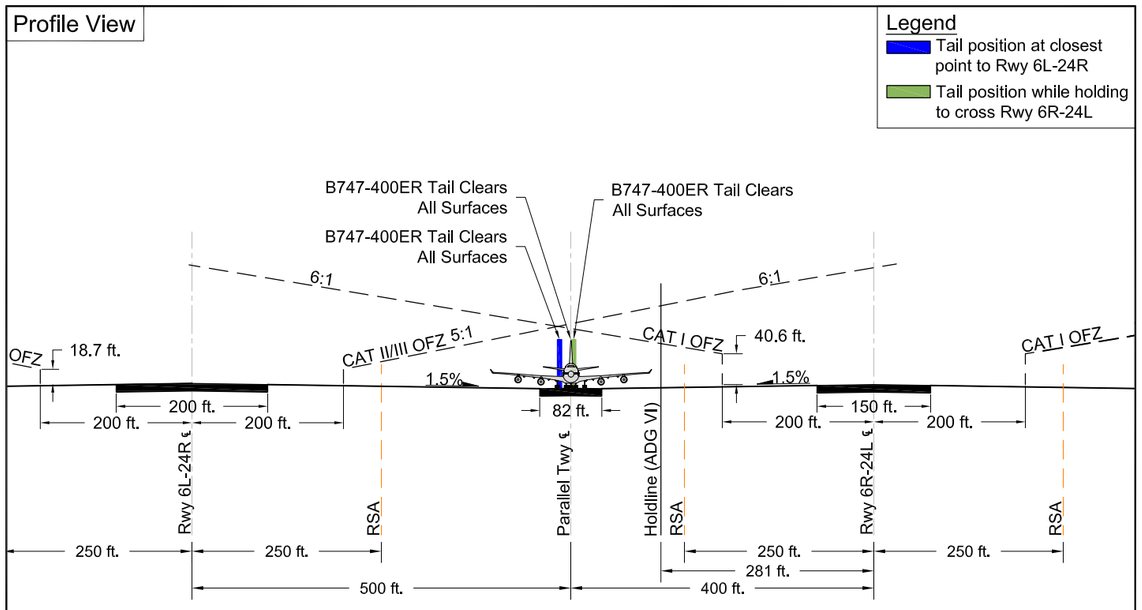
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

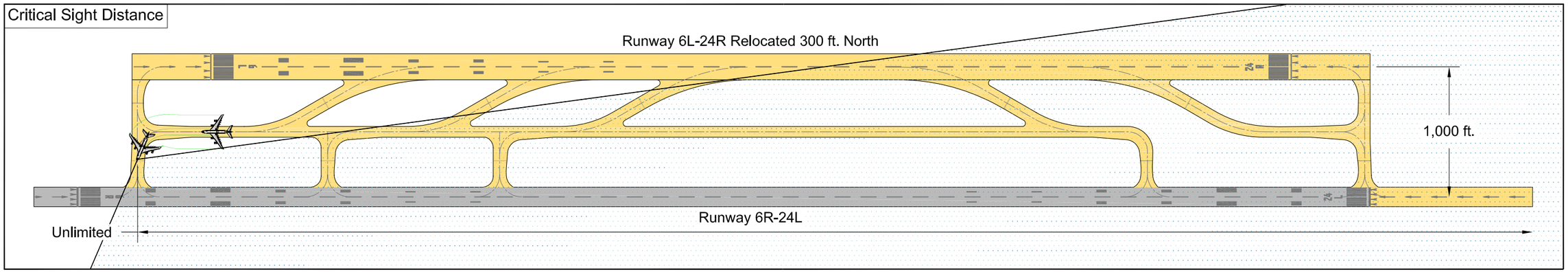
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, June 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 27

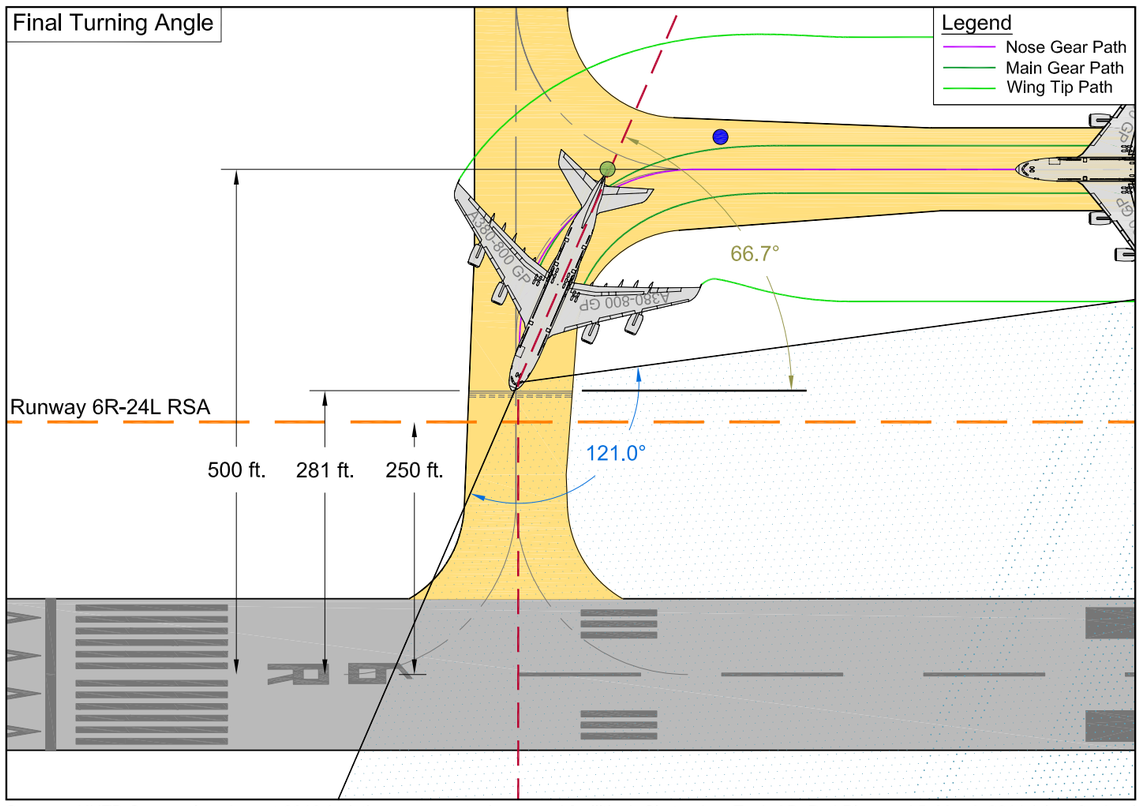
Runway 6L-24R Relocated 200 ft. North
Boeing B747-400ER Critical Sight Distance (Spiral + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 16-27_200 North_v2.dwg_Layout: 27_May 25, 2011, 3:23pm

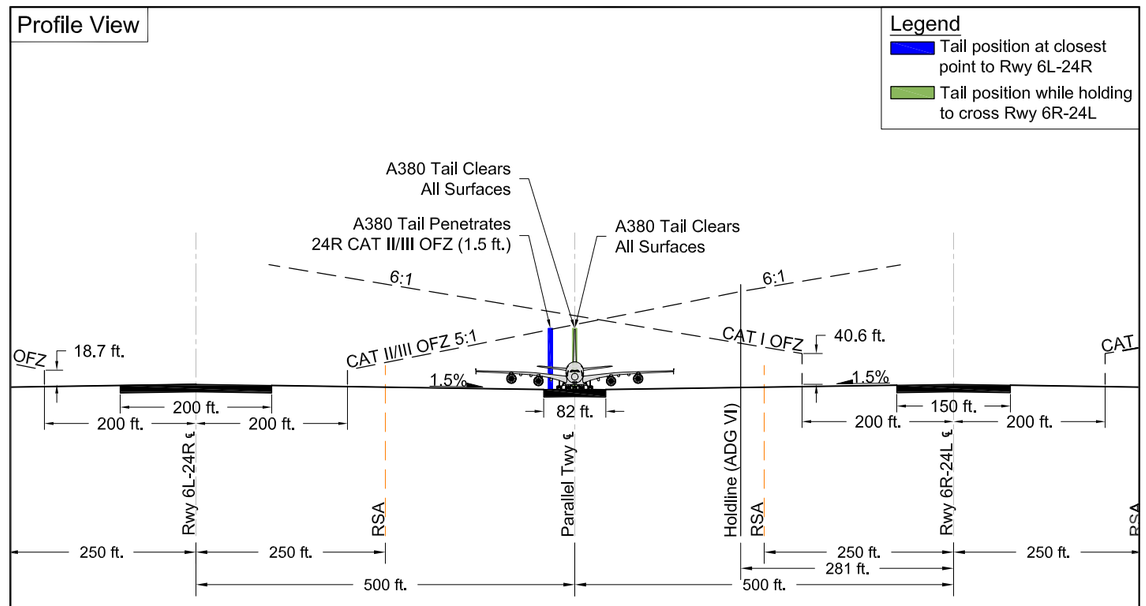
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

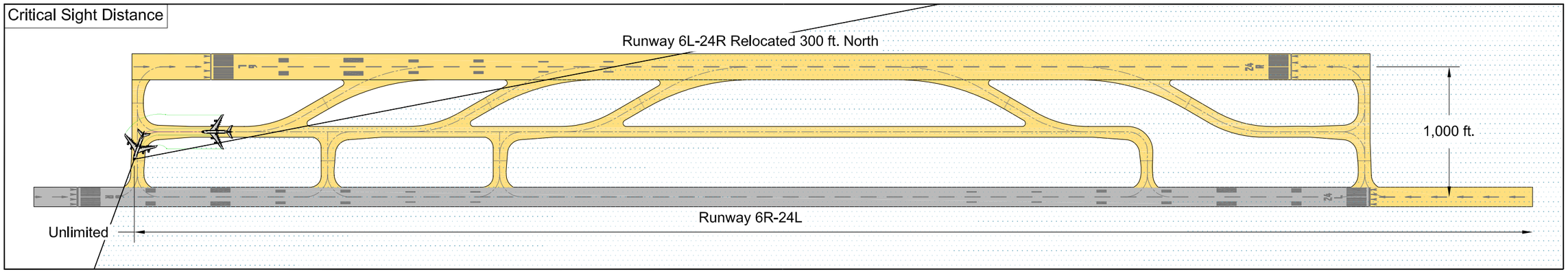
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Airbus, Airplane Characteristics for Airport Planning, March 2005 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 28

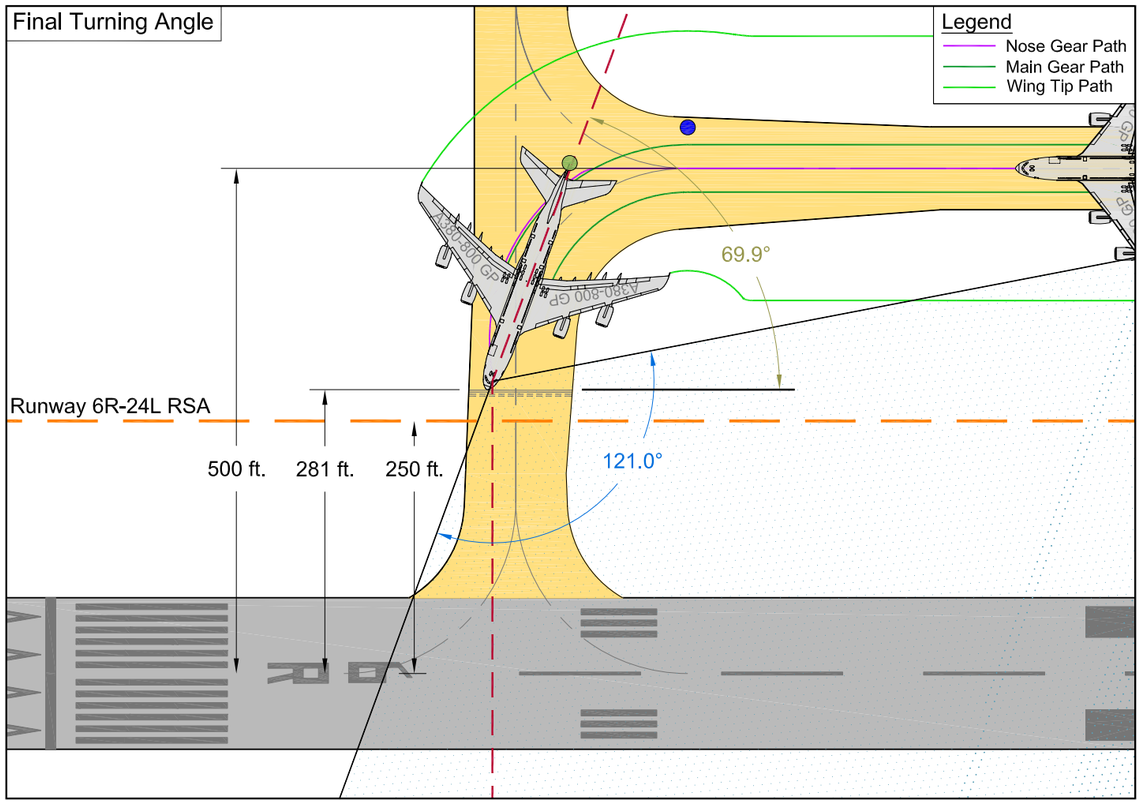
Runway 6L-24R Relocated 300 ft. North
Airbus A380-800 Critical Sight Distance (Standard + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 28-39_300 North_v2.dwg_Layout: 28_May 25, 2011, 3:23pm

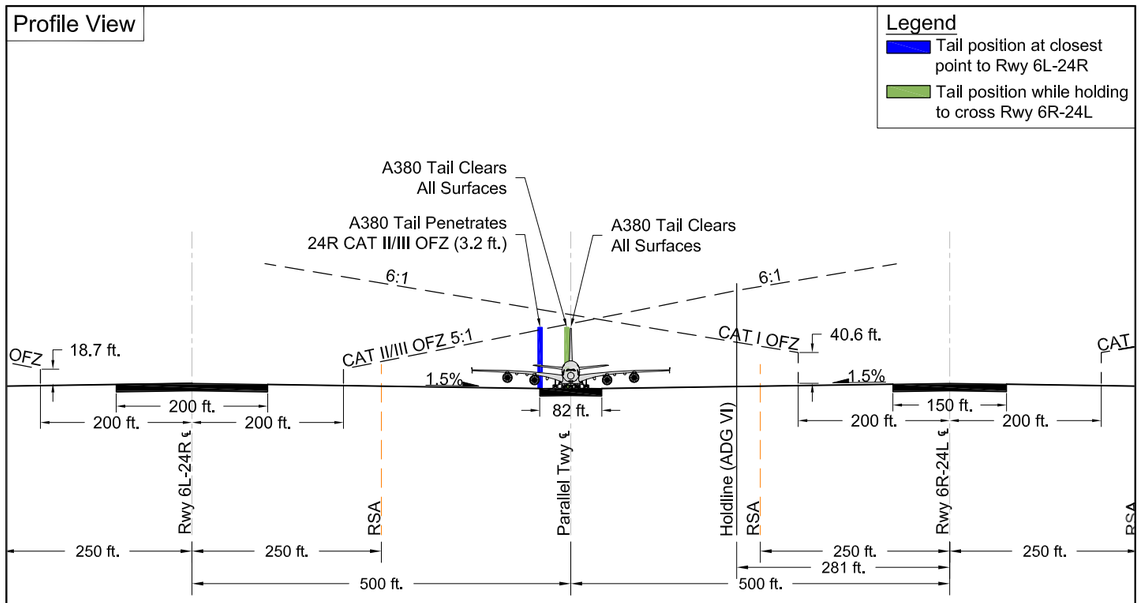
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

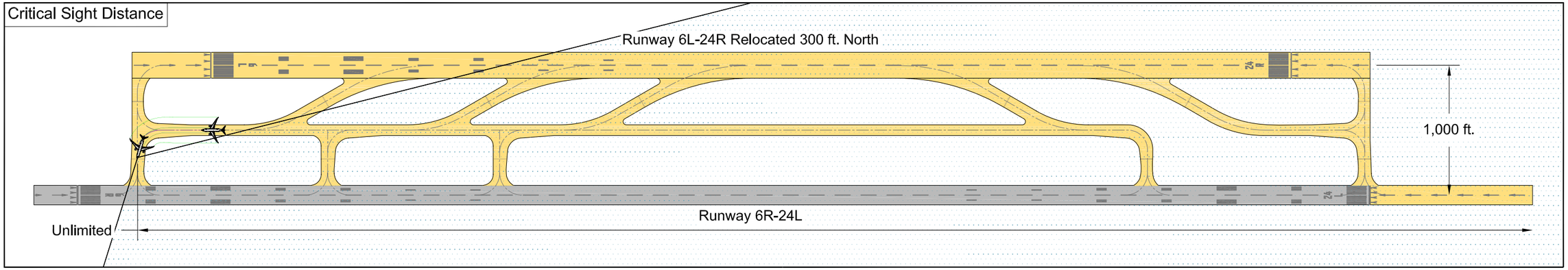
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Airbus, Airplane Characteristics for Airport Planning, March 2005 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 29

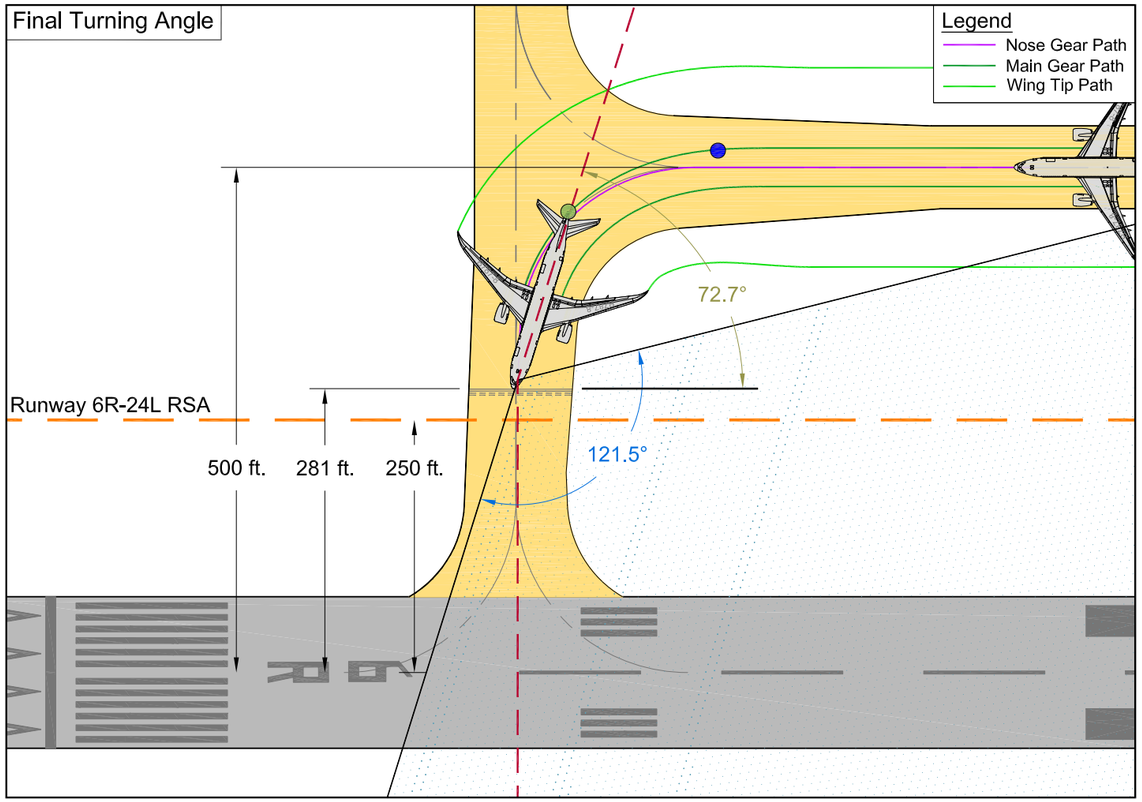
Runway 6L-24R Relocated 300 ft. North
Airbus A380-800 Critical Sight Distance (Standard + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 28-39_300 North_v2.dwg_Layout: 29_May 25, 2011, 3:24pm

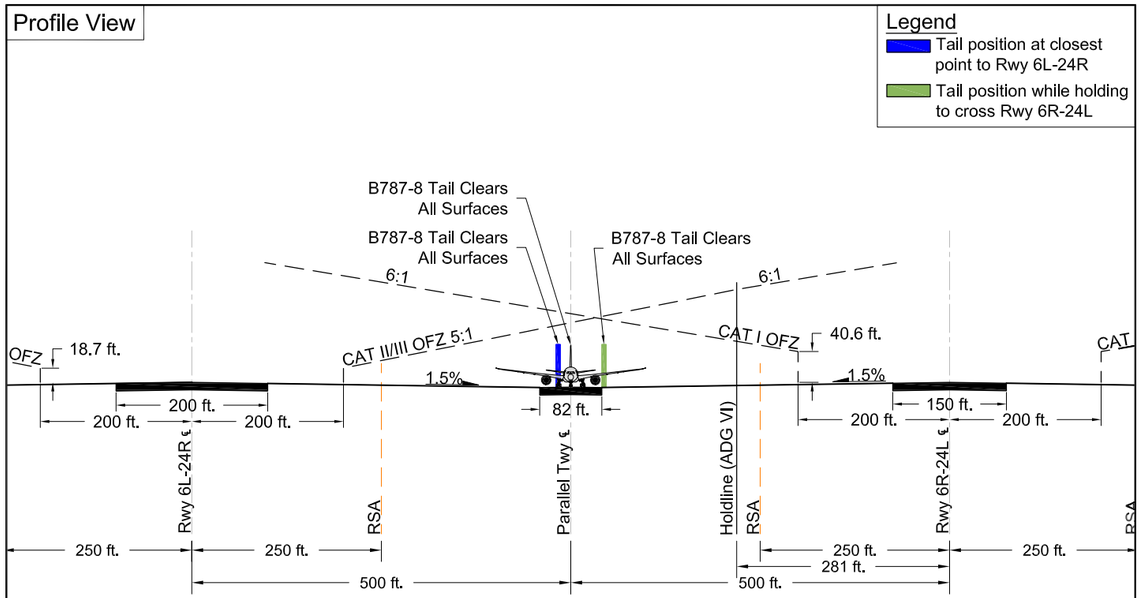
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

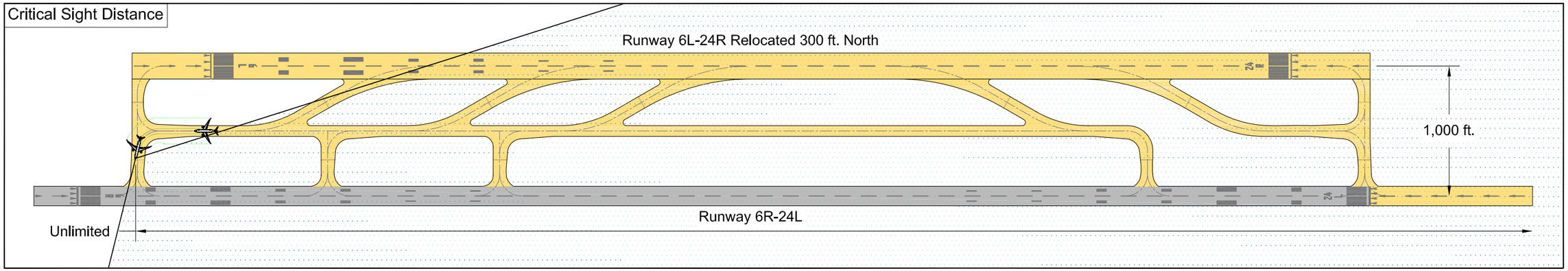
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, December 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 30

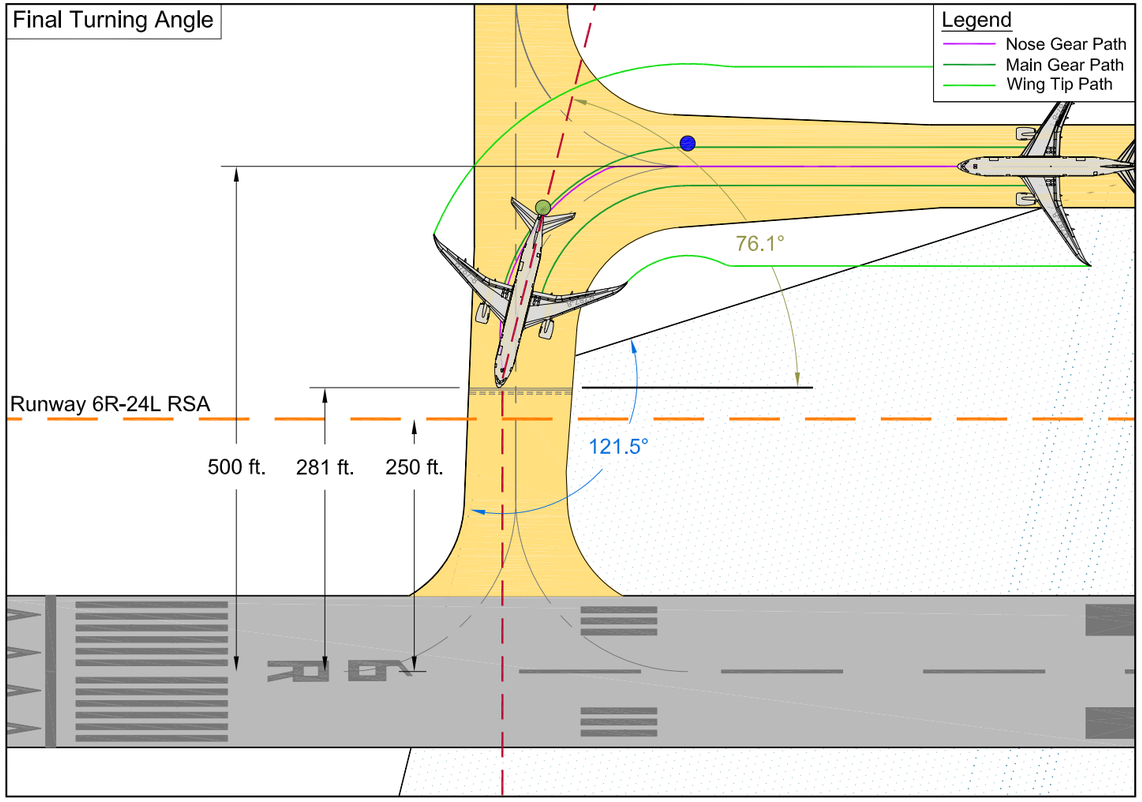
Runway 6L-24R Relocated 300 ft. North
Boeing B787-8 Critical Sight Distance (Standard + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 28-39_300 North_v2.dwg_Layout: 30_May 25, 2011, 3:24pm

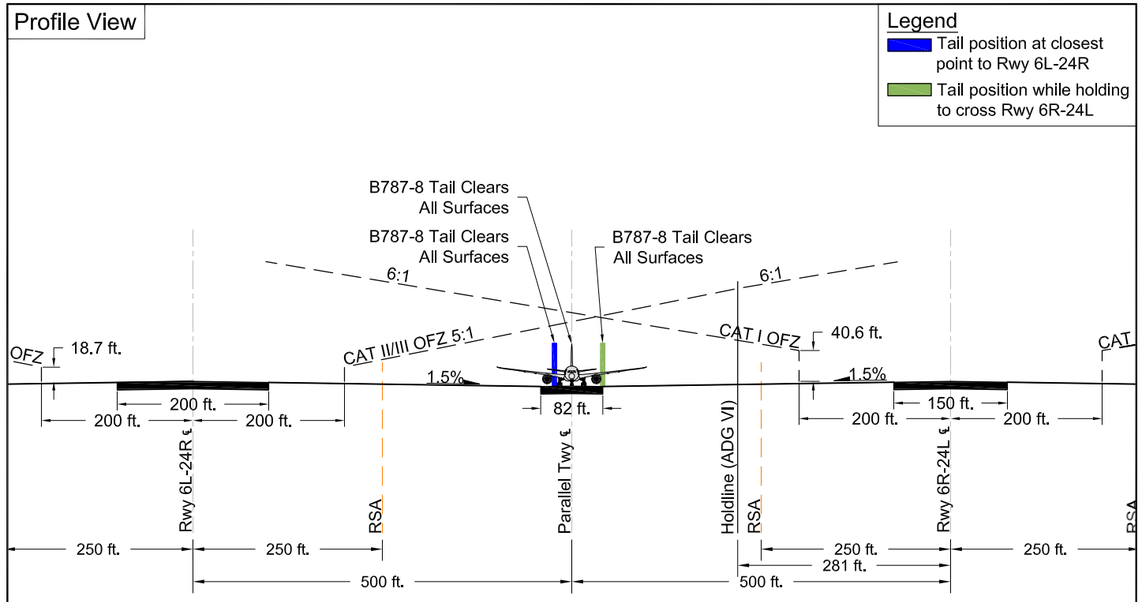
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

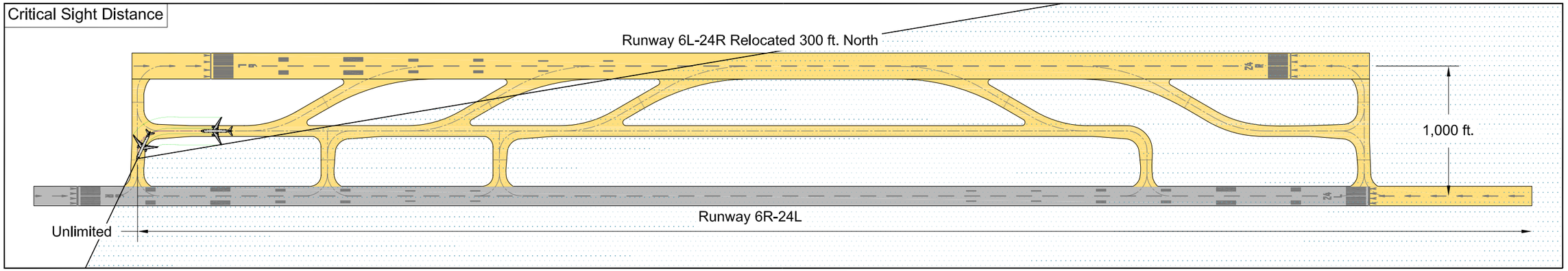
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, December 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 31

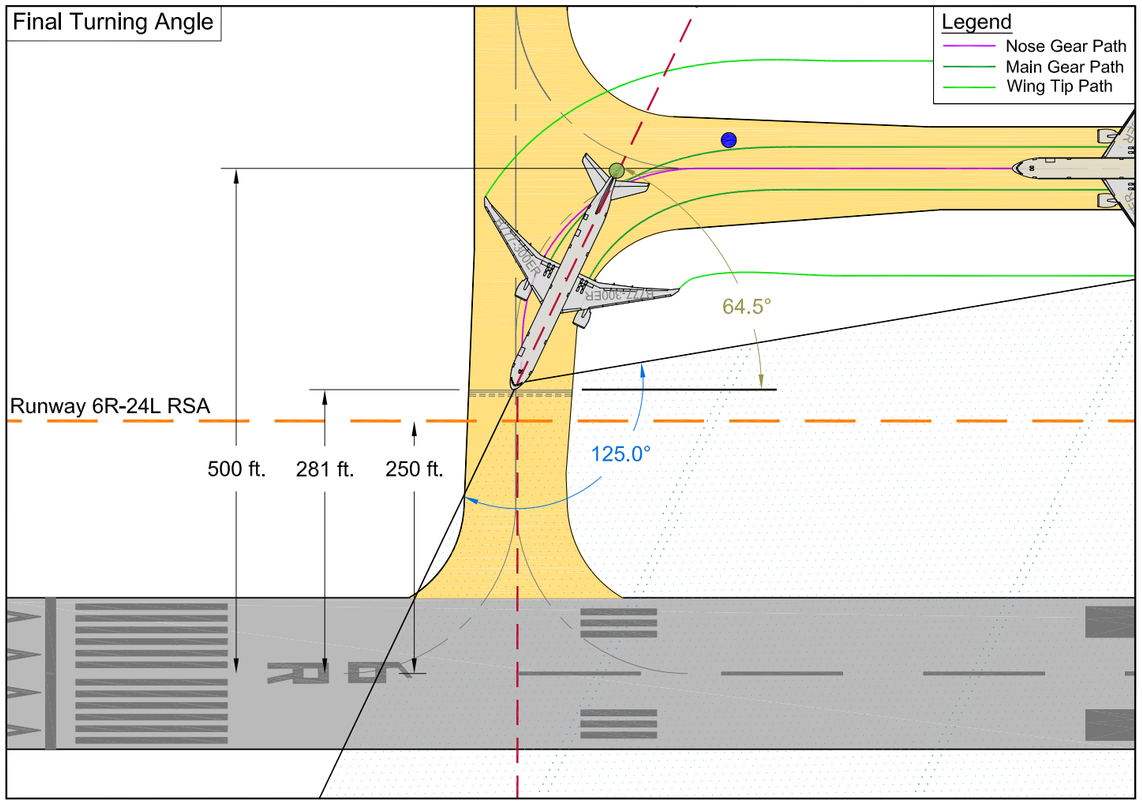
Runway 6L-24R Relocated 300 ft. North
Boeing B787-8 Critical Sight Distance (Standard + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 28-39_300 North_v2.dwg_Layout: 31_May 25, 2011, 3:24pm

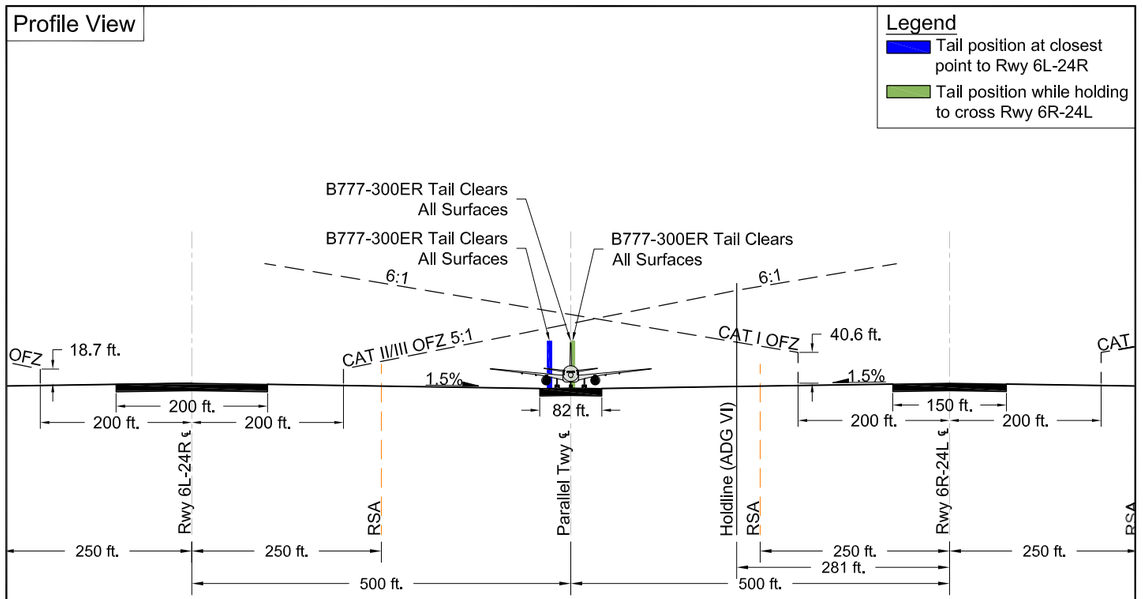
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

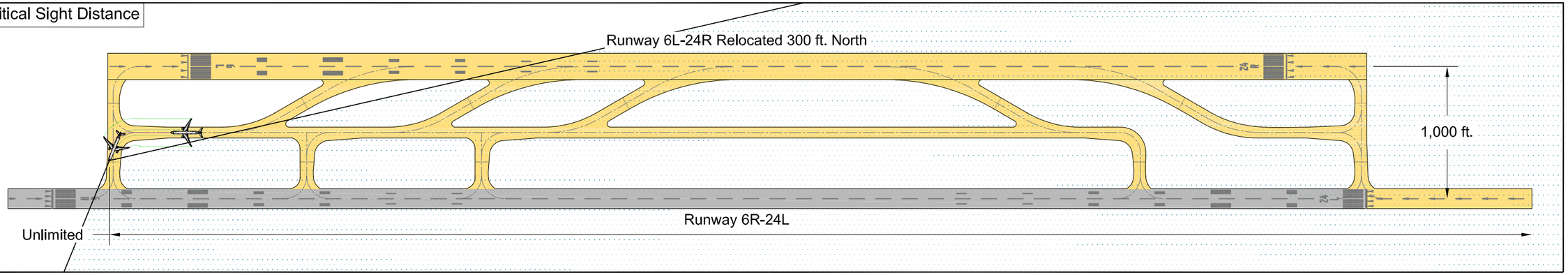
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, May 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 32

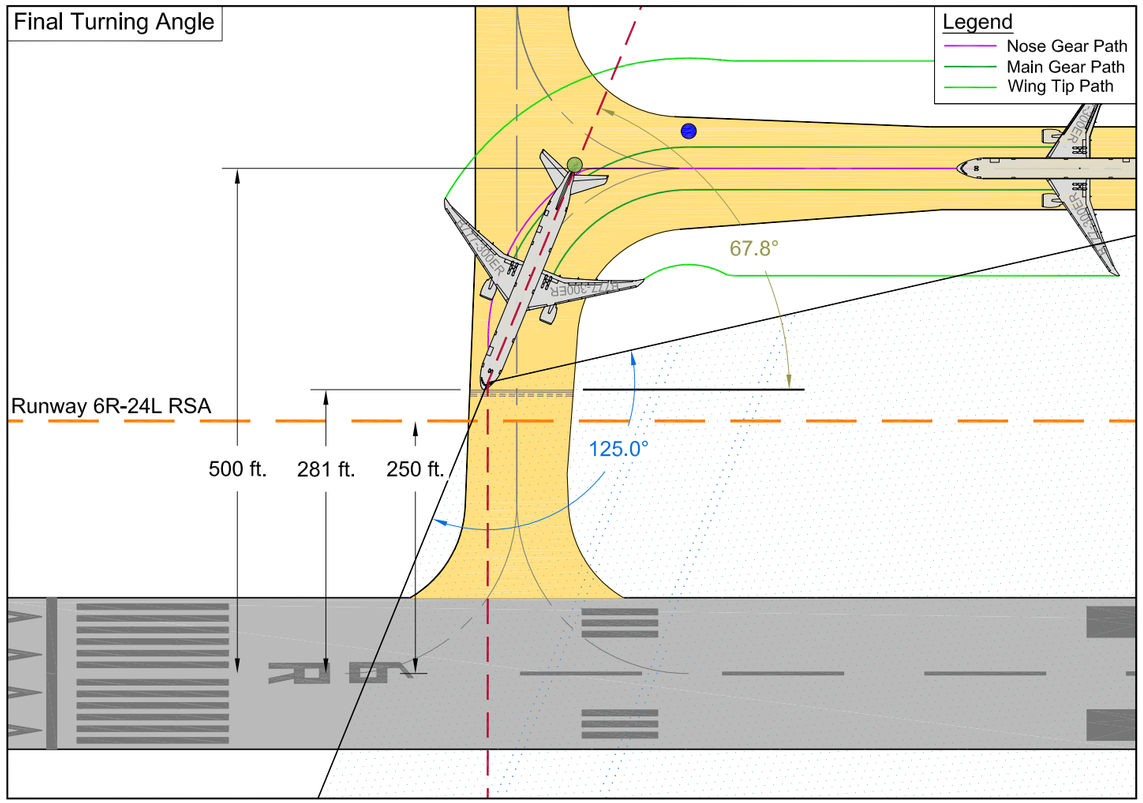
Runway 6L-24R Relocated 300 ft. North
Boeing B777-300ER Critical Sight Distance (Standard + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 28-39_300 North_v2.dwg_Layout: 32_May 25, 2011, 3:24pm

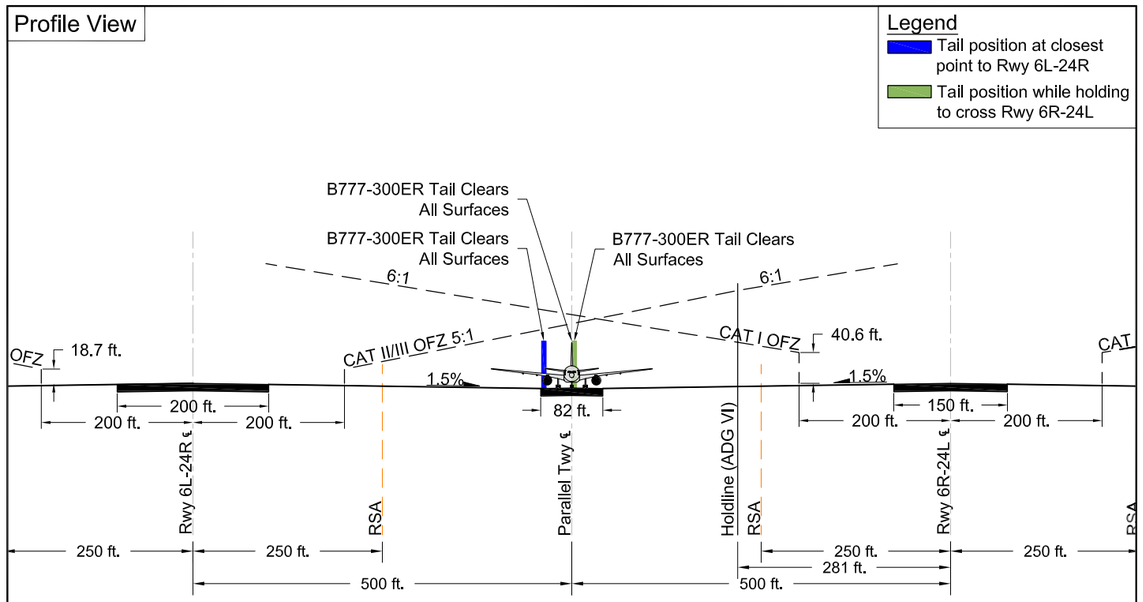
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

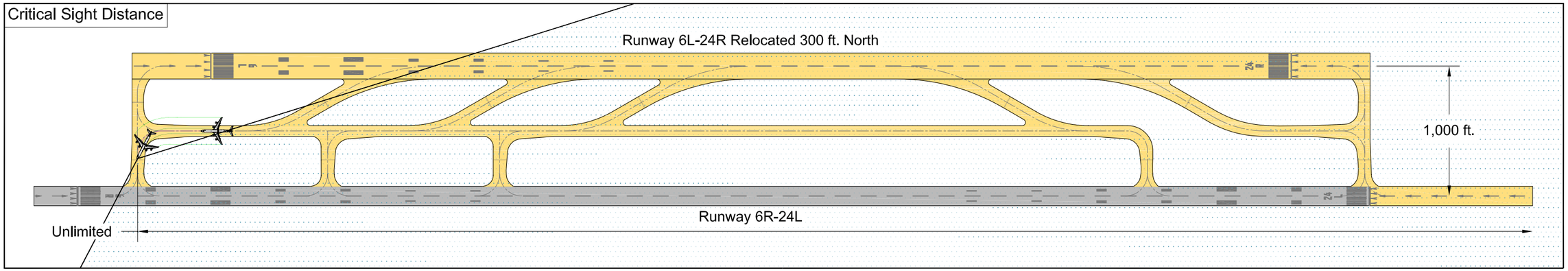
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, May 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 33

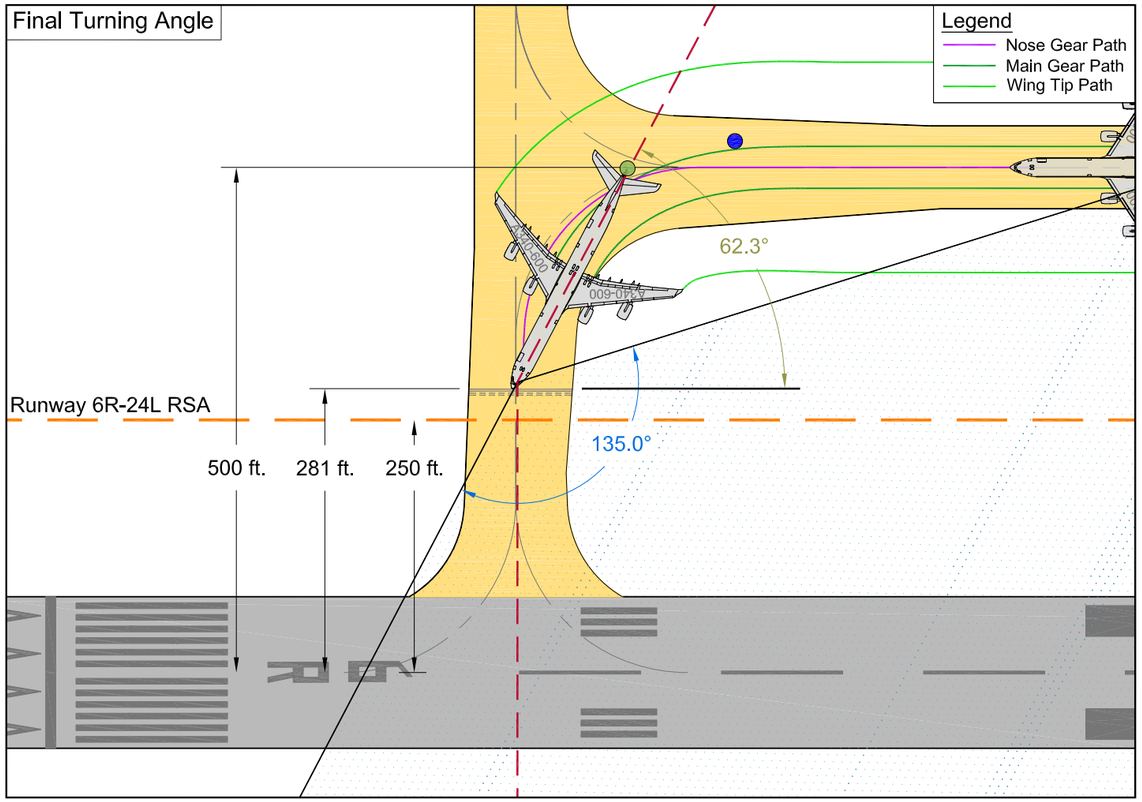
Runway 6L-24R Relocated 300 ft. North
Boeing B777-300ER Critical Sight Distance (Standard + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 28-39_300 North_v2.dwg_Layout: 33_May 25, 2011, 3:25pm

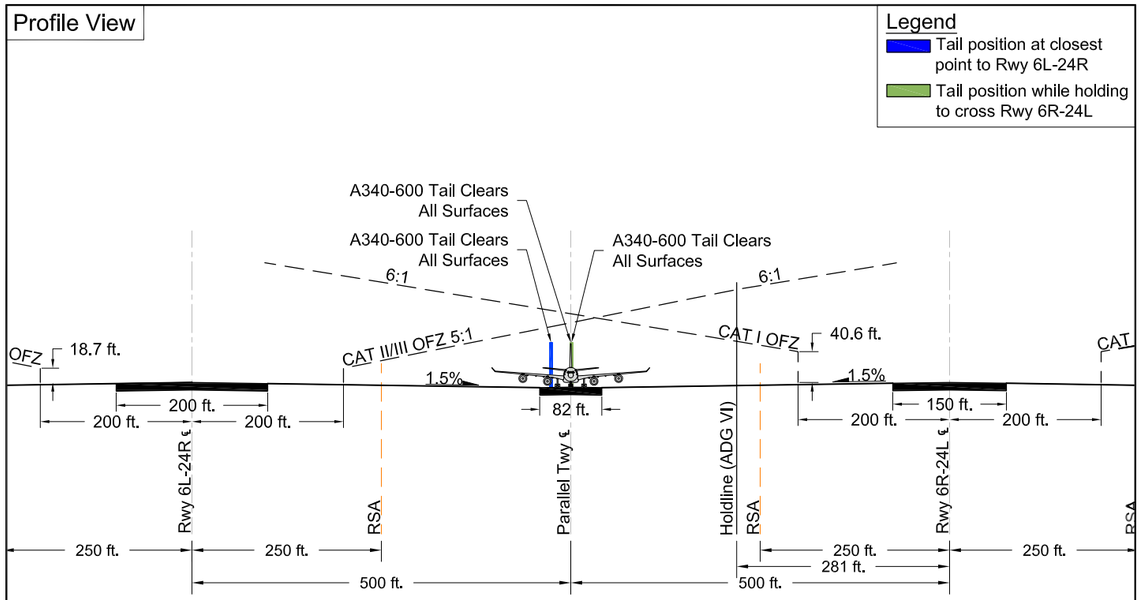
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

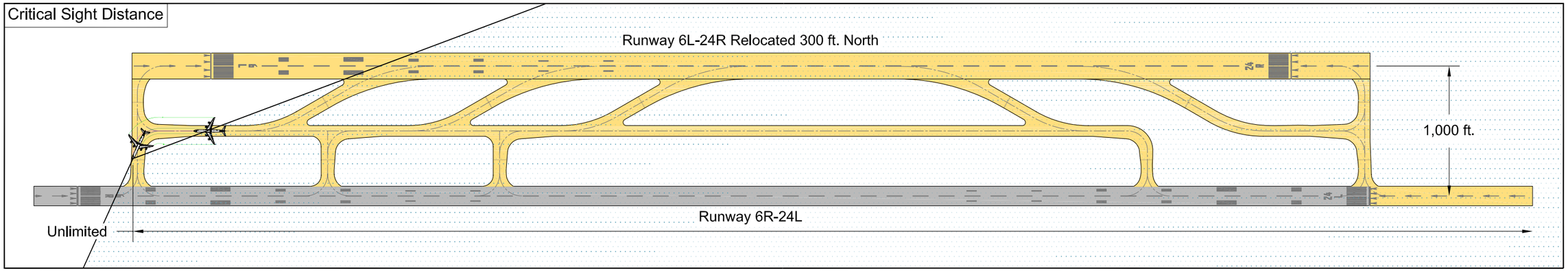
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Airbus, Airplane Characteristics for Airport Planning, April 2001 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 34

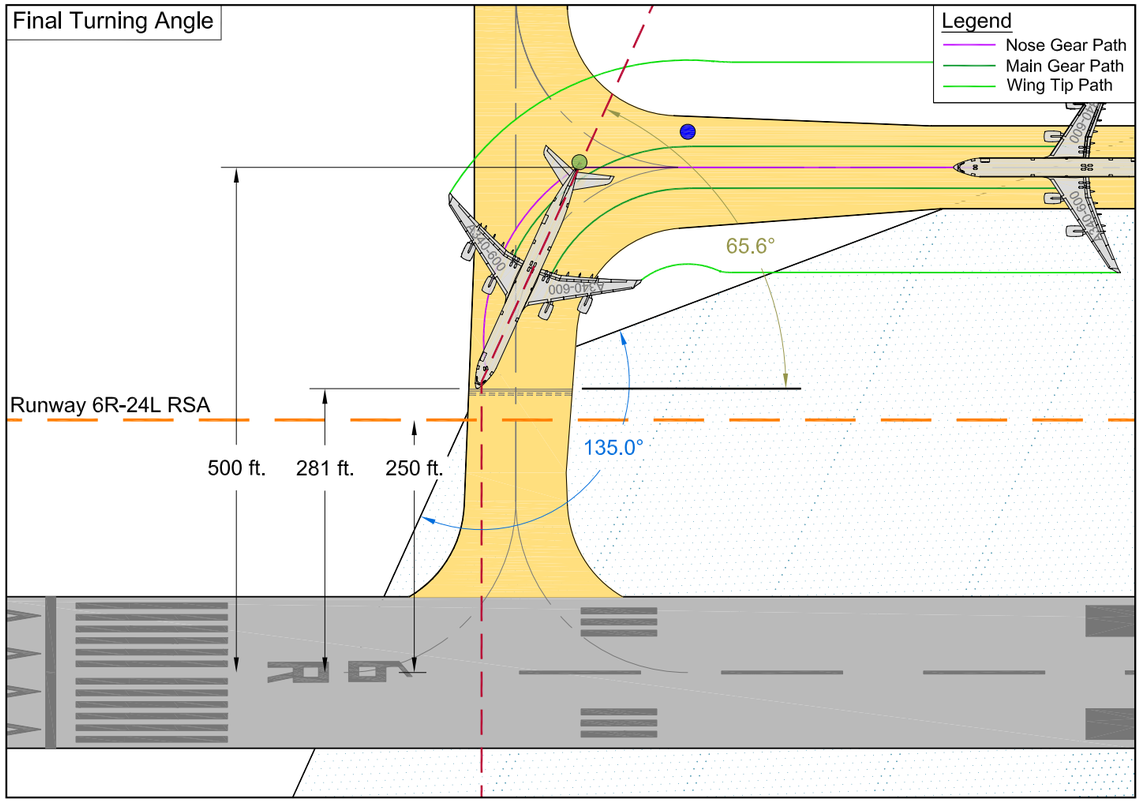
Runway 6L-24R Relocated 300 ft. North
Airbus A340-600 Critical Sight Distance (Standard + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 28-39_300 North_v2.dwg_Layout: 34_May 25, 2011, 3:25pm

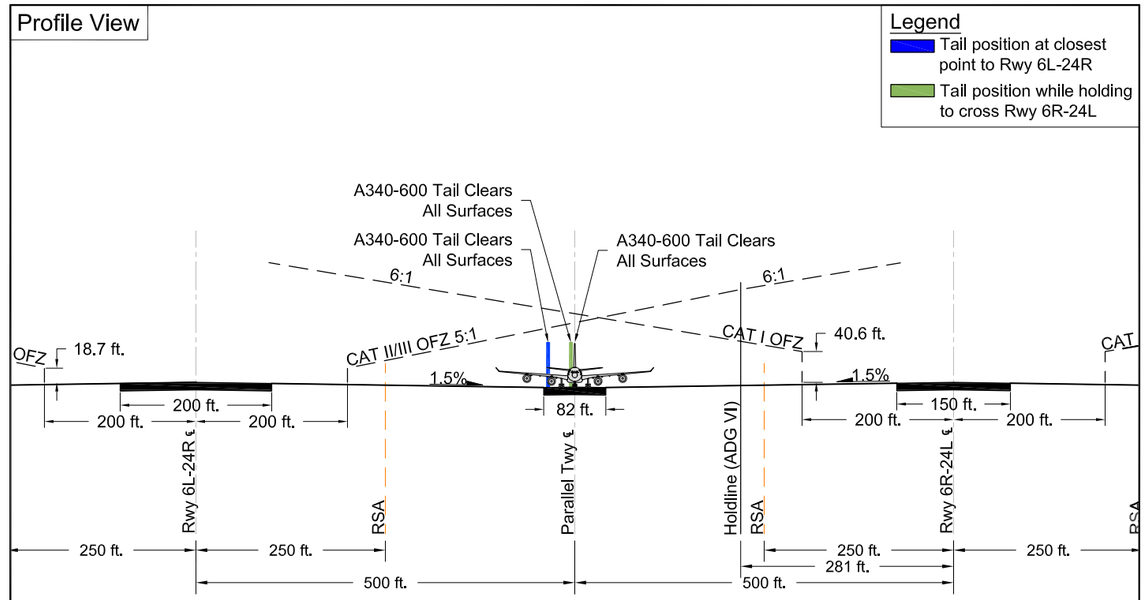
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

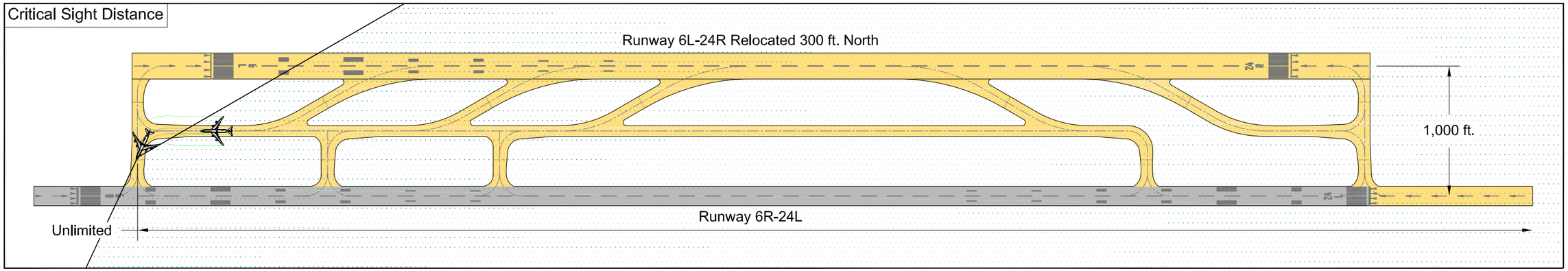
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Airbus, Airplane Characteristics for Airport Planning, April 2001 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 35

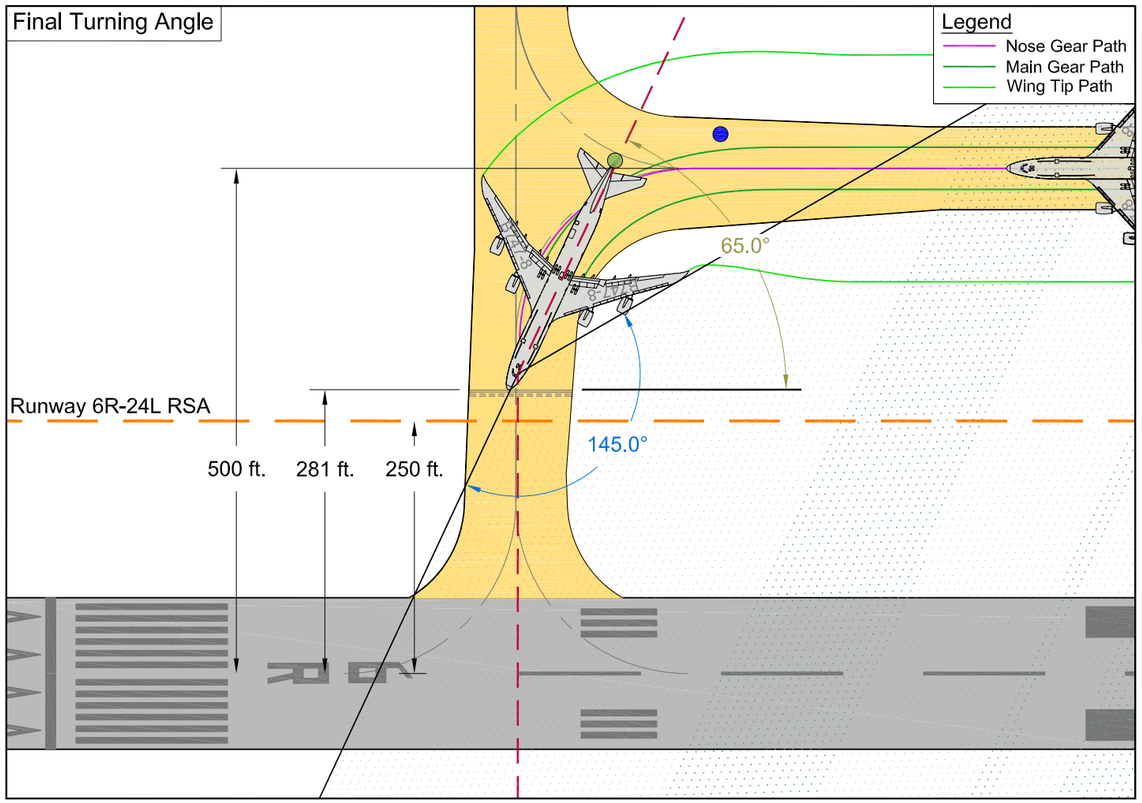
Runway 6L-24R Relocated 300 ft. North
Airbus A340-600 Critical Sight Distance (Standard + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 28-39_300 North_v2.dwg_Layout: 35_May 25, 2011, 3:25pm

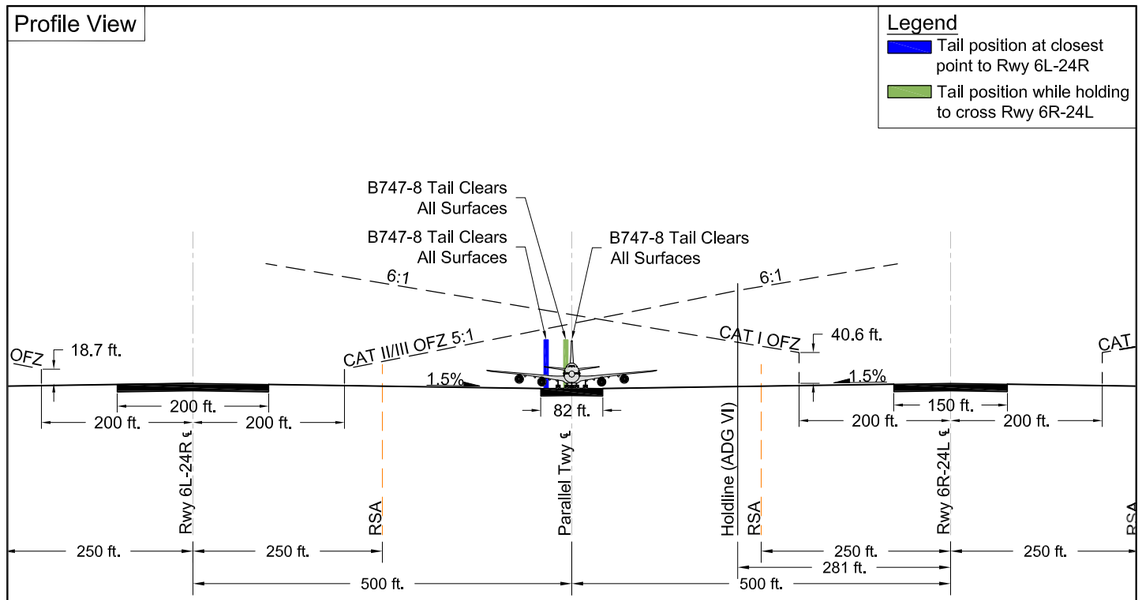
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

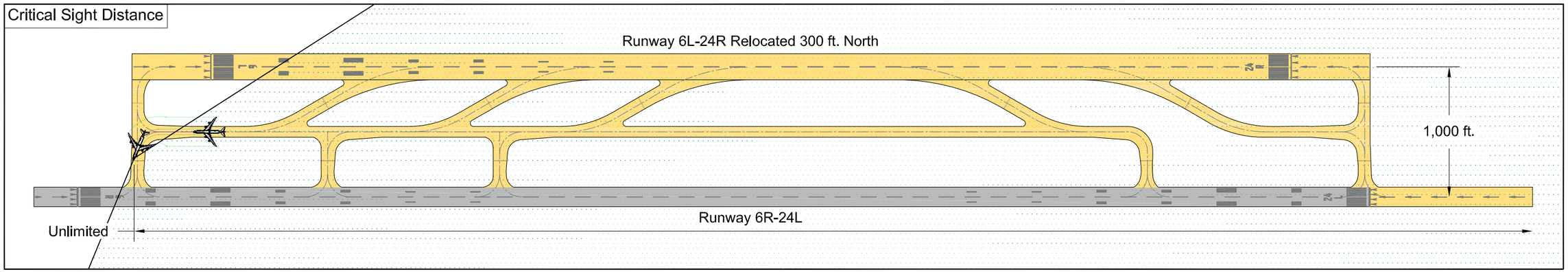
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, March 2011 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 36

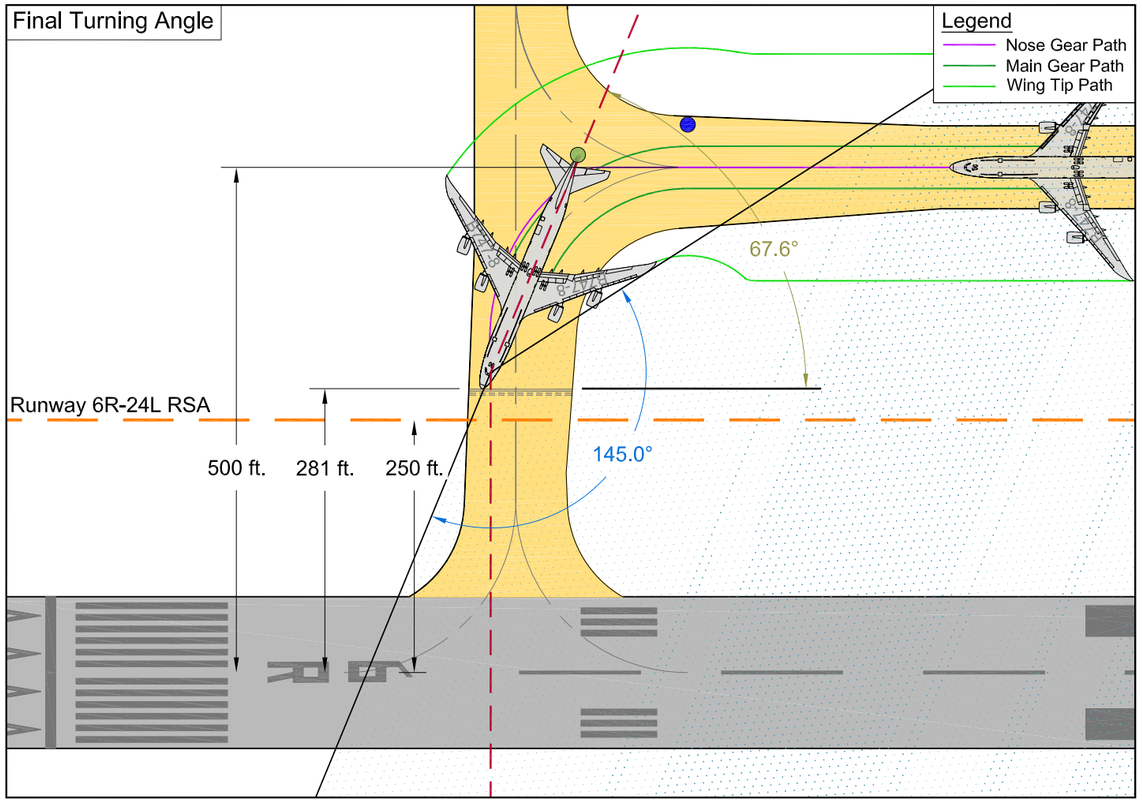
Runway 6L-24R Relocated 300 ft. North
Boeing B747-8 Critical Sight Distance (Standard + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 28-39_300 North_v2.dwg_Layout: 36_May 25, 2011, 3:25pm

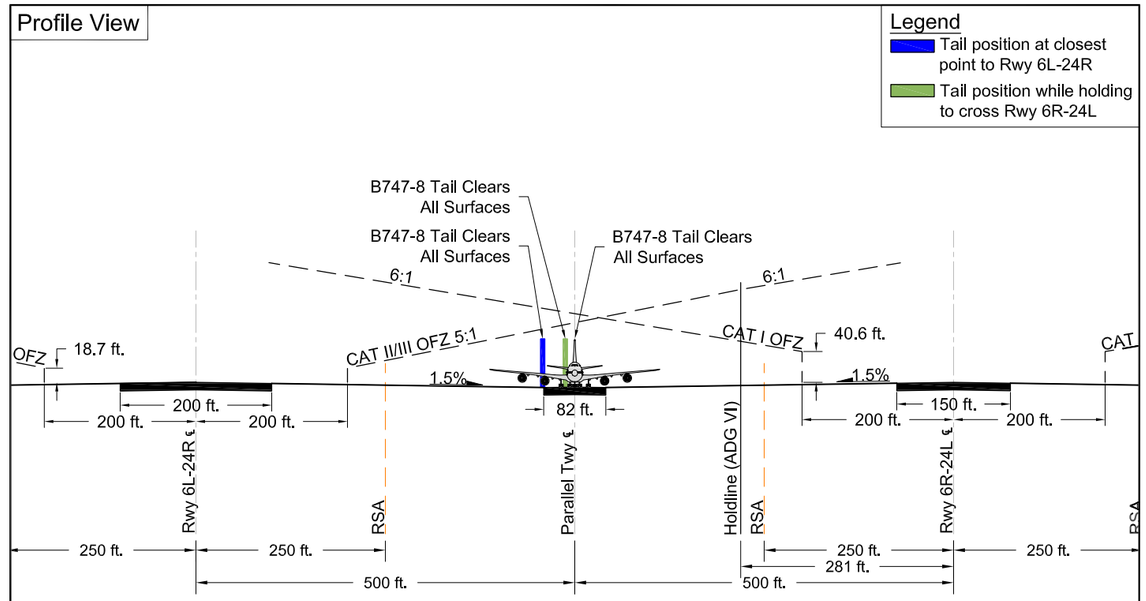
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

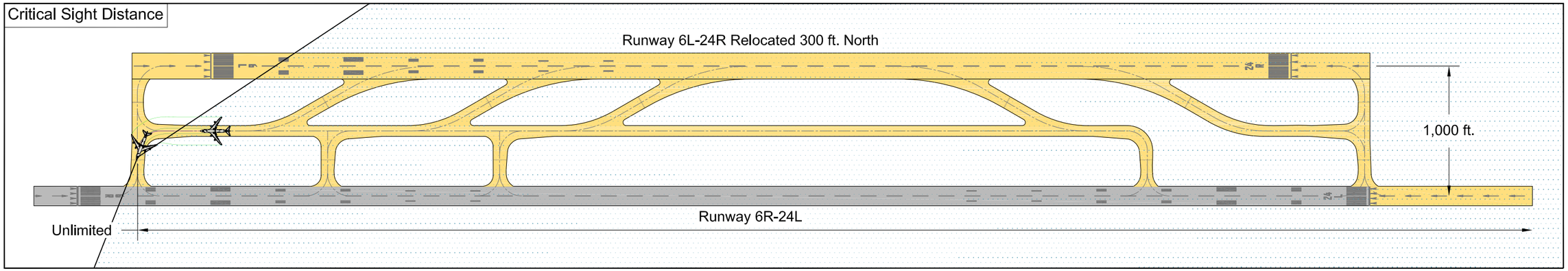
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, March 2011 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 37

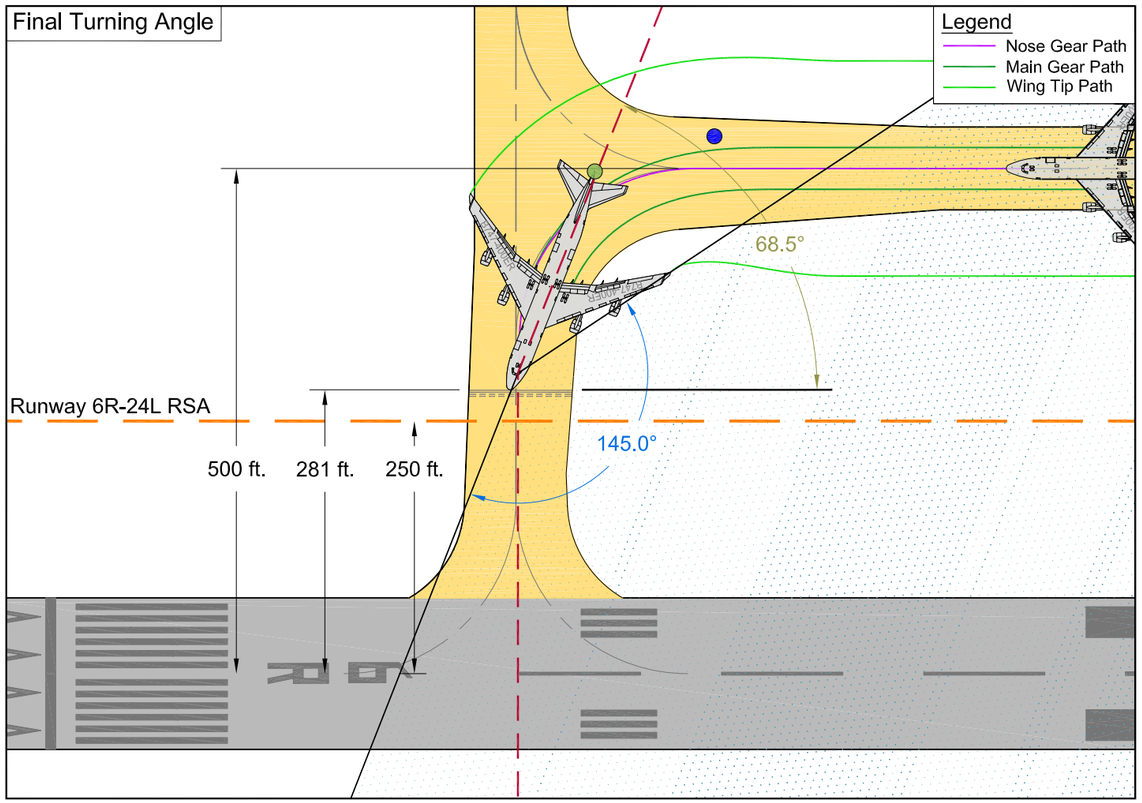
Runway 6L-24R Relocated 300 ft. North
Boeing B747-8 Critical Sight Distance (Standard + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 28-39_300 North_v2.dwg_Layout: 37_May 25, 2011, 3:26pm

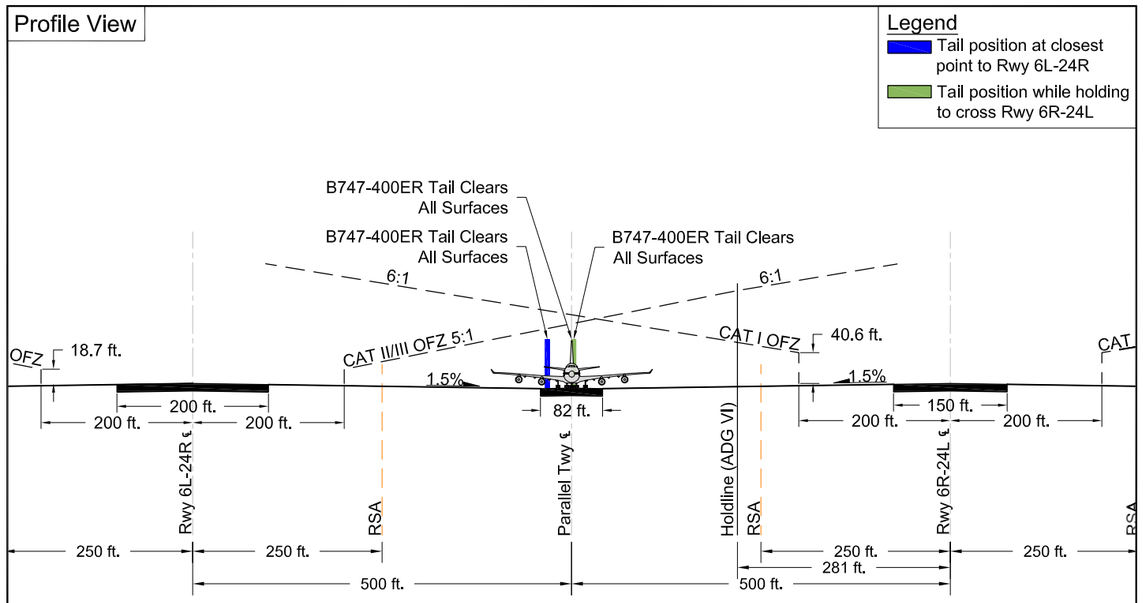
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

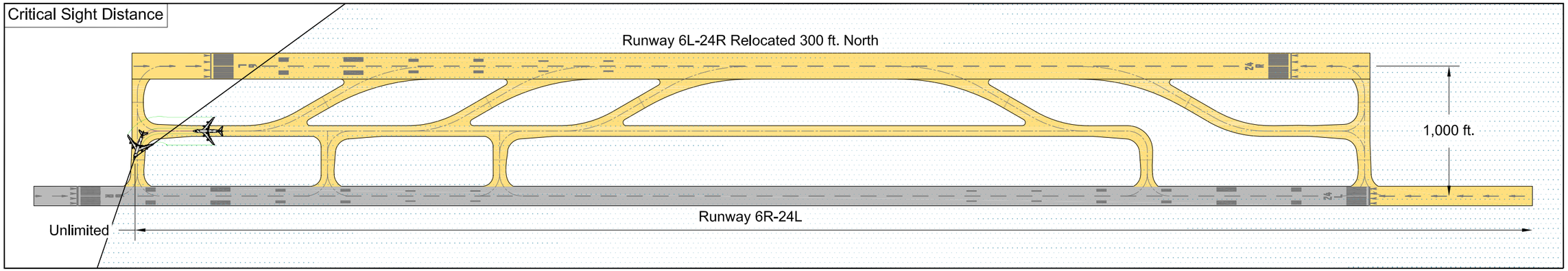
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, June 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 38

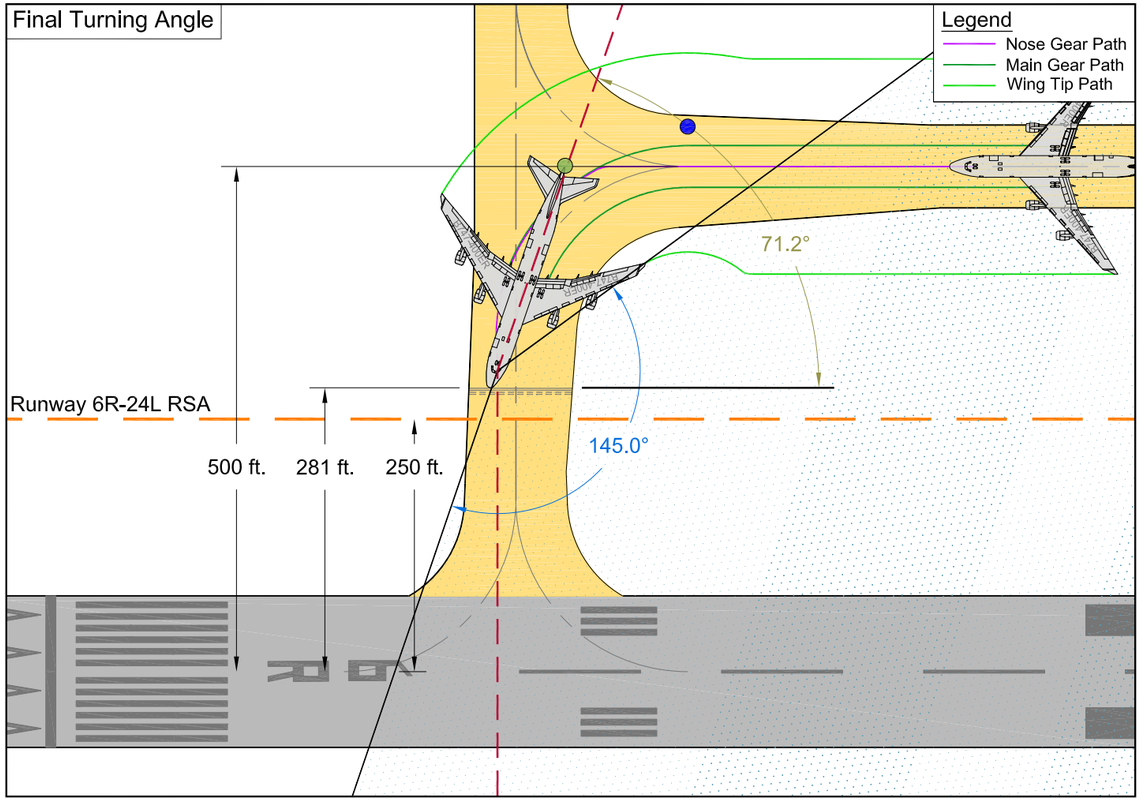
Runway 6L-24R Relocated 300 ft. North
Boeing B747-400ER Critical Sight Distance (Standard + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 28-39_300 North_v2.dwg_Layout: 38_May 25, 2011, 3:26pm

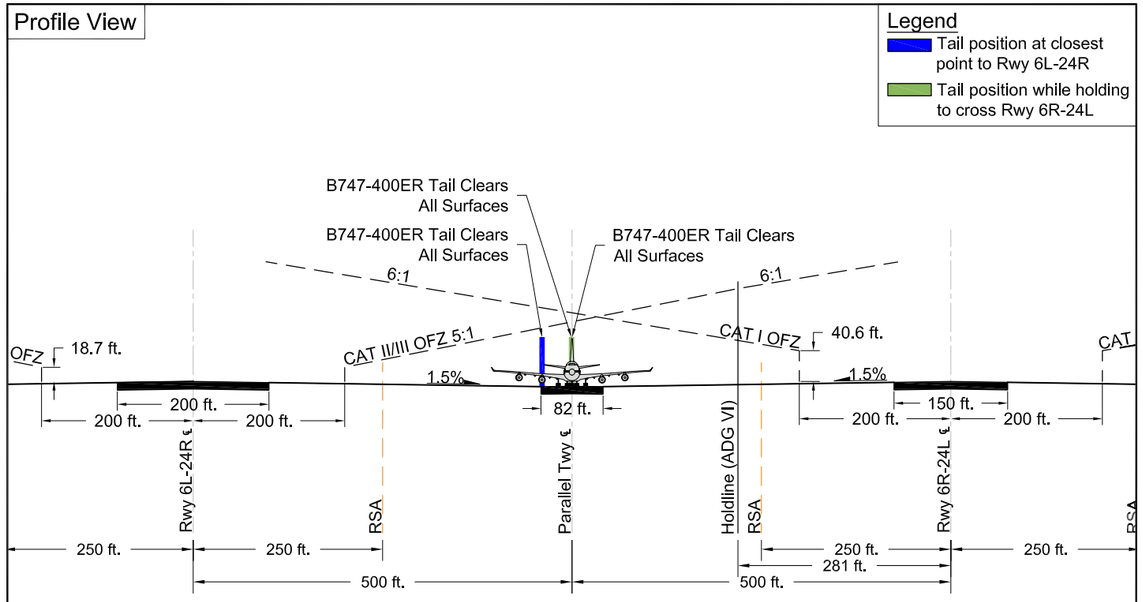
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

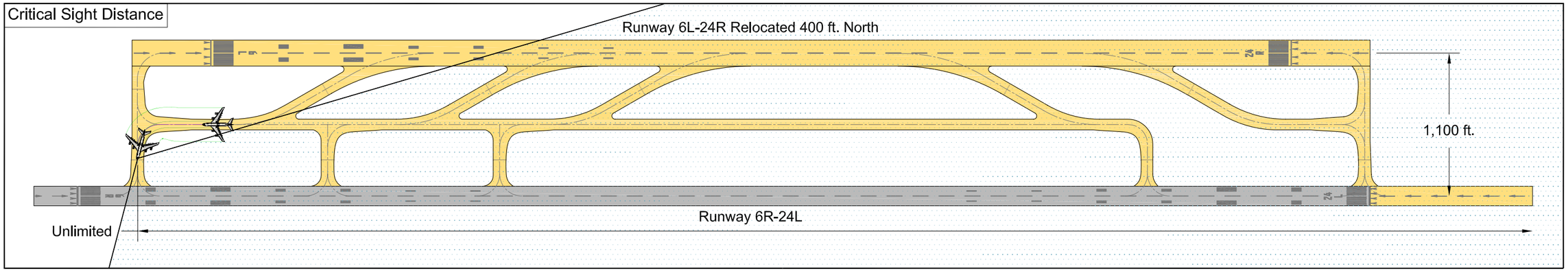
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, June 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 39

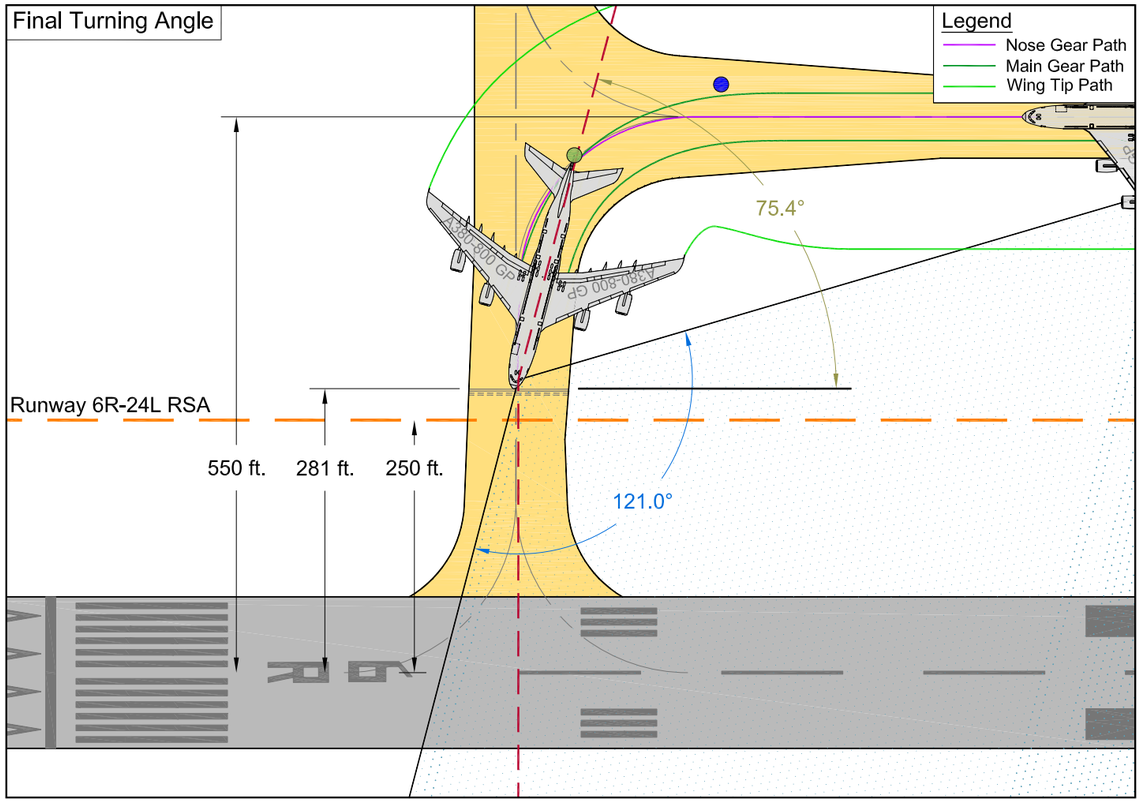
Runway 6L-24R Relocated 300 ft. North
Boeing B747-400ER Critical Sight Distance (Standard + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 28-39_300 North_v2.dwg_Layout: 39_May 25, 2011, 3:26pm

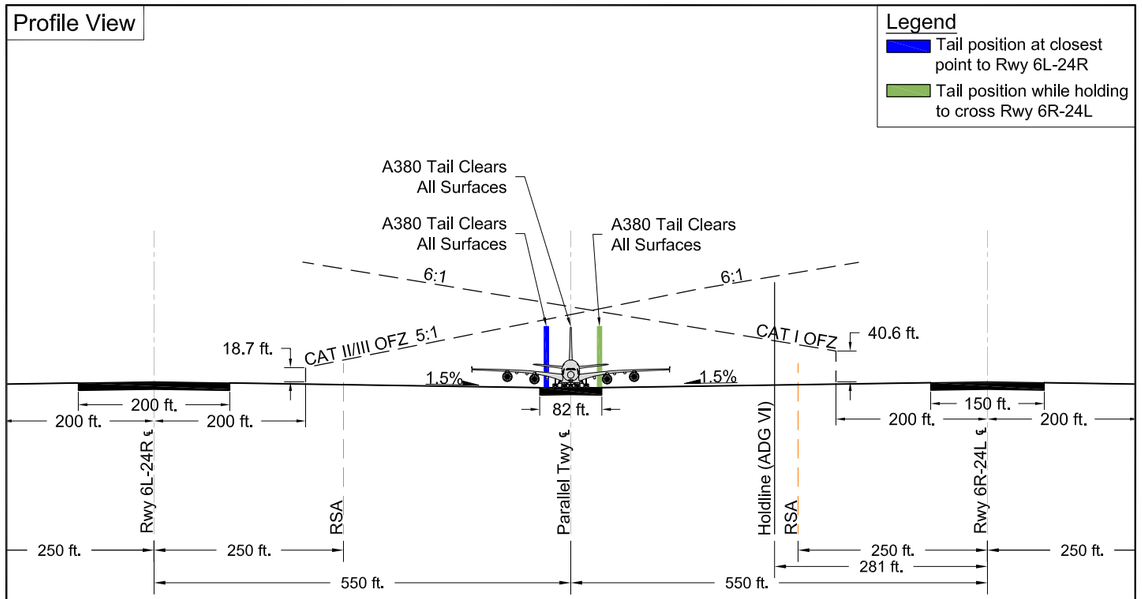
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

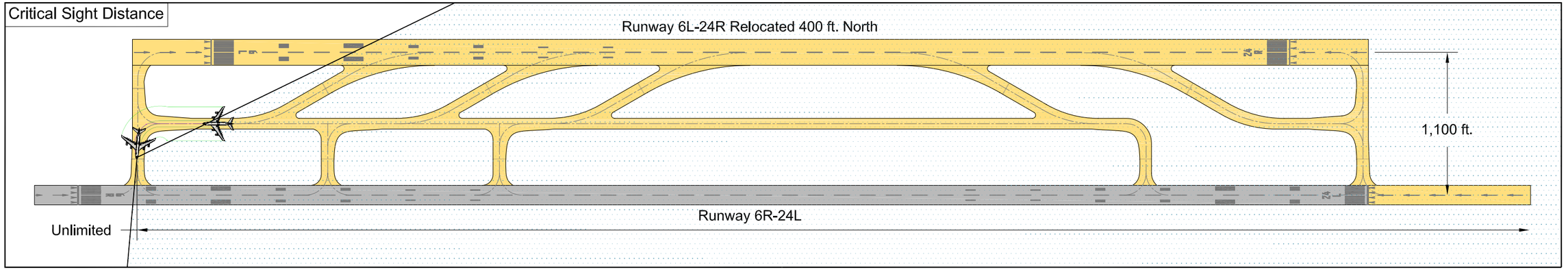
Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

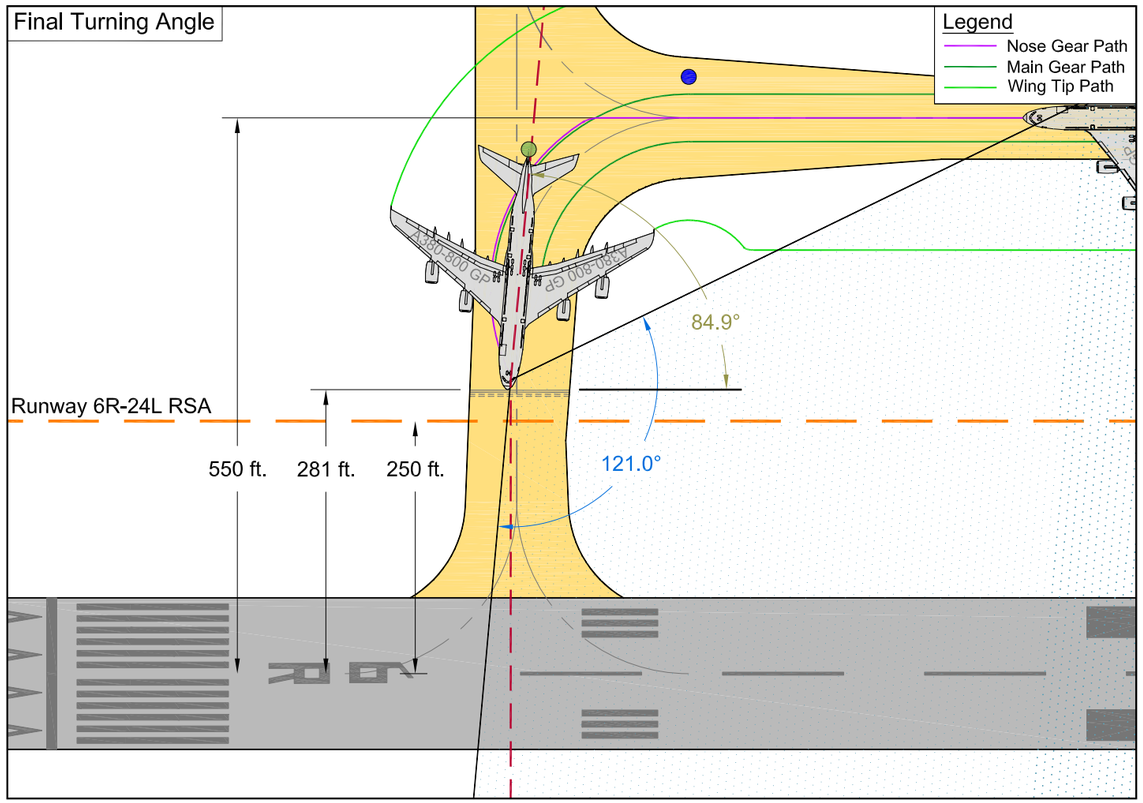
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Airbus, Airplane Characteristics for Airport Planning, March 2005 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

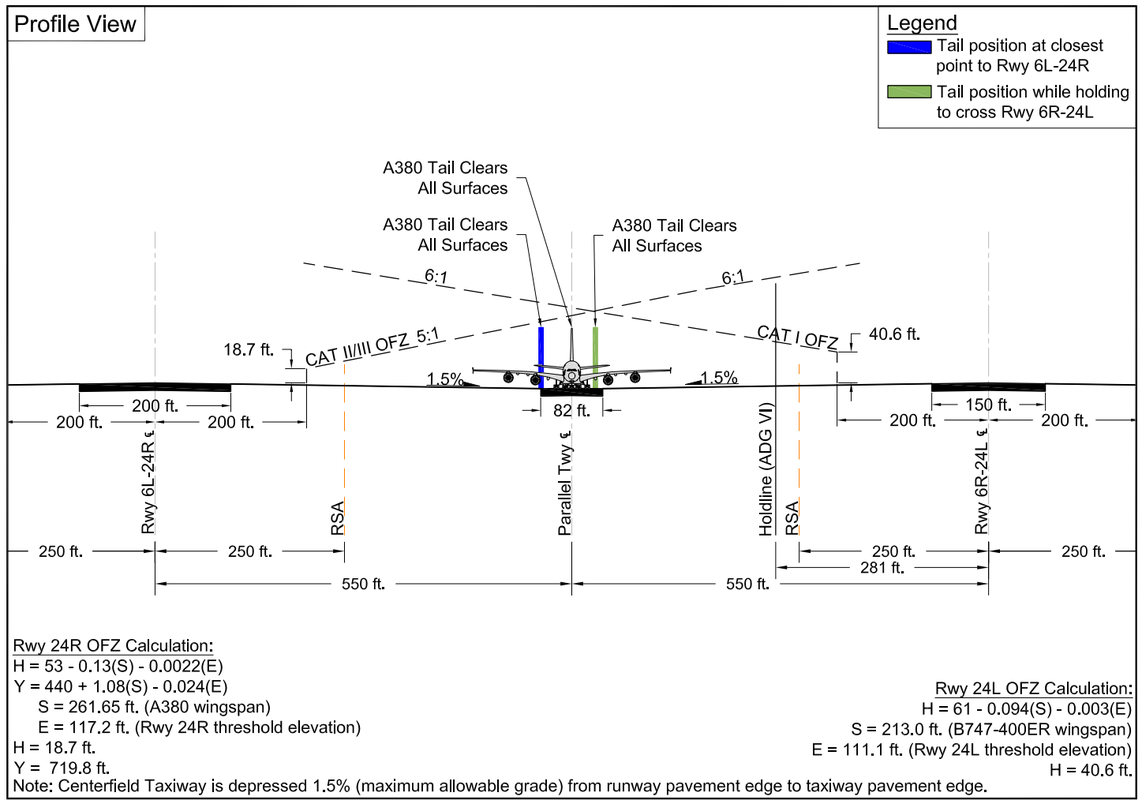
Exhibit 40

Runway 6L-24R Relocated 400 ft. North
Airbus A380-800 Critical Sight Distance (Standard + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 40-51_400 North_v2.dwg_Layout: 40_May 25, 2011, 3:27pm







Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

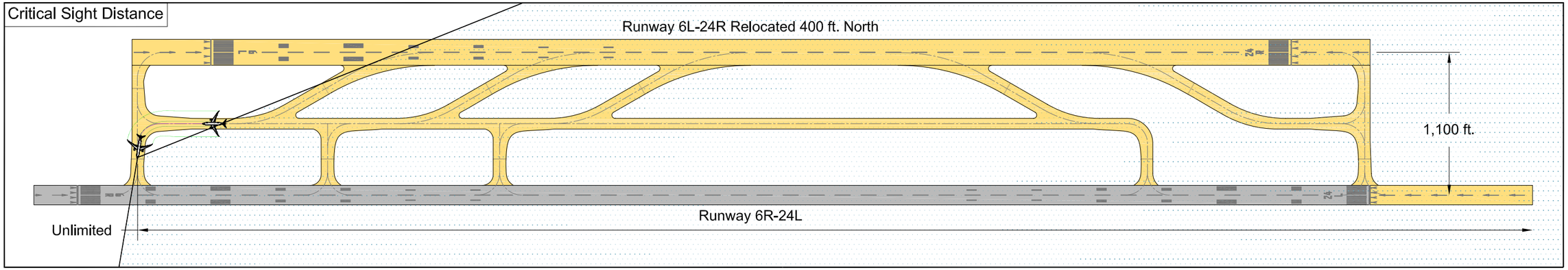
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Airbus, Airplane Characteristics for Airport Planning, March 2005 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 41

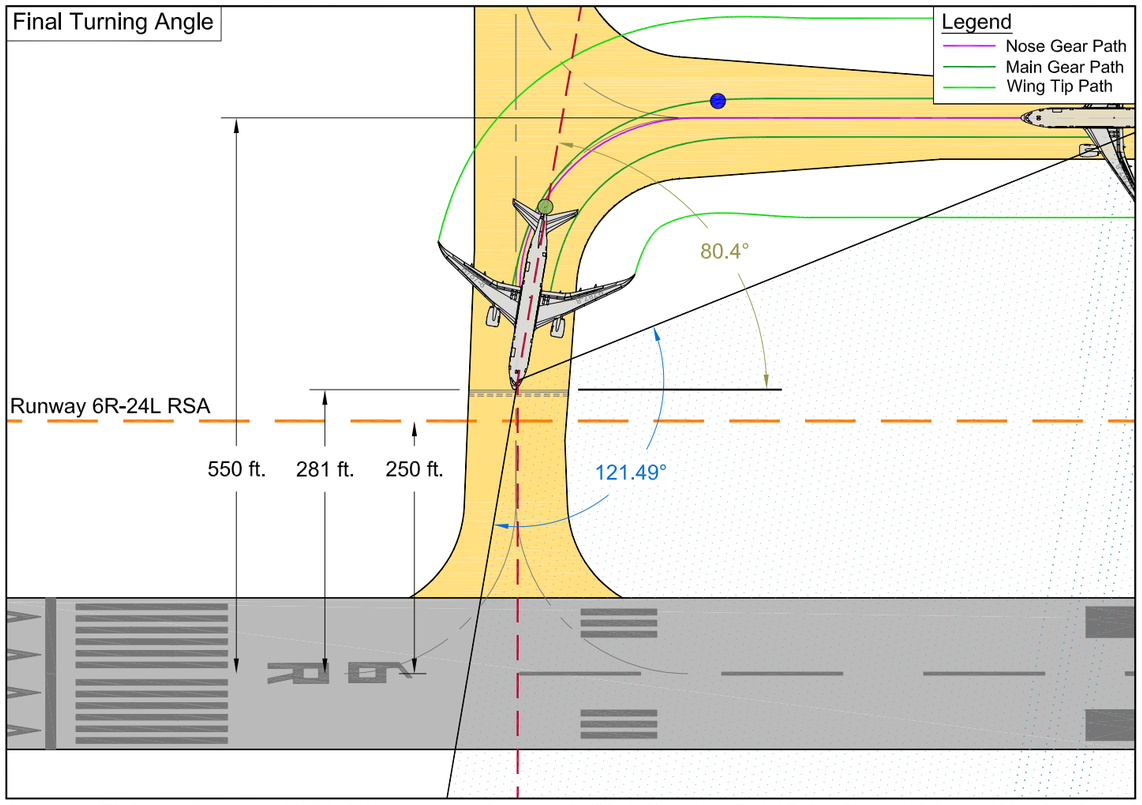
Runway 6L-24R Relocated 400 ft. North
Airbus A380-800 Critical Sight Distance (Standard + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 40-51_400 North_v2.dwg_Layout: 41_May 25, 2011, 3:27pm

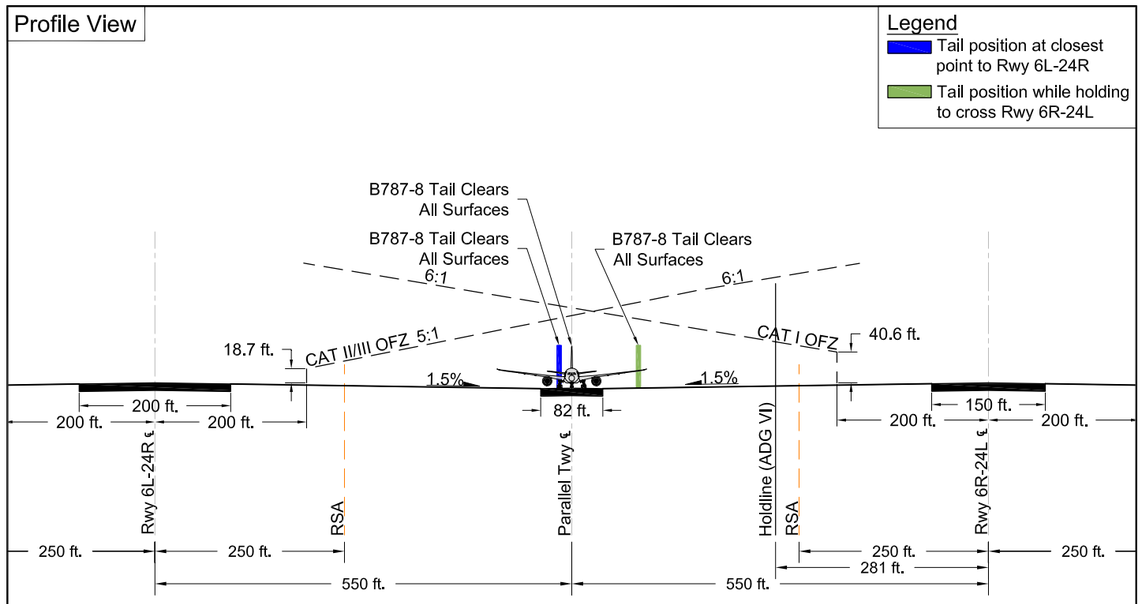
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

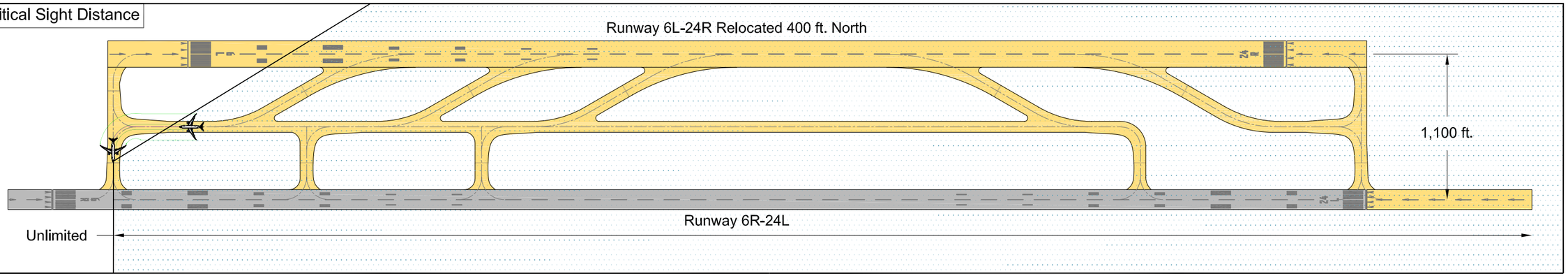
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, December 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 42

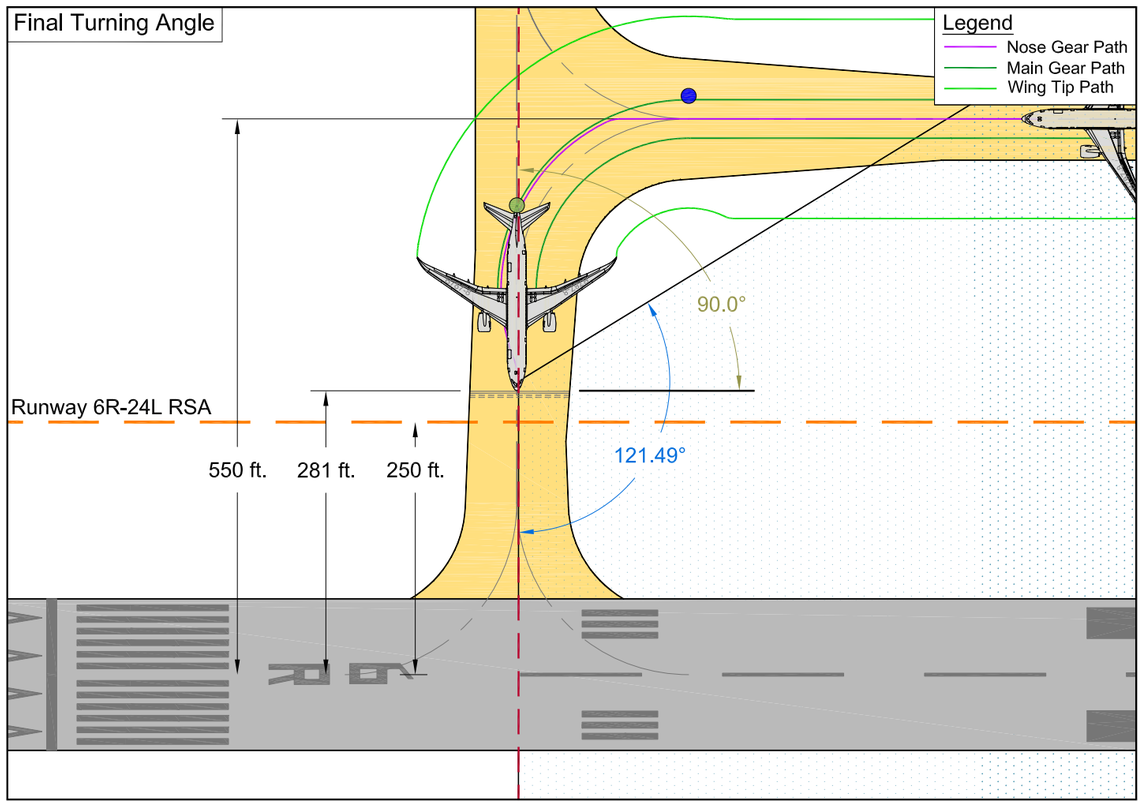
Runway 6L-24R Relocated 400 ft. North
Boeing B787-8 Critical Sight Distance (Standard + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 40-51_400 North_v2.dwg_Layout: 42_May 25, 2011, 3:27pm

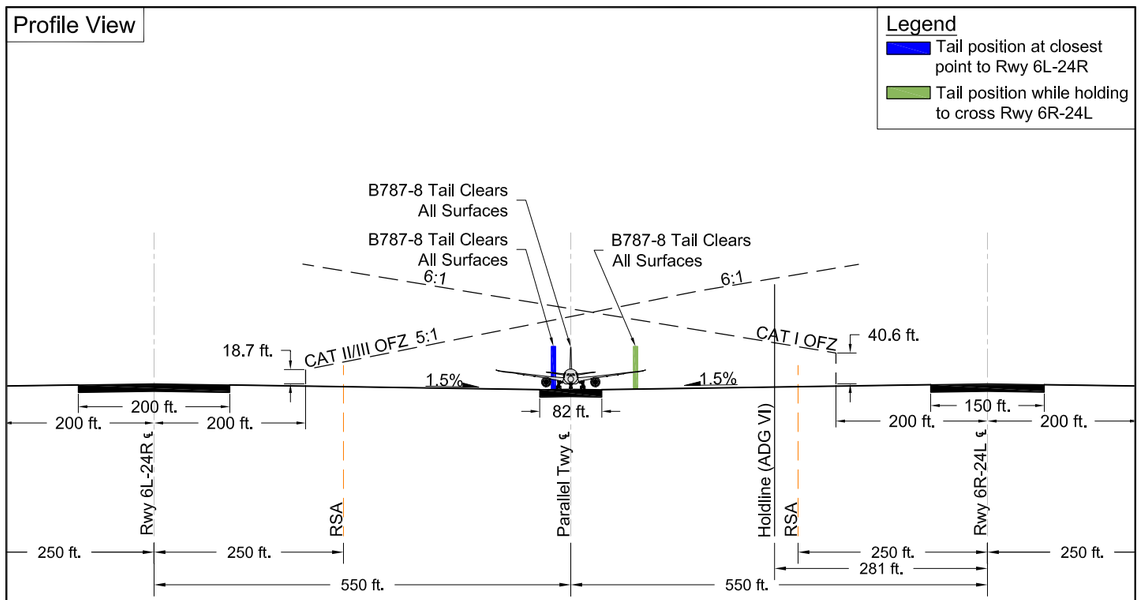
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

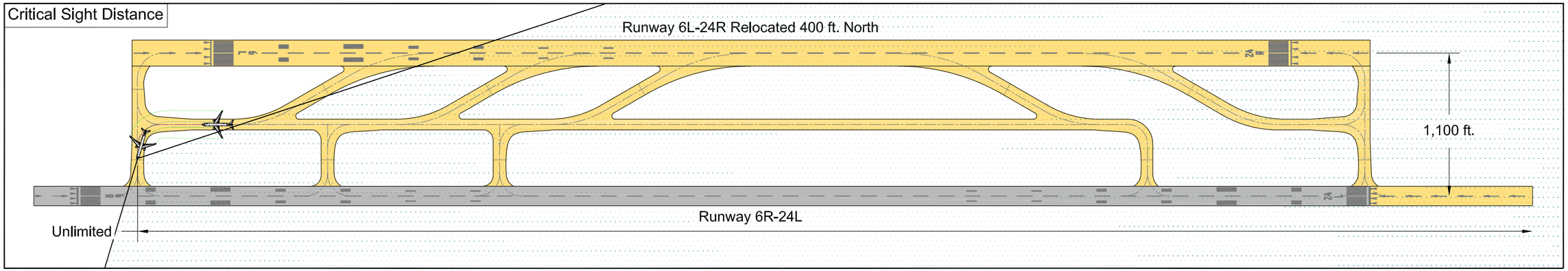
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, December 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 43

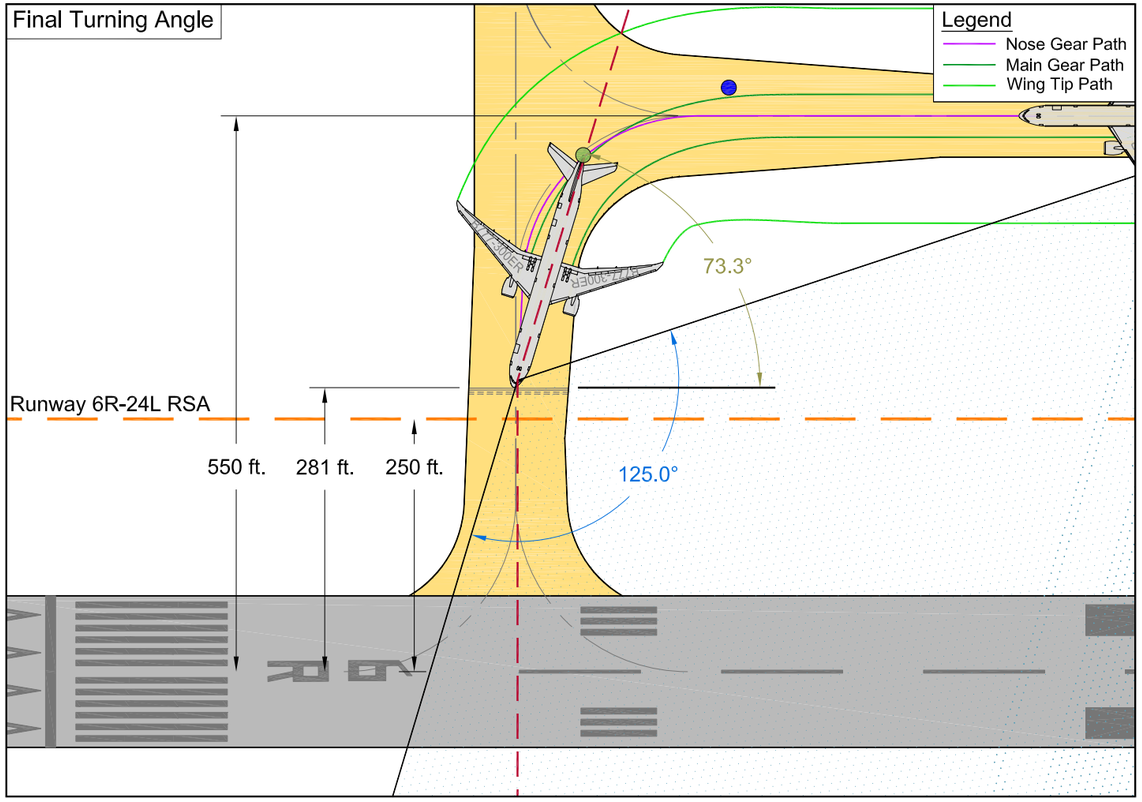
Runway 6L-24R Relocated 400 ft. North
Boeing B787-8 Critical Sight Distance (Standard + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 40-51_400 North_v2.dwg_Layout: 43_May 25, 2011, 3:27pm

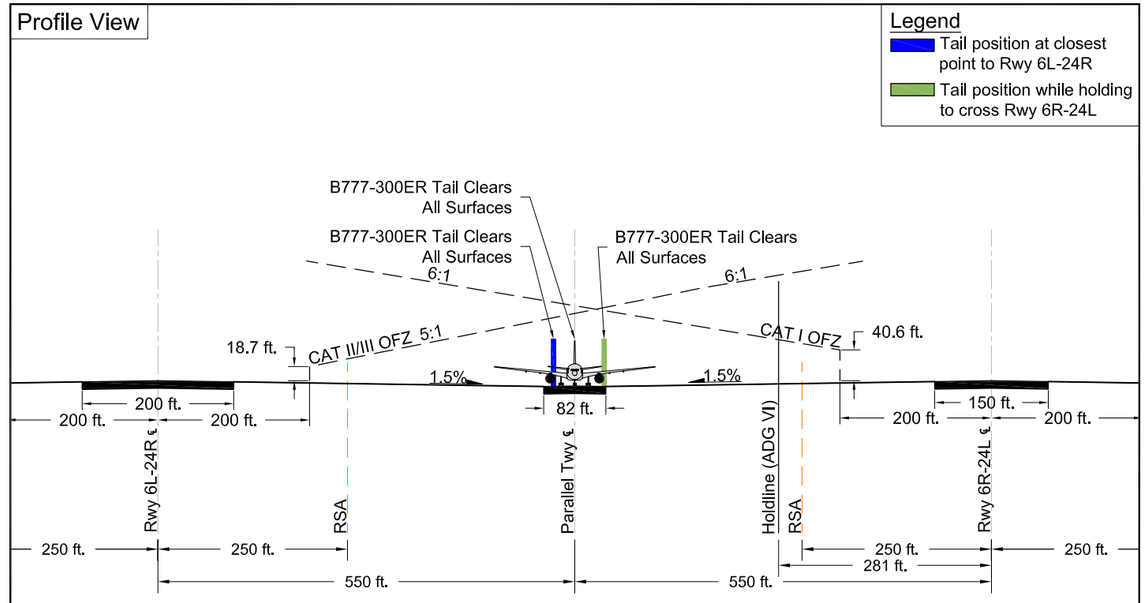
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

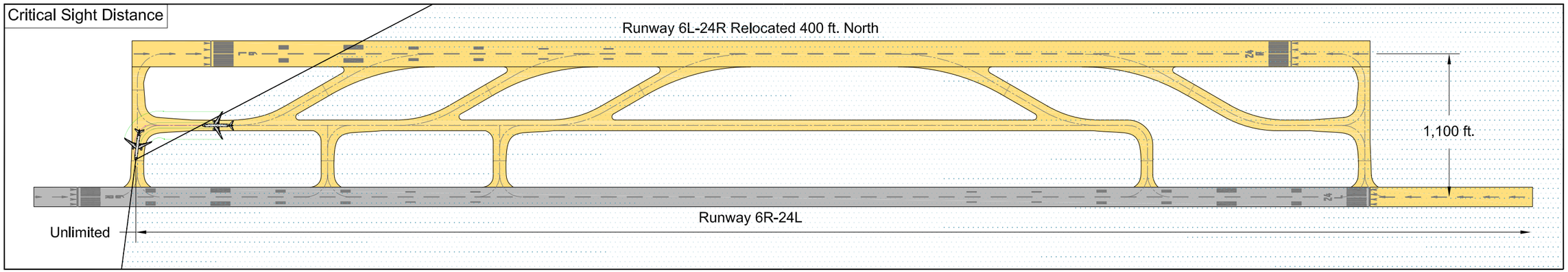
Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, May 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

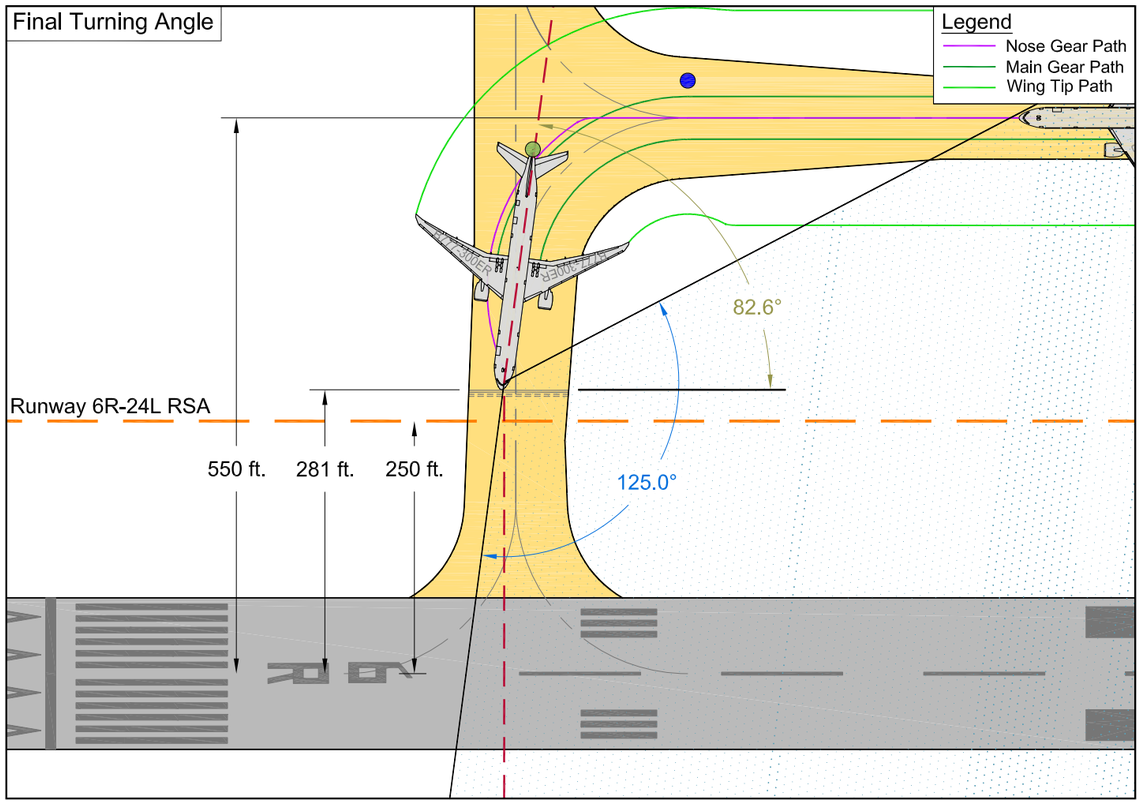
Exhibit 44

Runway 6L-24R Relocated 400 ft. North
Boeing B777-300ER Critical Sight Distance (Standard + Cockpit over Centerline)

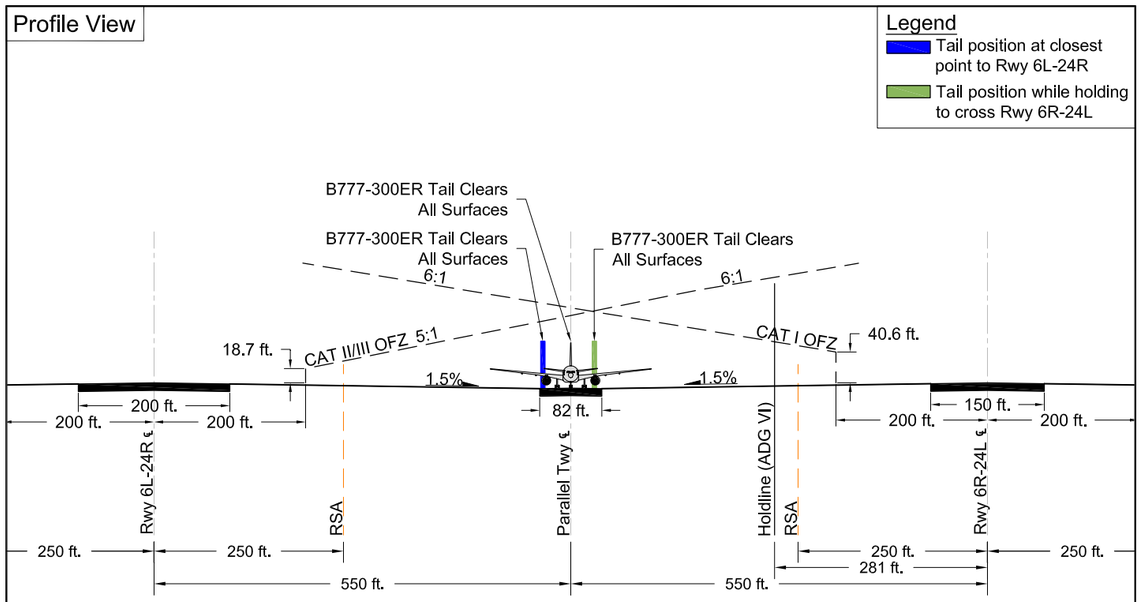
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

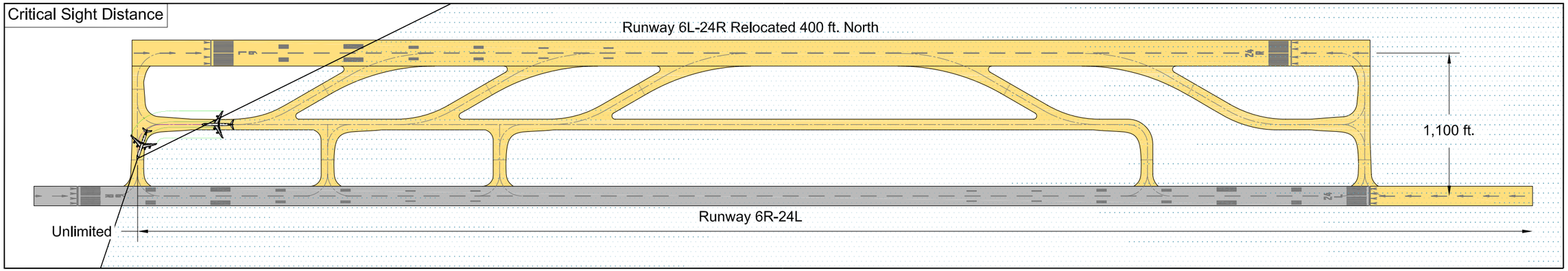
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, May 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 45

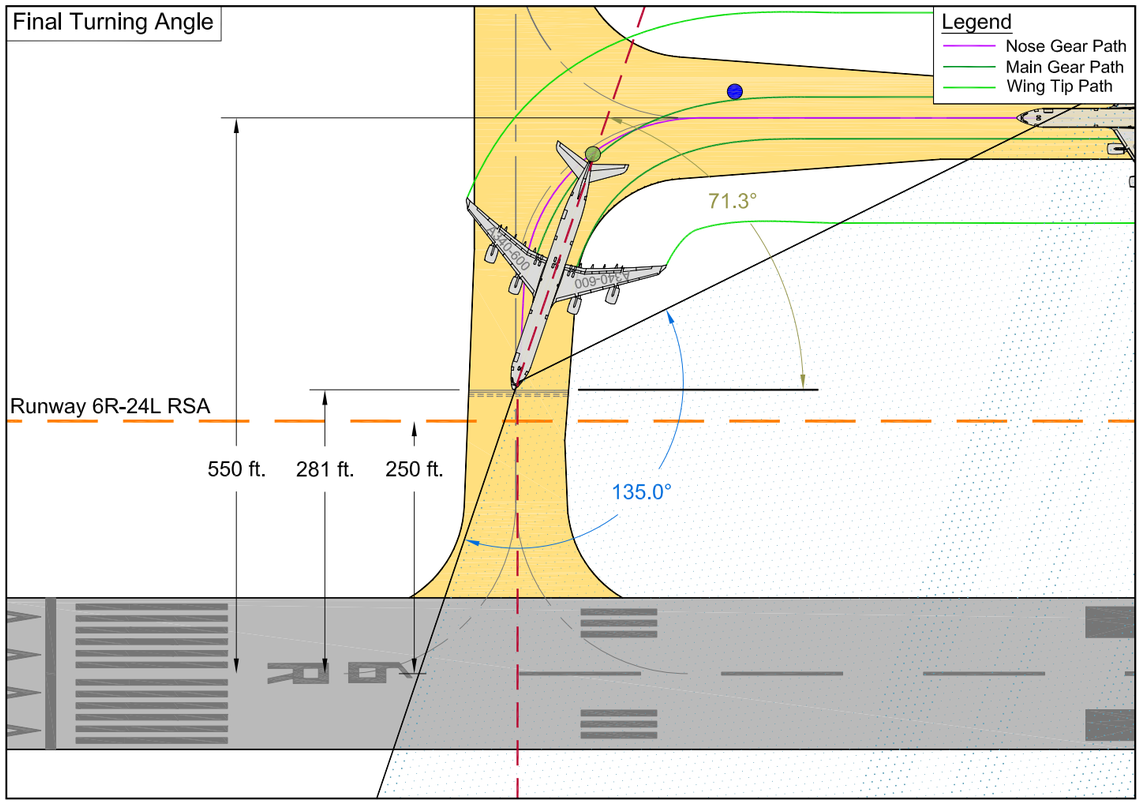
Runway 6L-24R Relocated 400 ft. North
Boeing B777-300ER Critical Sight Distance (Standard + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 40-51_400 North_v2.dwg_Layout: 45_May 25, 2011, 3:28pm

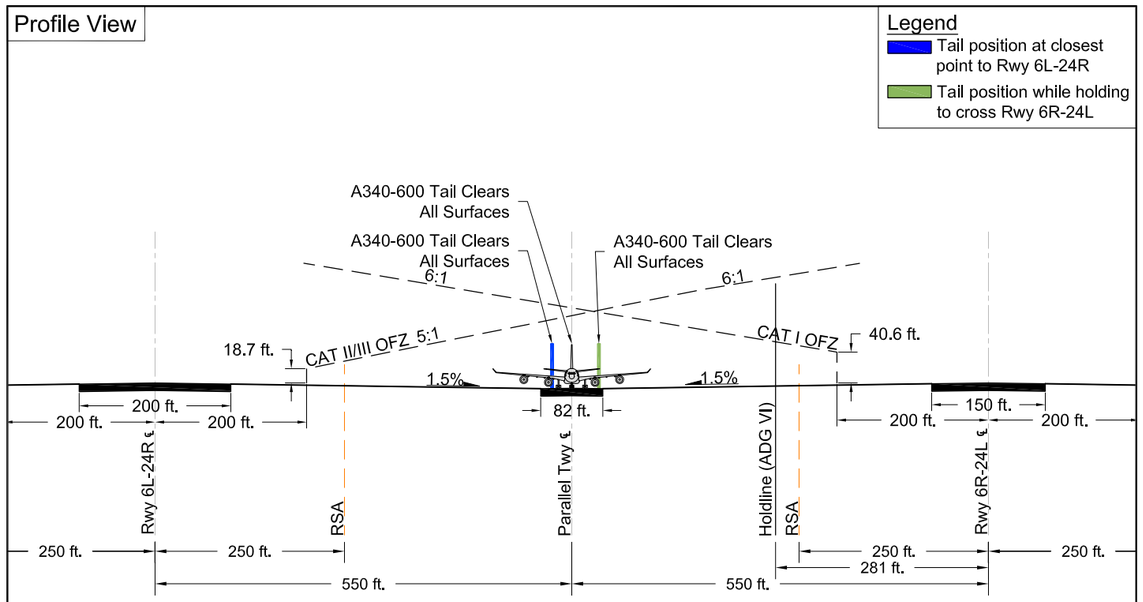
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

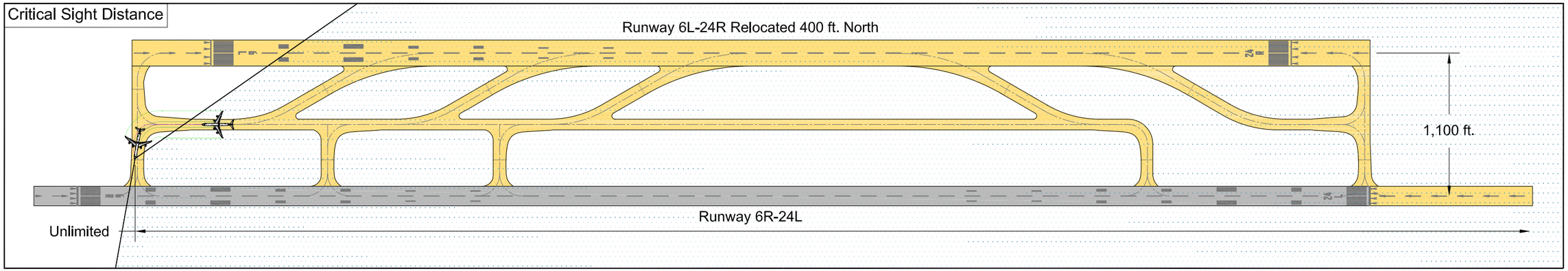
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Airbus, Airplane Characteristics for Airport Planning, April 2001 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 46

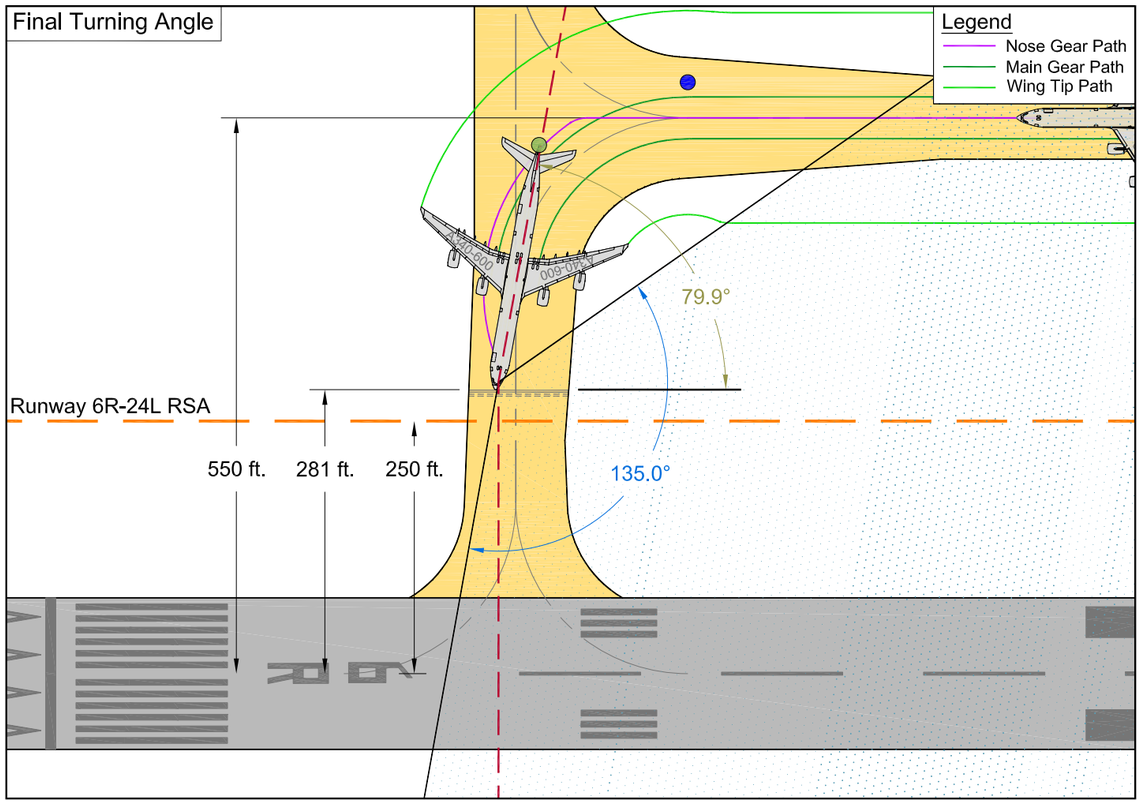
Runway 6L-24R Relocated 400 ft. North
Airbus A340-600 Critical Sight Distance (Standard + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 40-51_400 North_v2.dwg_Layout: 46_May 25, 2011, 3:28pm

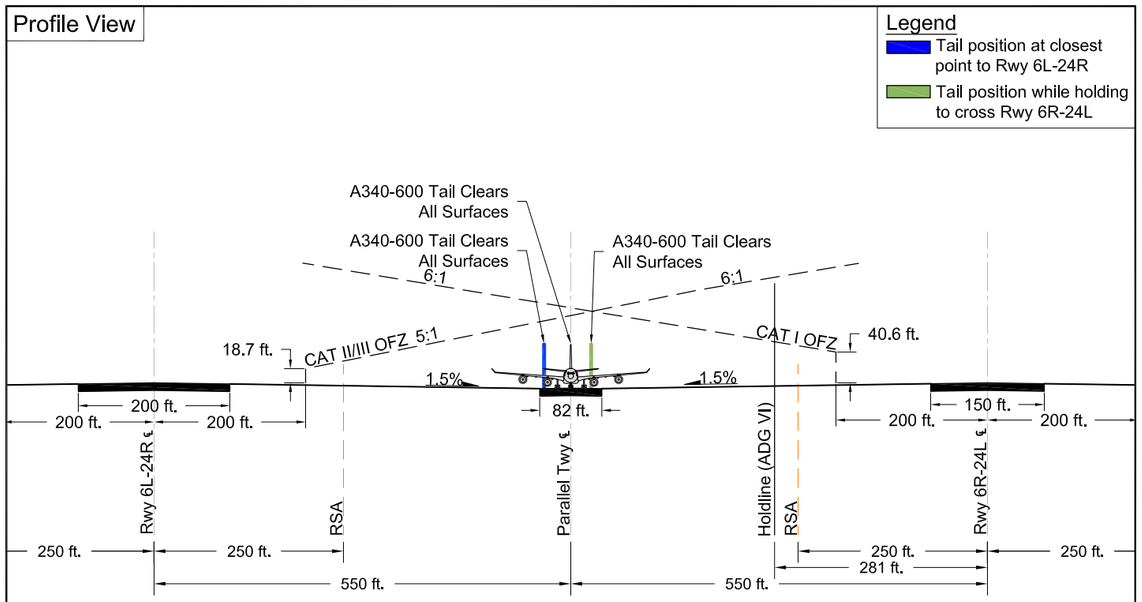
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

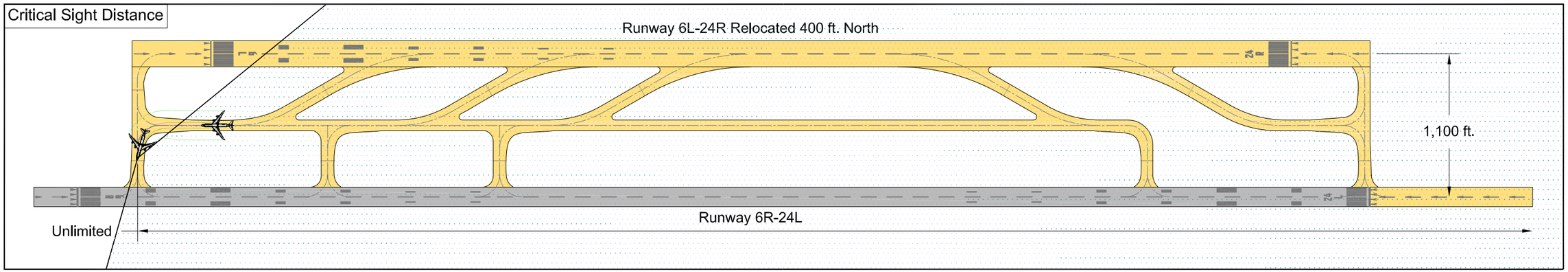
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Airbus, Airplane Characteristics for Airport Planning, April 2001 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 47

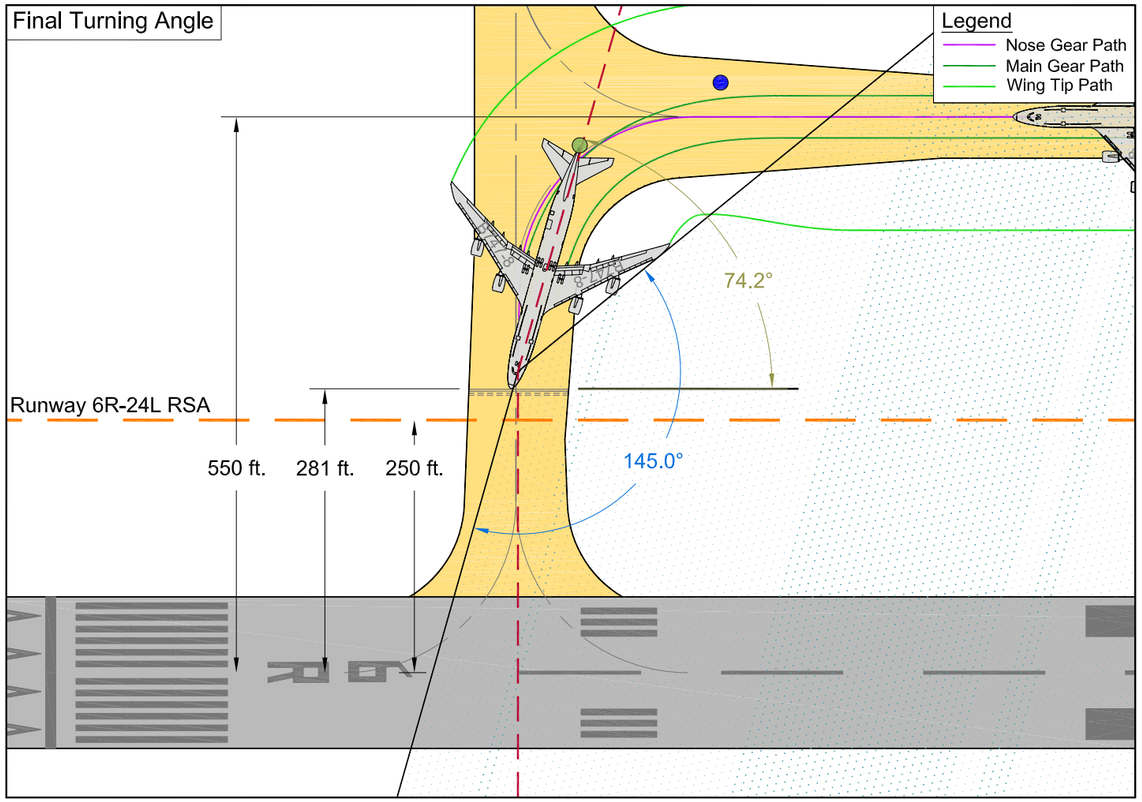
Runway 6L-24R Relocated 400 ft. North
Airbus A340-600 Critical Sight Distance (Standard + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 40-51_400 North_v2.dwg_Layout: 47_May 25, 2011, 3:29pm

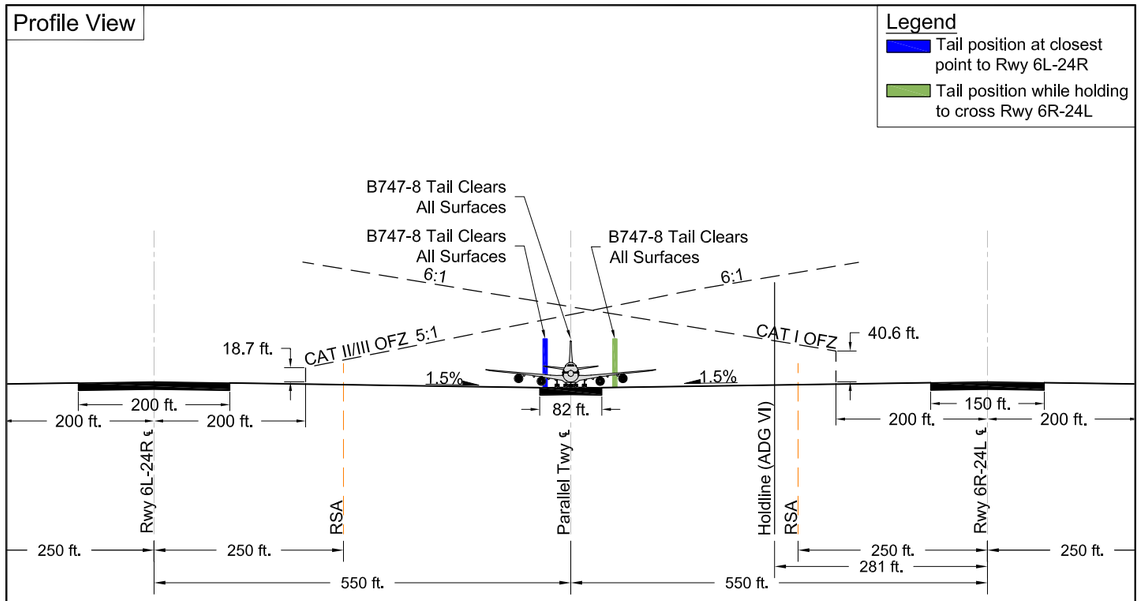
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

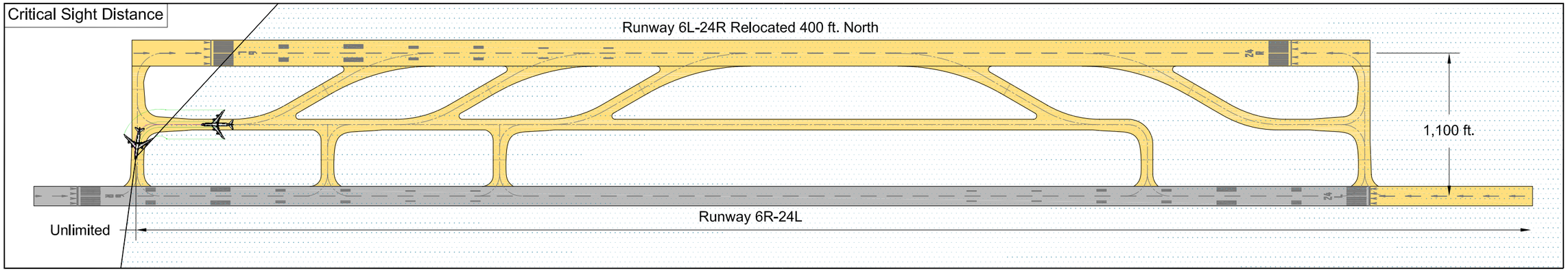
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, March 2011 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 48

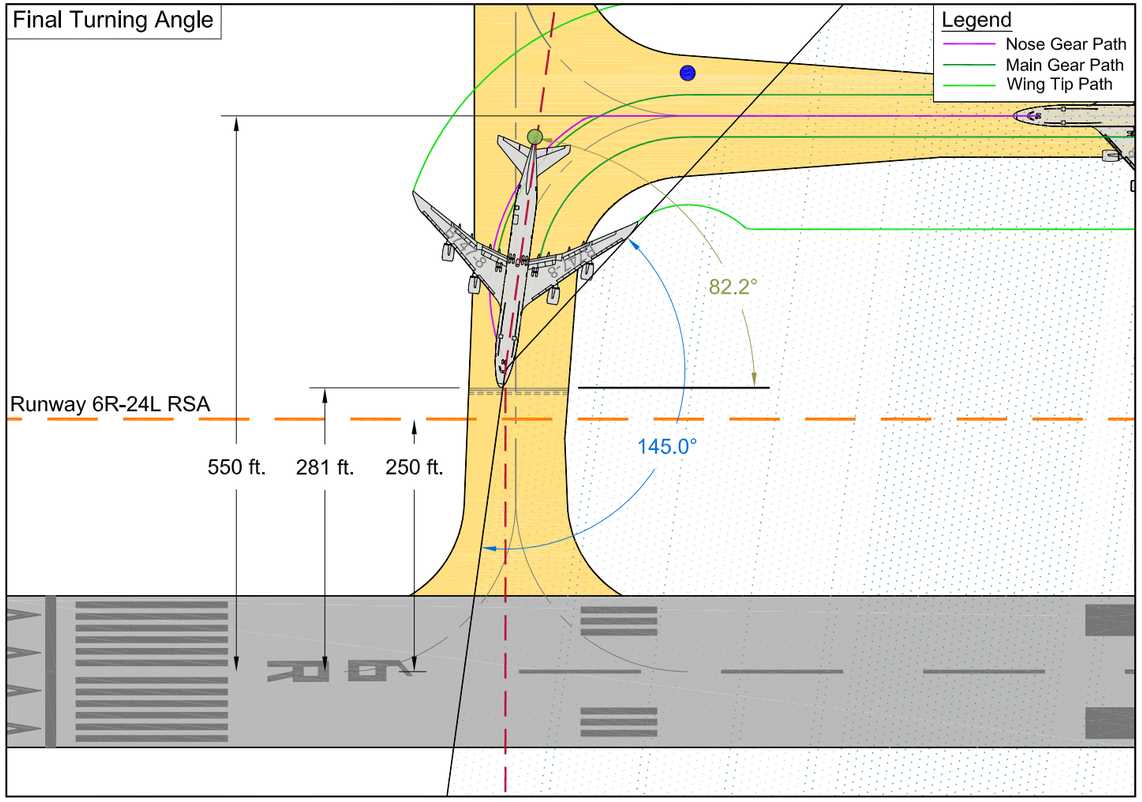
Runway 6L-24R Relocated 400 ft. North
Boeing B747-8 Critical Sight Distance (Standard + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 40-51_400 North_v2.dwg_Layout: 48_May 25, 2011, 3:29pm

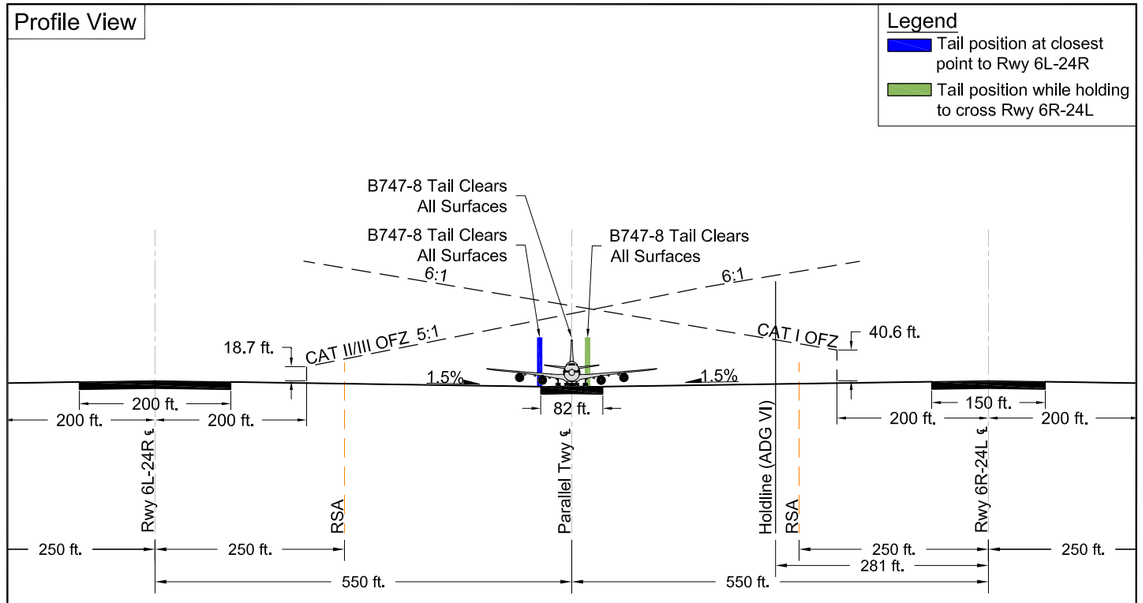
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

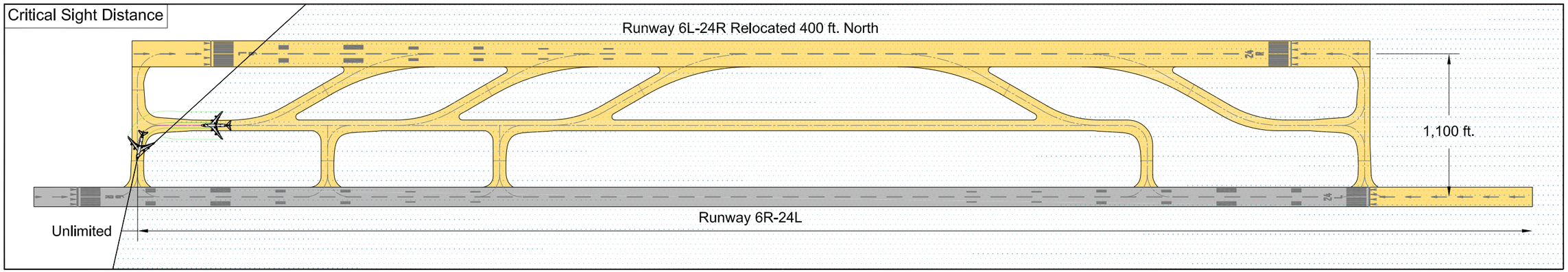
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, March 2011 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 49

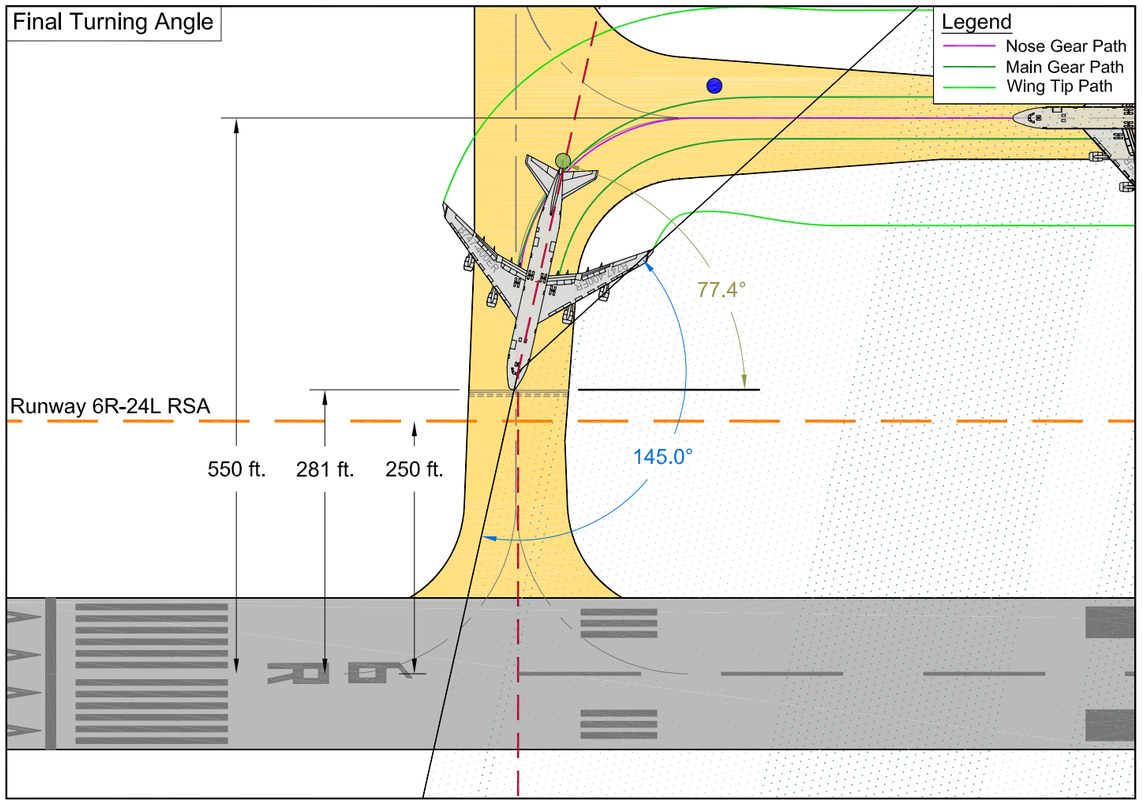
Runway 6L-24R Relocated 400 ft. North
Boeing B747-8 Critical Sight Distance (Standard + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 40-51_400 North_v2.dwg_Layout: 49_May 25, 2011, 3:29pm

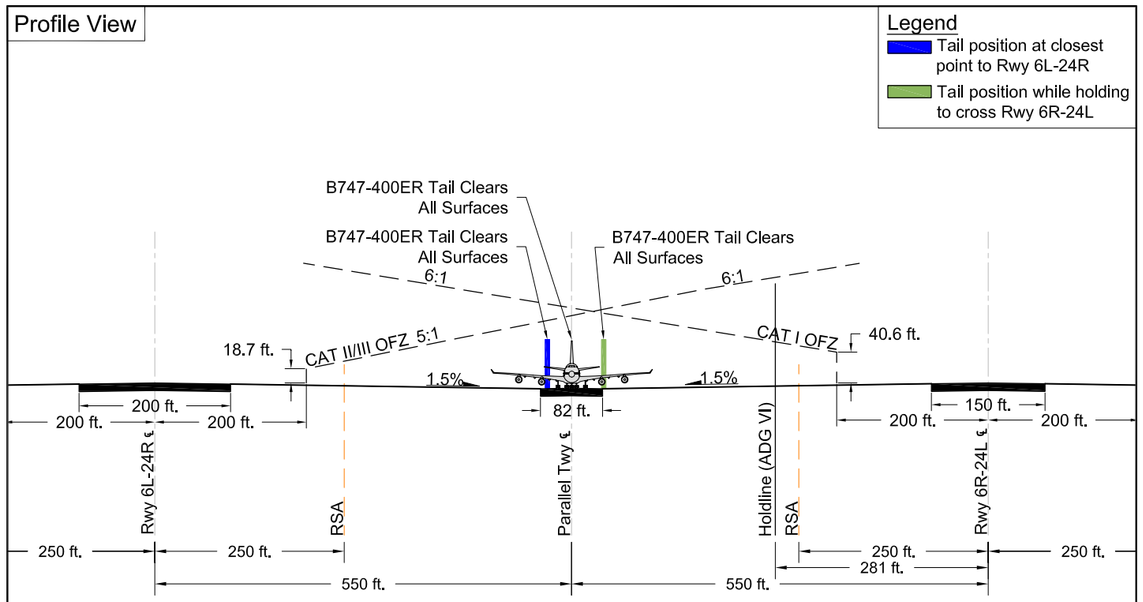
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

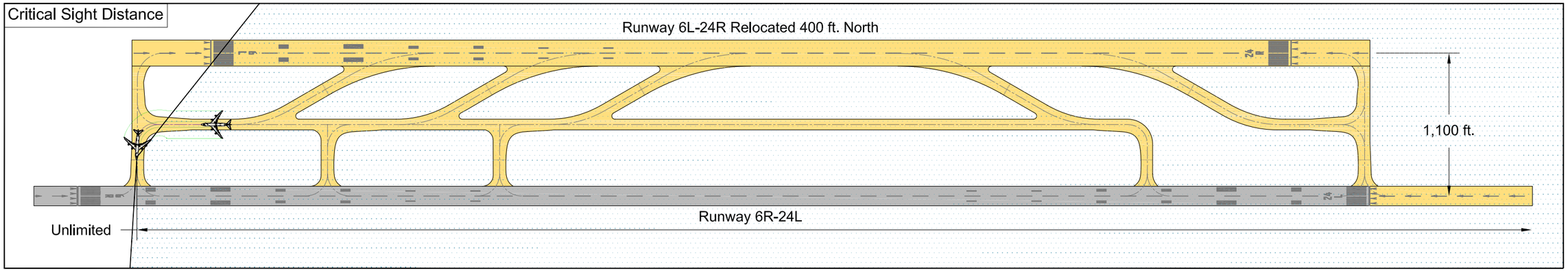
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, June 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 50

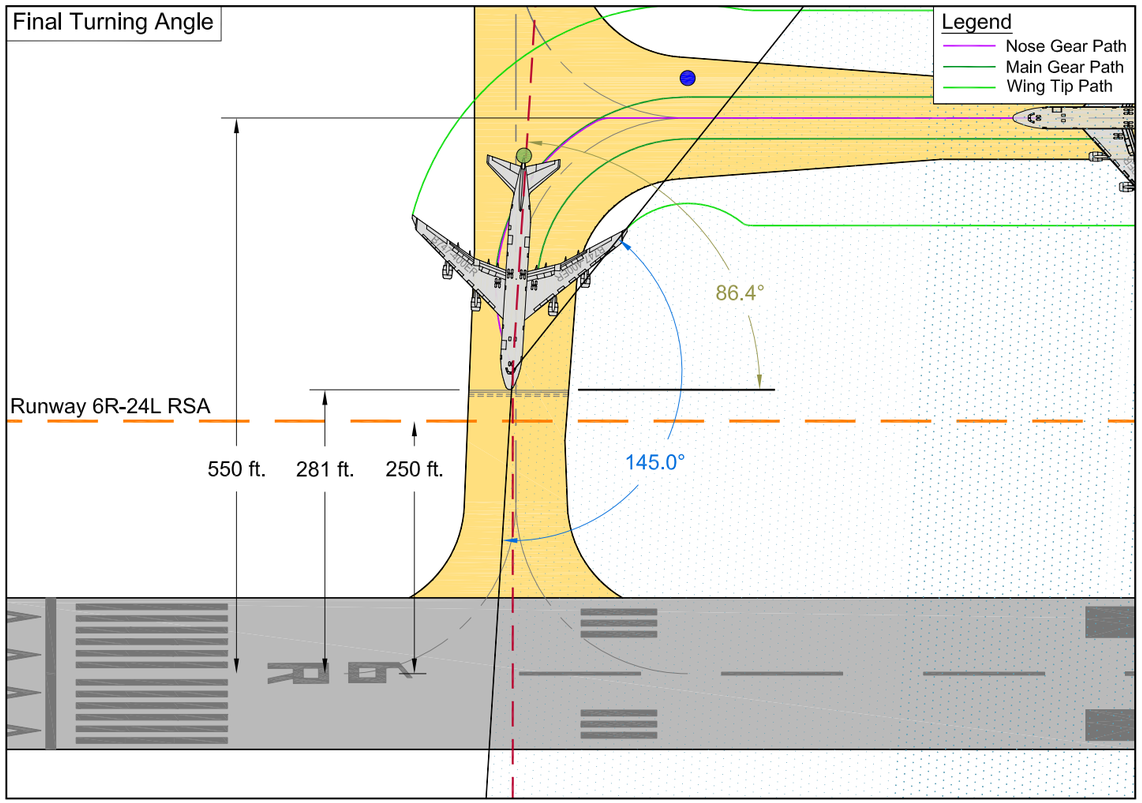
Runway 6L-24R Relocated 400 ft. North
Boeing B747-400ER Critical Sight Distance (Standard + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 40-51_400 North_v2.dwg_Layout: 50_May 25, 2011, 3:29pm

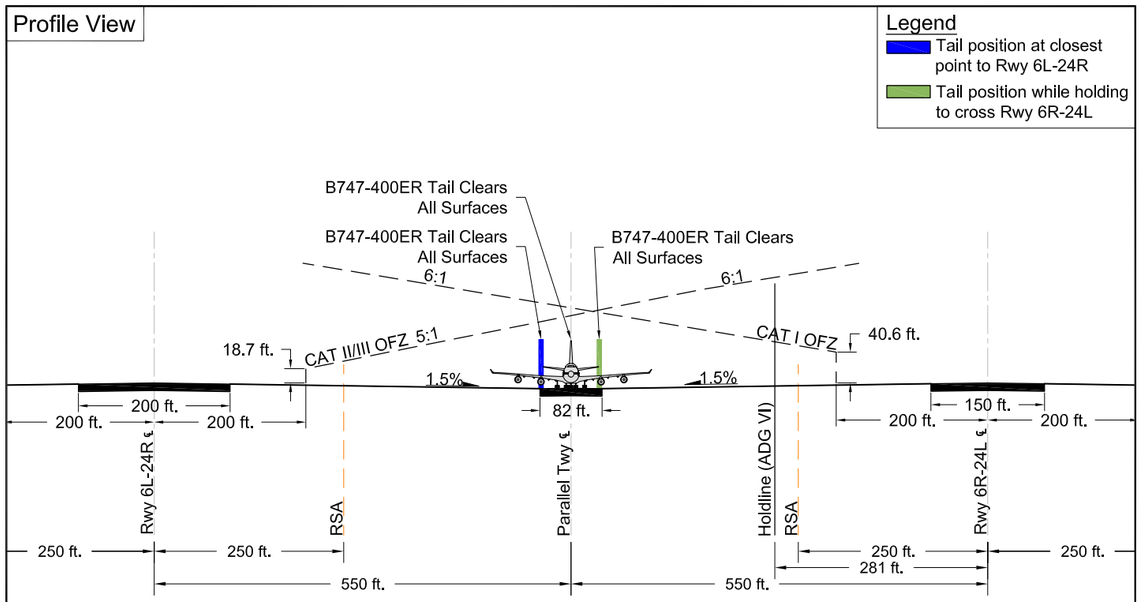
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

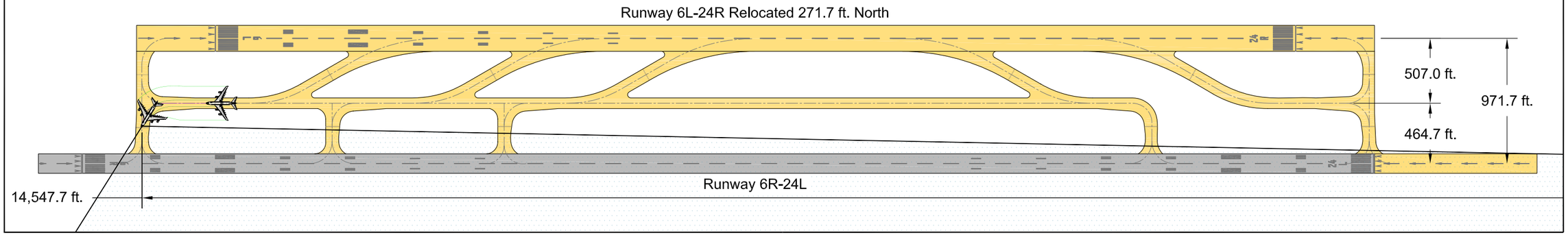
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, June 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 51

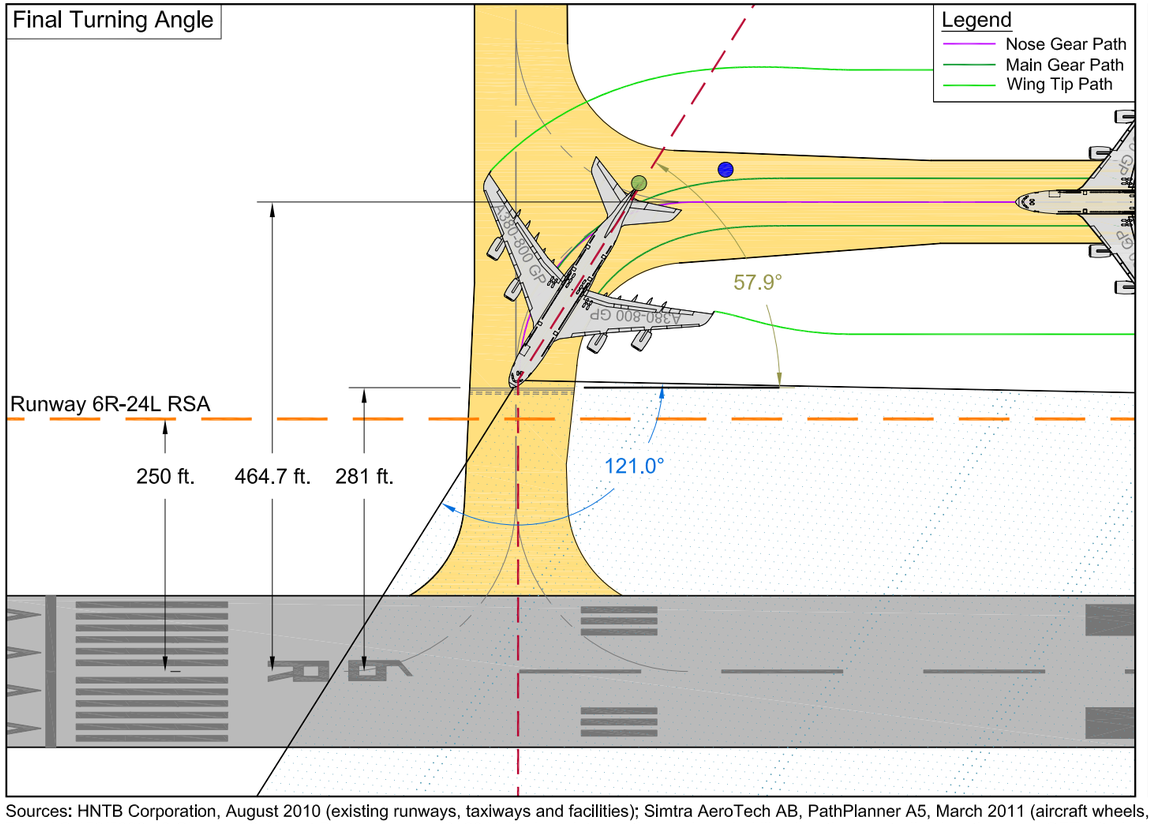
Runway 6L-24R Relocated 400 ft. North
Boeing B747-400ER Critical Sight Distance (Standard + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 40-51_400 North_v2.dwg_Layout: 51_May 25, 2011, 3:30pm

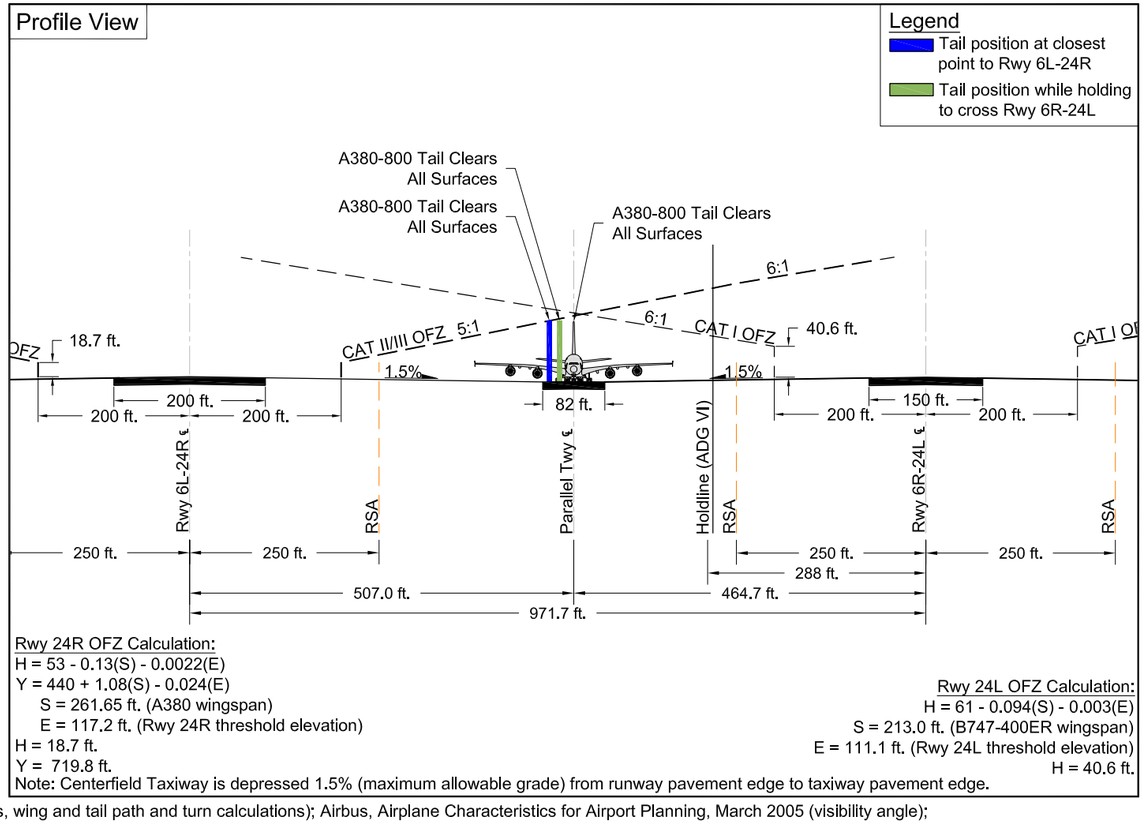
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

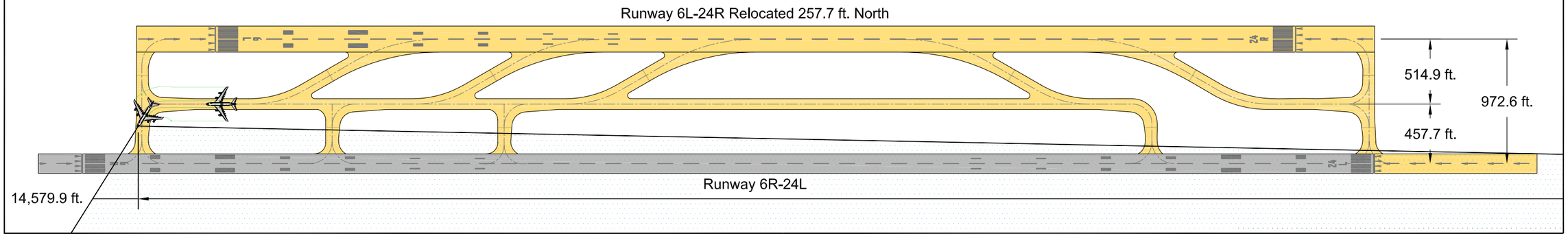
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Airbus, Airplane Characteristics for Airport Planning, March 2005 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 52

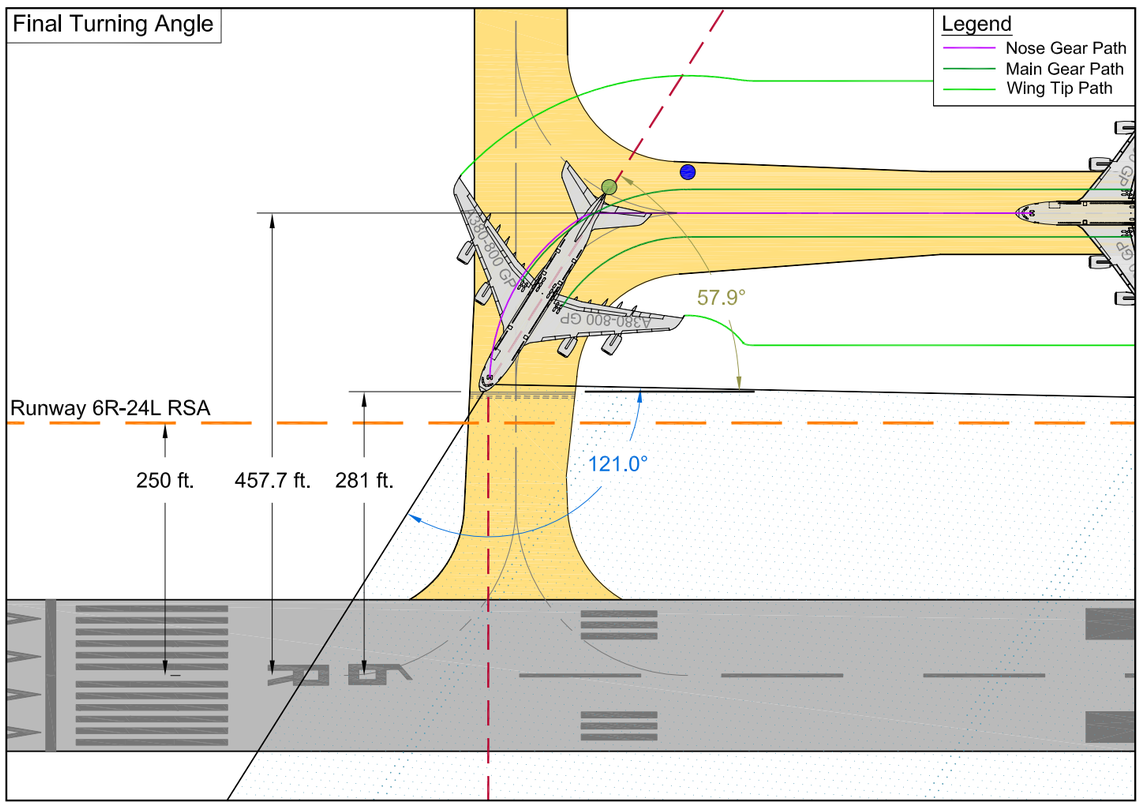
Minimum Runway-Runway Separation
Airbus A380-800 (Standard + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 52-53_A380_Critical Distance.dwg_Layout: 52_May 25, 2011, 3:30pm

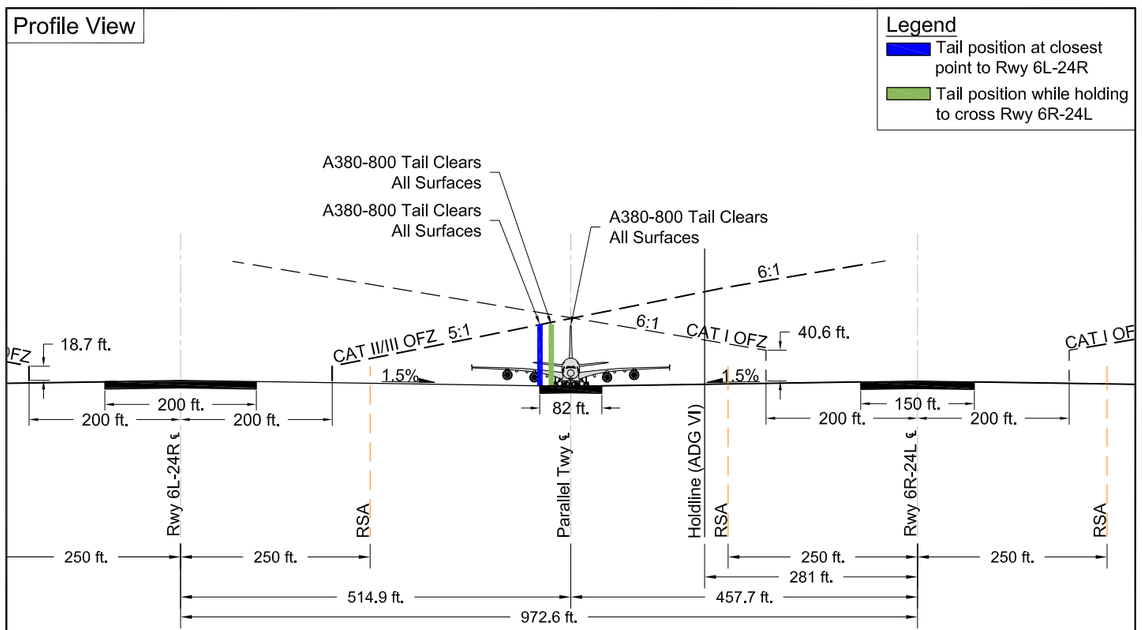
Critical Sight Distance



Final Turning Angle



Profile View



Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

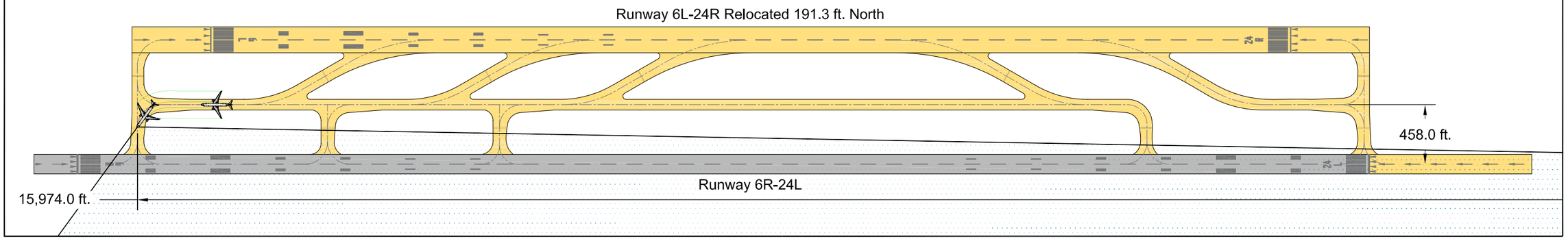
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Airbus, Airplane Characteristics for Airport Planning, March 2005 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 53

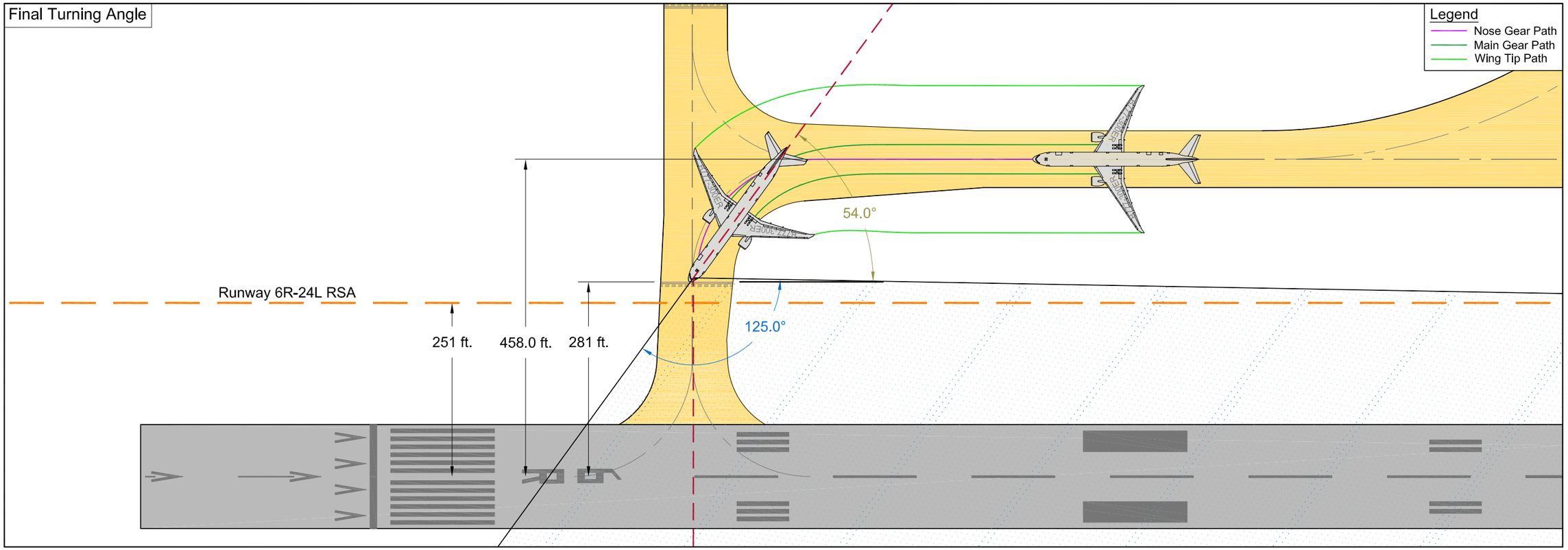
Minimum Runway-Runway Separation
Airbus A380-800 (Standard + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 52-53_A380_Critical Distance.dwg_Layout: 53_May 25, 2011, 3:30pm

Critical Sight Distance



Final Turning Angle



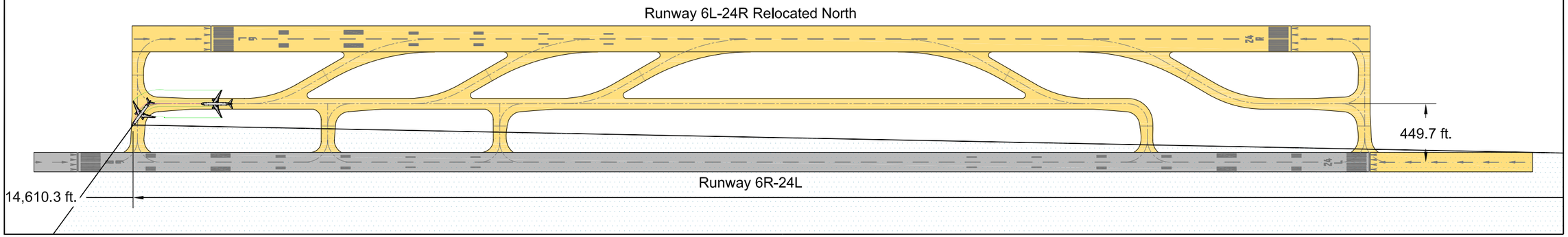
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, May and June 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 54

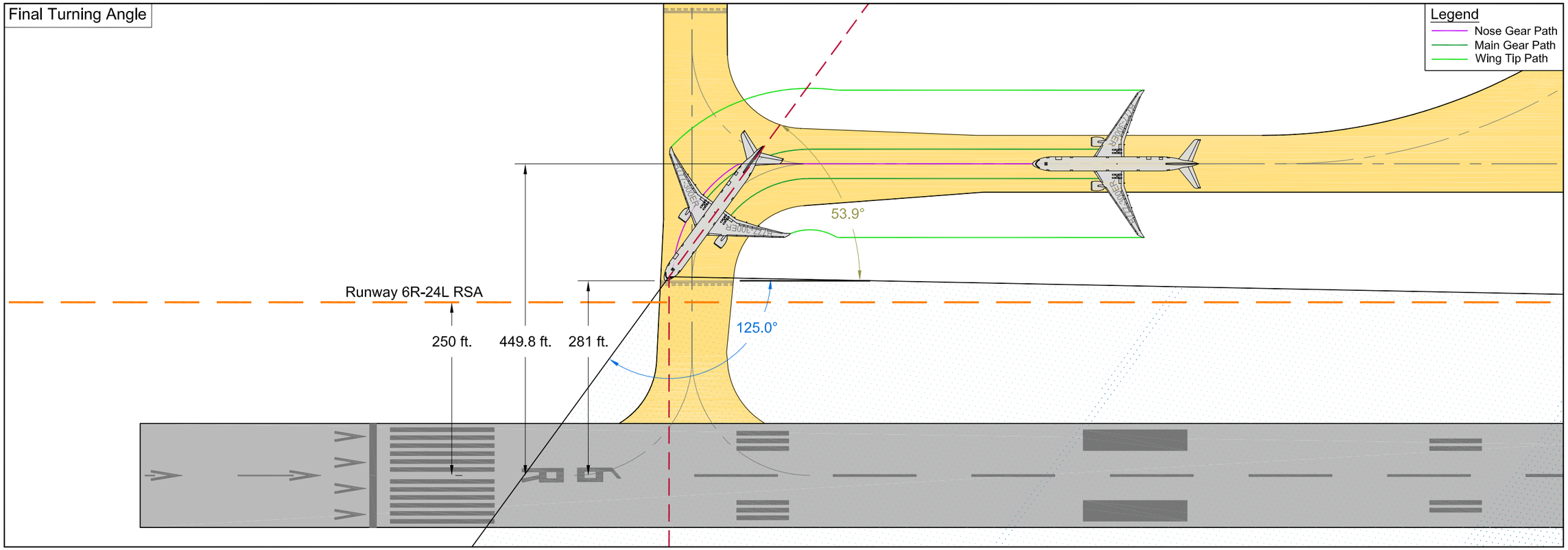
Minimum Runway 6R-24L-Centerfield Taxiway Separation
Boeing B777-300ER (Standard + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 54-57_ADG V_Critical Distance.dwg_Layout: 54_May 25, 2011, 3:31pm

Critical Sight Distance



Final Turning Angle

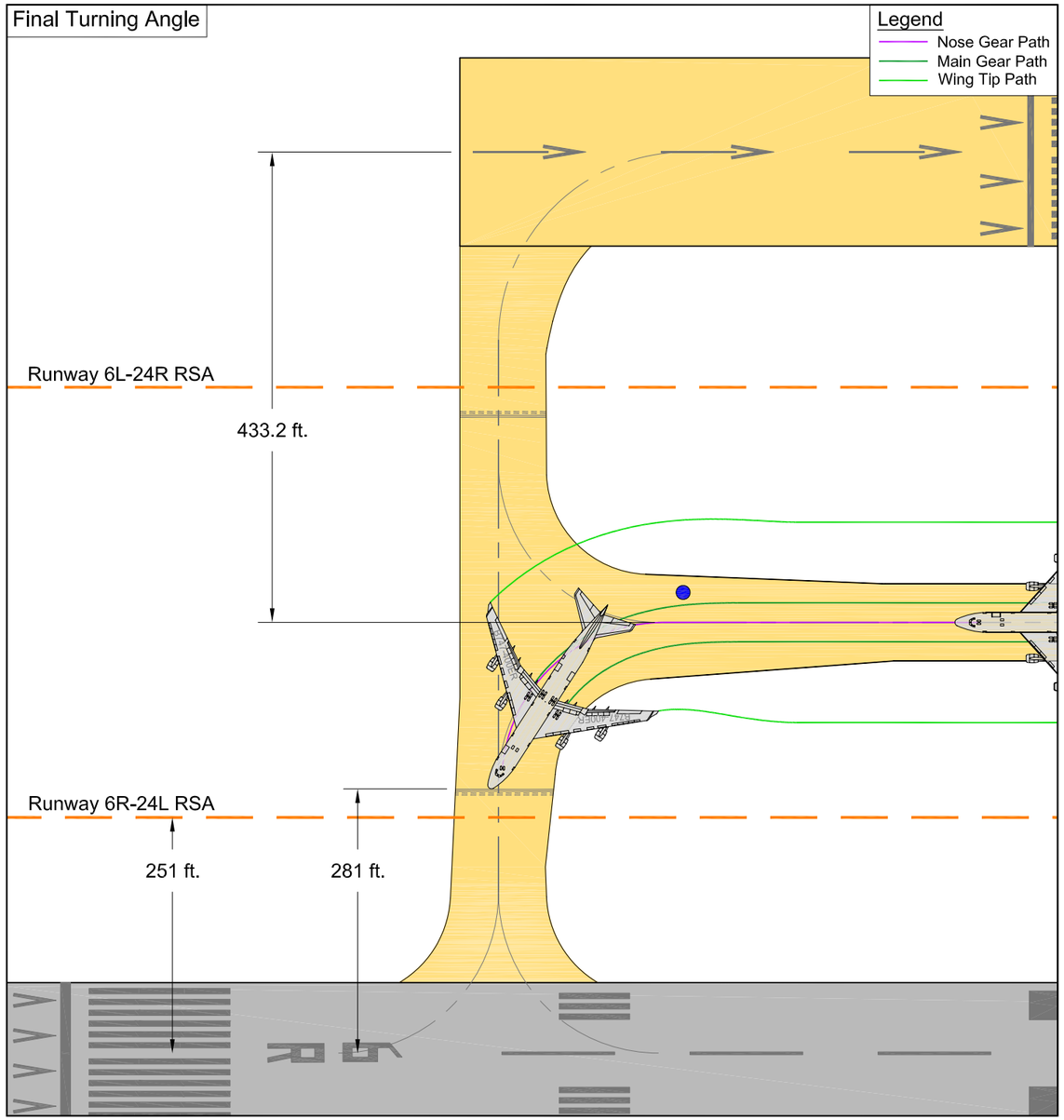


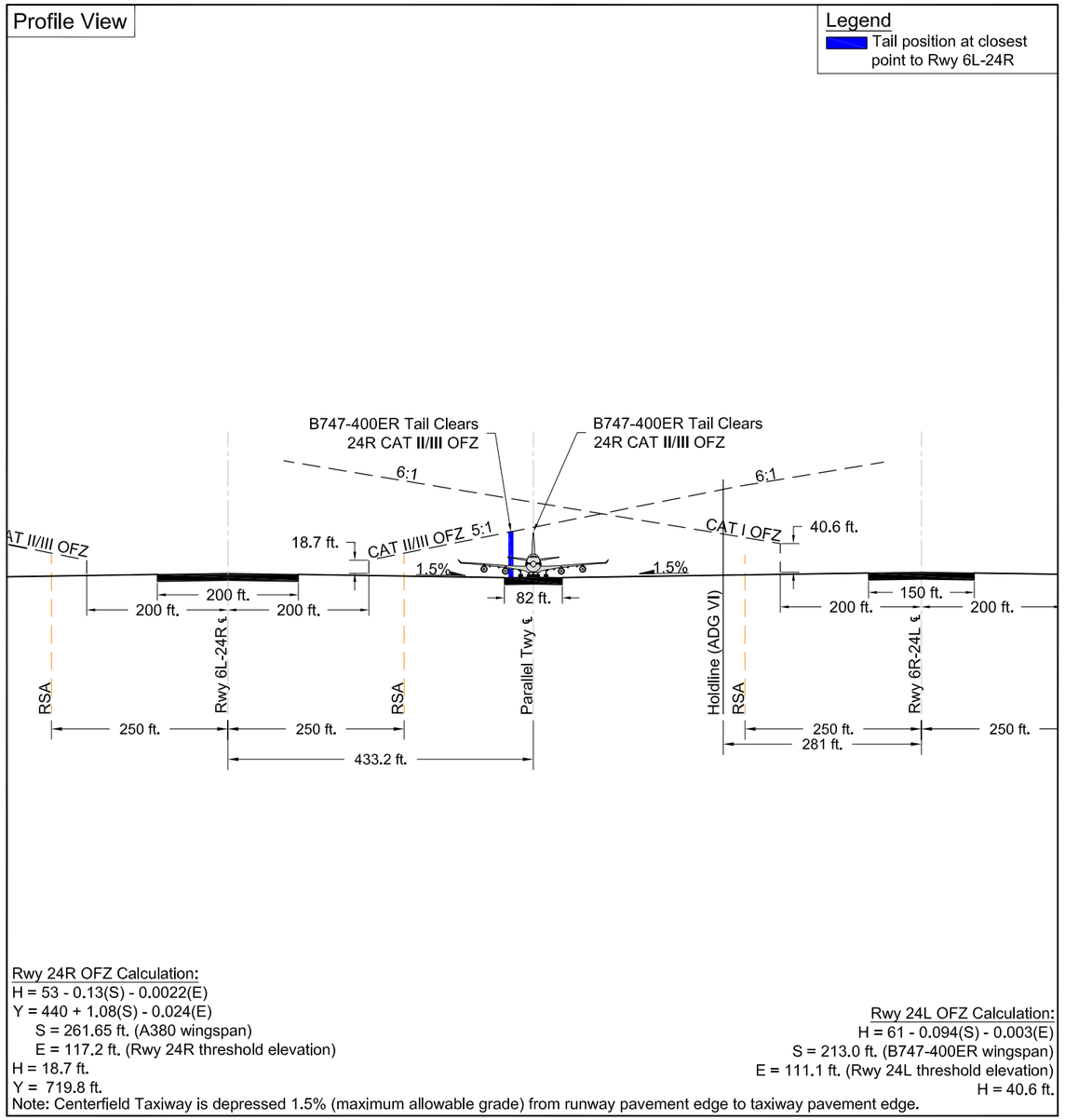
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, May and June 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., March 2011.

Exhibit 55

Minimum Runway 6R-24L-Centerfield Taxiway Separation
Boeing B777-300ER (Standard + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 54-57_ADG V_Critical Distance.dwg_Layout: 55_May 25, 2011, 3:31pm





Rwy 24R OFZ Calculation:
H = 53 - 0.13(S) - 0.0022(E)
Y = 440 + 1.08(S) - 0.024(E)
S = 261.65 ft. (A380 wingspan)
E = 117.2 ft. (Rwy 24R threshold elevation)
H = 18.7 ft.
Y = 719.8 ft.

Rwy 24L OFZ Calculation:
H = 61 - 0.094(S) - 0.003(E)
S = 213.0 ft. (B747-400ER wingspan)
E = 111.1 ft. (Rwy 24L threshold elevation)
H = 40.6 ft.

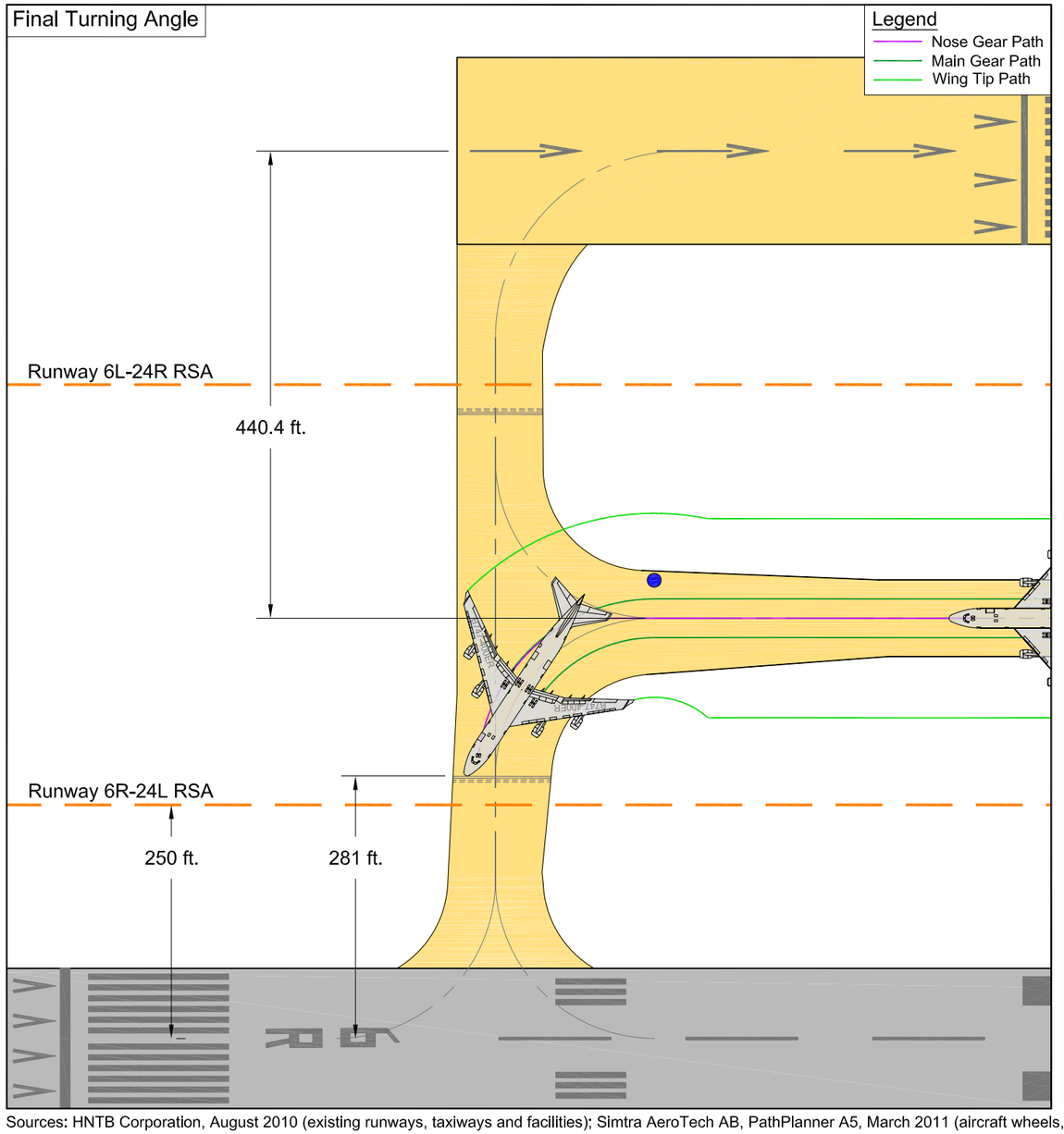
Note: Centerfield Taxiway is depressed 1.5% (maximum allowable grade) from runway pavement edge to taxiway pavement edge.

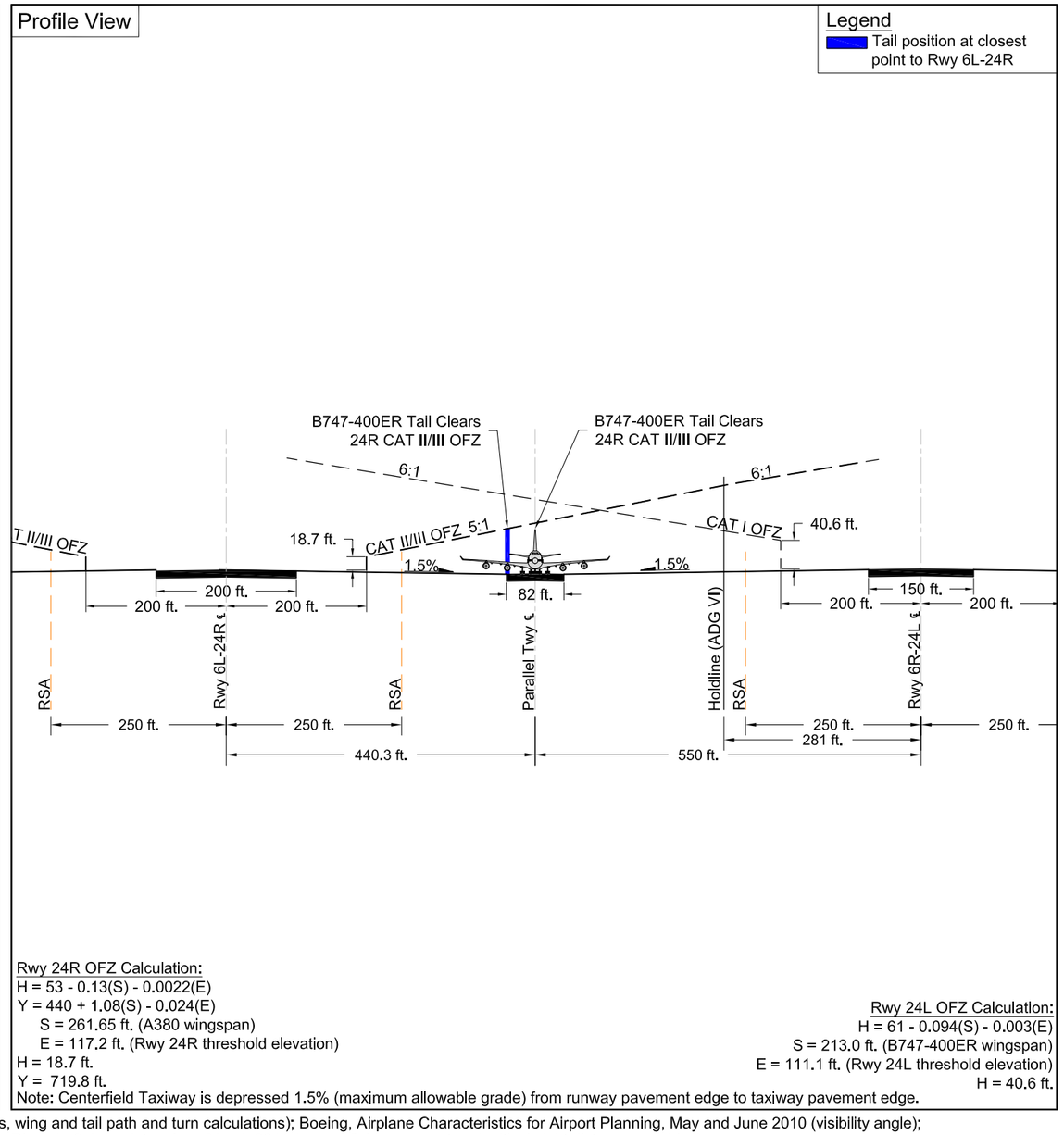
Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, May and June 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., May 2011.

Exhibit 56

Minimum Centerfield Taxiway-Runway 6L-24R Separation
Boeing B747-400ER (Standard + Cockpit over Centerline)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 54-57_ADG V_Critical Distance.dwg_Layout: 56_May 25, 2011, 3:32pm



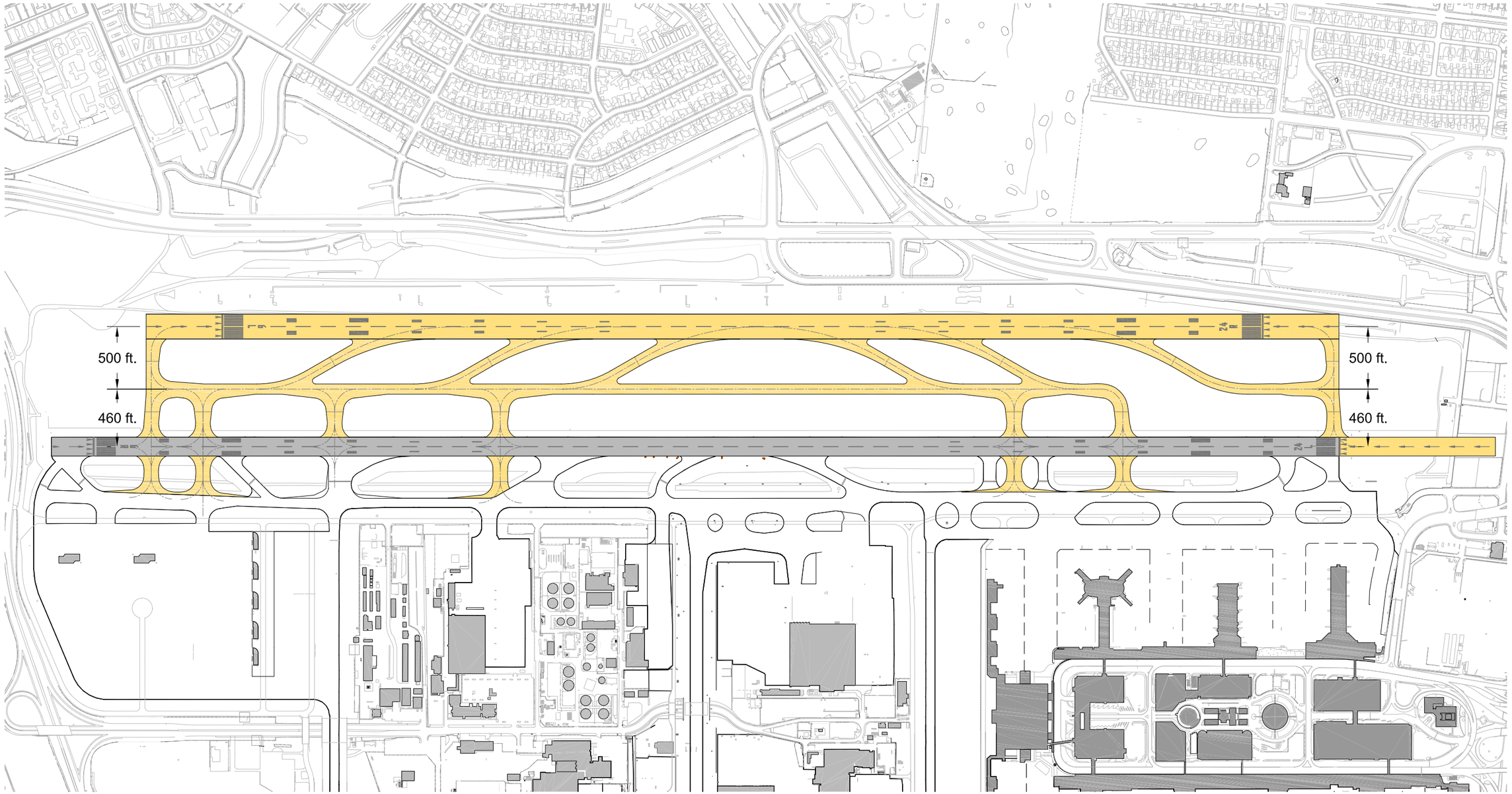


Sources: HNTB Corporation, August 2010 (existing runways, taxiways and facilities); Simtra AeroTech AB, PathPlanner A5, March 2011 (aircraft wheels, wing and tail path and turn calculations); Boeing, Airplane Characteristics for Airport Planning, May and June 2010 (visibility angle); FAA, AC 150/5300-13 Change 16 *Airport Design*, January 3, 2011 (taxiway intersection designs, holdline location, centerline locations and OFZ criteria); Ricondo & Associates, Inc., March 2011 (new airfield pavement and critical sight distance variables).
Prepared by: Ricondo & Associates, Inc., May 2011.

Exhibit 57

Minimum Centerfield Taxiway-Runway 6L-24R Separation
Boeing B747-400ER (Standard + Judgmental Oversteer)

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 54-57_ADG V_Critical Distance.dwg_Layout: 57_May 25, 2011, 3:33pm



Source: HNTB Corporation, Los Angeles International Airport Layout Plan, August 2010; FAA, AC 150/5300-13 *Airport Design*, January 3, 2011; Ricondo & Associates, Inc., May 2011.
Prepared by: Ricondo & Associates, Inc., May 2011.

Exhibit 58

0 800 ft.

north

Runway 6L-24R Relocated 260 ft. North

Drawing: Z:\LAWA\LAX North Runway Alternatives\Runway Visibility\CAD\Ex 58_260N Concept.dwg_Layout: Layout1_May 25, 2011, 3:33pm