

## 2. Alternatives

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### 2.1 Introduction

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#### 2.1.1 SCOPE OF THE ALTERNATIVE ANALYSIS

This section summarizes the screening process that was used to identify, compare, and evaluate a wide range of alternatives to the Proposed Action. The process followed to identify the range of initial alternatives to be considered and the screening process used to determine which alternatives would reasonably satisfy the purpose of and need for the Proposed Action are described in this section. Those alternatives that would satisfy the purpose and need for the Proposed Action were carried forward for analysis of environmental consequences. Lists of applicable federal laws and regulations considered during the analysis are provided at the end of this section.

The alternatives presented in this EA were developed as part of the *Runway 6L-24R & 6R-24L Safety Area (RSA) Practicability Study for Los Angeles International Airport* (RSA Practicability Study).<sup>1</sup> This study was conducted following a review of the previous RSA determination by the FAA, several meetings with LAWA representatives and the FAA, and the development of order of magnitude construction cost estimates for each of the alternatives. Additionally, the practicability of RSA improvements was considered based on a review of airport operating characteristics, runway-use configurations, weather data, and aircraft operational characteristics.

The RSA improvement alternatives were ranked in order of magnitude of construction complexity and costs. Based on FAA guidance, those alternatives that were not deemed financially feasible or otherwise had a negative impact on aircraft operations were not considered a viable or a practicable alternative. Recommendations provided by the FAA to improve the RSAs<sup>2</sup> were included to the greatest extent practicable.

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<sup>1</sup> Ricondo and Associates, Inc., *Runway 6L-24R & 6R-24L Safety Area (RSA) Practicability Study for Los Angeles International Airport*, April 9, 2010.

<sup>2</sup> U.S. Department of Transportation, Federal Aviation Administration, *Runway Safety Area Evaluation and Analysis, Los Angeles International Airport*, June 14, 2006.

## 2.1.2 REQUIREMENTS OF THE FAA AND NATIONAL ENVIRONMENTAL POLICY ACT

FAA Orders 1050.1E and 5050.4B set forth FAA policies and procedures to be followed in assessing the environmental impacts of aviation-related projects in compliance with NEPA. These Orders require a thorough and objective assessment of the Proposed Action, the No Action alternative, and all “reasonable” alternatives that would achieve the stated purpose and need for the Proposed Action. The alternatives analysis presented in this section of the EA is consistent with the requirements of FAA Orders 1050.1E and 5050.4B.

The Council on Environmental Quality (CEQ) regulations (Title 40, Code of Federal Regulations [CFR] § 1502.14) for implementing the *National Environmental Policy Act of 1969* requires that federal agencies perform the following tasks:

- Rigorously explore and objectively evaluate all reasonable alternatives and, for alternatives which were eliminated from detailed study, briefly discuss the reasons for their elimination;
- Devote substantial treatment to each alternative considered in detail, including the Proposed Action, so that reviewers may evaluate the alternatives’ comparative merits;
- Include reasonable alternatives not within the jurisdiction of the lead agency; and,
- Include the alternative of no action.

The purpose and need for the Proposed Action, as described in Section 1.4 of this Draft EA, includes the following:

- Comply with the Transportation, Treasury, Housing and Urban Development, the Judiciary, The District of Columbia, and Independent Agencies Appropriations Act (Public Law [P.L.] 109-115)<sup>3</sup>. This Act requires completion of RSA improvements by airport sponsors that hold a certificate under Title 14, Code of Federal Regulations (CFR) Part 139, Certification and Operations: Land Airports Serving Certain Air Carriers, to meet FAA design standards by December 31, 2015.
- Address poor pavement conditions and extend the useful life of Runway 6L-24R and Taxiway AA pavement and maintain its usage as the primary arrivals runway for the north airfield. Due to heavy usage over the years, sections of the pavement have deteriorated and need reconstruction. LAWA is responsible for providing suitable infrastructure and maintaining safe facilities at LAX for aircraft operations.
- Realign the existing holdbars on Taxiways Y, Z, and AA to comply with current FAA standards.

Reasonable alternatives that accomplish the purpose and need for the Proposed Action have been identified and evaluated in this Draft EA to satisfy CEQ requirements.

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<sup>3</sup> *The Transportation, Treasury, Housing and Urban Development, the Judiciary, The District of Columbia, and Independent Agencies Appropriations Act, 2006* Pub. L. No. 109-115, 109<sup>th</sup> Cong., 1<sup>st</sup> Sess. (November 30, 2005).

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## 2.2 RSA Alternatives Screening and Evaluation

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This section identifies potential RSA improvement alternatives for Runway 6L-24R and Runway 6R-24L, which includes alternatives identified in the FAA's *Runway Safety Area Evaluation and Analysis for LAX*<sup>4</sup> as well as alternatives identified during the RSA Practicability Study. The alternatives have been divided into two categories: 1) conceptual alternatives and 2) refined alternatives. The conceptual alternatives were developed following the FAA guidelines listed in Section 2.2.3, and the refined alternatives are additional RSA improvements based on a combination of the conceptual alternatives, consistent with FAA Order 5200.8. The Runway Safety Area Technical Team, comprised of the Sponsor and FAA officials, conducted preliminary review and the subsequent evaluation process for the alternatives as part of the RSA Practicability Study. The RSA Technical Team was responsible for identifying the pros and cons of the conceptual alternatives, providing suggestions for refined alternatives, and making final recommendations. Since the need for pavement rehabilitation and realignment of the taxiway holdbars is necessary regardless of which RSA Alternative is chosen, the pavement rehabilitation and taxiway holdbar realignment components of the Proposed Action are not included in the RSA Alternatives screening evaluation.

### 2.2.1 RSA ALTERNATIVES SCREENING EVALUATION CRITERIA

The identification and evaluation of RSA alternatives in this Draft EA incorporates information presented in the RSA Practicability Study. The evaluation of RSA alternatives in this Draft EA was performed using a three step evaluation process:

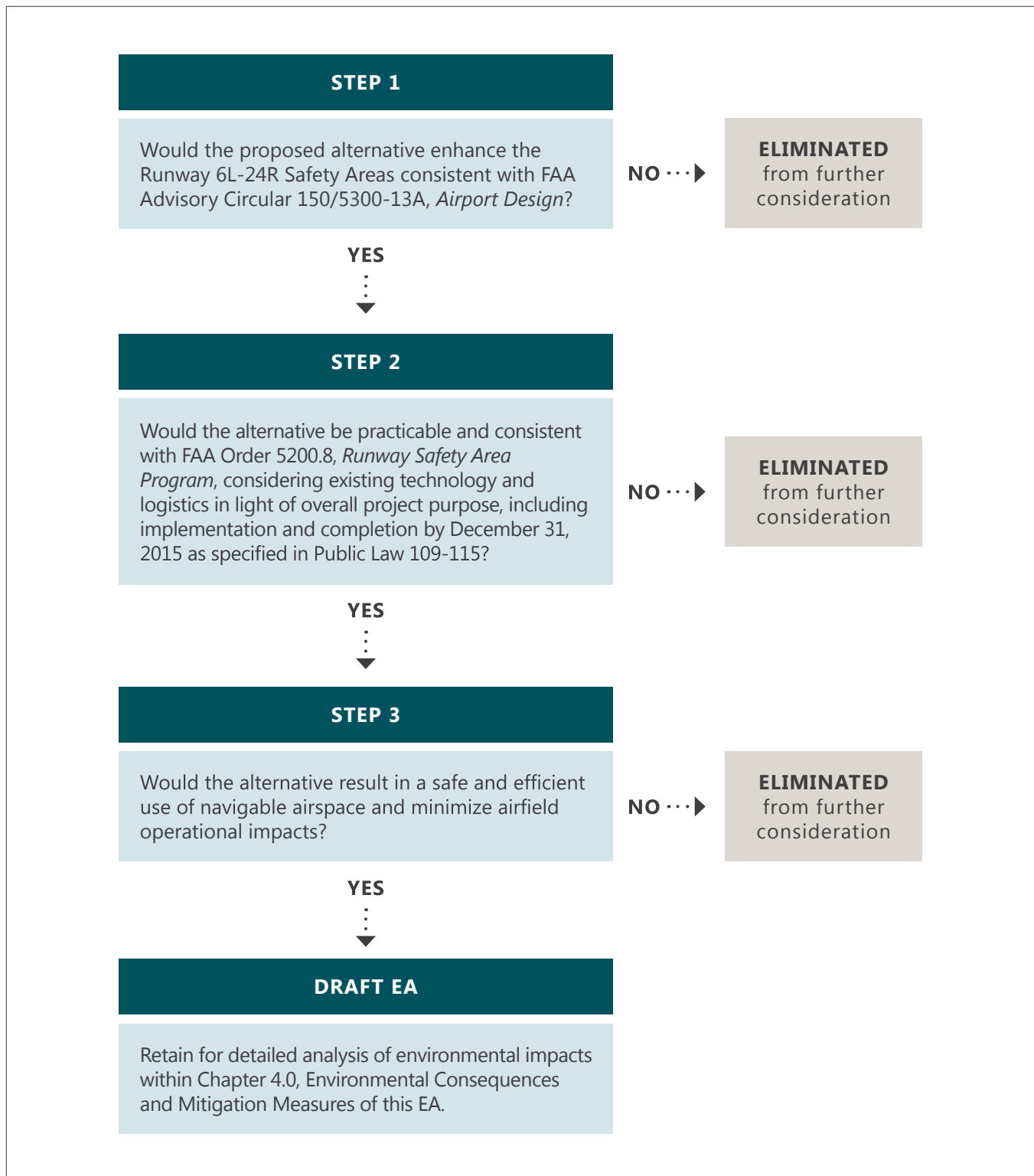
- Step 1: Would the proposed alternative enhance the Runway 6L-24R and 6R-24L Runway Safety Areas consistent with FAA Advisory Circular 150/5300-13A, *Airport Design*?
- Step 2: Would the alternative be practicable and consistent with FAA Order 5200.8, *Runway Safety Area Program*, considering existing technology and logistics in light of overall project purpose, including implementation and completion by December 31, 2015 as specified in P.L. 109-115?
- Step 3: Would the alternative result in a safe and efficient use of navigable airspace and minimize airfield operational impacts?

**Exhibit 2-1** illustrates the alternative evaluation screening process.

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<sup>4</sup> Federal Aviation Administration, *Runway Safety Area Evaluation and Analysis, Los Angeles International Airport*, June 14, 2006.

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SOURCE: Ricondo & Associates, Inc., 2013.  
PREPARED BY: Ricondo & Associates, Inc., May 2014.

**EXHIBIT 2-1**

## RSA Alternative Screening Process

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Alternatives meeting each criterion were retained for detailed analysis of environmental impacts within Section 4, *Environmental Consequences and Mitigation Measures* of this EA.

Each alternative was first evaluated to determine whether it would meet the purpose of and need for the Proposed Action by enhancing RSAs consistent with FAA airport design standards and improve safety for arriving and departing passengers and aircraft. Each alternative found to meet the Step 1 criteria was then evaluated in Step 2 to determine whether or not it would be practicable, considering existing technology and logistics in light of the overall project purpose, including implementation and completion of RSA improvements by December 31, 2015. In Step 3, alternatives that were found to meet both the Step 1 and Step 2 criteria were further evaluated to determine whether each would result in a safe and efficient use of navigable airspace, and would minimize impacts on existing airfield operations. Alternatives that were found to satisfy the screening criteria were carried forward for evaluation of potential environmental effects, as described in Section 4 of this Draft EA. In accordance with the requirements of the CEQ Regulations, the implementing regulations for NEPA, the No Action Alternative was retained and carried forward for detailed analysis in Section 4.

#### 2.2.1.1 Step 1 Criteria: Purpose and Need

Would an alternative improve the Runway 6L-24R and Runway 6R-24L RSAs consistent with FAA airport design standards, articulated in FAA AC 150/5300-13A, *Airport Design*, and improve safety for arriving and departing passengers and aircraft? **Table 2-1** depicts the RSA dimensions for runways such as Runway 6L-24R and Runway 6R-24L that serve large commercial aircraft in Approach Categories C and D, per Table 3-8 of FAA AC 150/5300-13A, *Airport Design*.

**Table 2-1: Runway Safety Area Dimensions**

RSA DIMENSIONS	APPROACH CATEGORY C AND D (FEET)
RSA Width	500
RSA Length Prior to Landing	600
RSA Length Beyond each Runway End	1,000

SOURCE: Federal Aviation Administration, Advisory Circular 150/5300-13A, *Airport Design*, September 28, 2012.

PREPARED BY: Ricondo & Associates, Inc., August 2013.

As discussed in Section 1.2.2 of this Draft EA, an RSA must be capable, under dry conditions, of supporting aircraft rescue and fire fighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.

### 2.2.1.2 Step 2 Criteria: Practicality and Implementation Schedule

The criteria used in the Step 2 screening evaluation addressed several key considerations:

- Could the alternative realistically be developed and implemented by December 31, 2015, as specified in P.L. 109-115?
  - *Implementation Schedule:* The ability to successfully plan, design, obtain the necessary permits for, and construct necessary improvements by the December 31, 2015 deadline established by P.L. 109-115, were key criteria for each of the RSA alternatives considered.
- Would the alternative be practical and prudent, considering existing technology, as well as design and construction challenges and potential costs when compared to other alternatives?
  - *Construction and Cost Practicability:* This criterion addressed the relative engineering design and construction complexity of each RSA alternative, along with the projected construction cost (including any environmental mitigation requirements). For example, the requirement to relocate major surface transportation facilities (e.g., Sepulveda Boulevard or Lincoln Boulevard) would pose substantial design and construction challenges and have a substantially higher cost than an alternative that did not affect such facilities. As such, alternatives that had fewer complexities in terms of staging, phasing, and construction activities were considered more feasible and practical than those with highly complex construction issues.
- Does the alternative provide the maximum practicable benefit to aviation safety in accordance with the guidance in FAA Order 5200.8, *Runway Safety Area Program*?
  - *Provision of Maximum Practical Benefit to Aviation Safety:* An explicit goal of FAA Order 5200.8, *Runway Safety Area Program*, is to encourage airports to provide the maximum practical benefit to aviation safety in developing their RSA program, when provision of standard RSAs specified in FAA AC 150/5300-13A, *Airport Design*, is not practical. The order recommends consideration of a sequence of possible improvements, and recommends that for each alternative improvement, the greatest practical conformance with the FAA airport design standards for RSA dimensions and/or performance be implemented.

### 2.2.1.3 Step 3 Criteria: Safe and Efficient Use of Navigable Airspace and Impact on Airfield Operations

The final step of the screening evaluation considered these two criteria:

- Is the alternative consistent with the FAA's statutory mission to ensure the safe and efficient use of navigable airspace?
  - *Safe and Efficient Use of Navigable Airspace:* This criterion considered whether or not an alternative would require significant changes to either local or regional airspace procedures, as well as the potential to cause airspace conflicts.
- Would the alternative minimize the impact of the RSA improvements on the operation of the Airport, including the ability to effectively serve the aircraft fleet currently using and expected to use the Airport?

- *Airport Operations*: This criterion evaluated to what extent an alternative may affect the efficient use of the airfield, reduce the utility of Runway 6L-24R or Runway 6R-24L, or otherwise substantially impact airfield operations. Examples of such impacts would be increased taxi distances and times; increased delay resulting from increased runway crossings; or reductions in runway length that would impose new operational restrictions on aircraft. Operational restrictions would include any increased weight limitations for departing aircraft that reduce the number of passengers, amount of cargo, or amount of fuel that can be carried by the departing aircraft.

## 2.2.2 EVALUATION OF OFF-SITE AND OPERATIONAL ALTERNATIVES CONSIDERED

### 2.2.2.1 Use of Alternative Modes of Transportation Alternative

The primary purpose of the Proposed Action is to enhance RSAs for Runway 6L-24R and Runway 6R-24L consistent with FAA AC 150/5300-13A, *Airport Design*, as required by P.L. 109-115. The use of alternative modes of transportation to replace some or all of the air transportation activity at LAX does not meet this purpose because the Runway 6L-24R and Runway 6R-24L RSAs would still fail to meet FAA airport design standards, and safety would not be enhanced as required by P.L. 109-115. In addition, FAA and LAWA do not have the authority to compel LAX airport users to use other modes of transportation. The Use of Alternative Modes of Transportation Alternative was, therefore, eliminated from further consideration in this EA.

### 2.2.2.2 Use of Other Public Airports Alternative

The primary purpose of the Proposed Action is to enhance RSAs for Runway 6L-24R and Runway 6R-24L consistent with FAA airport design standards. The use of other area public airports to replace some or all of the air transportation activity at LAX does not meet this purpose because the RSAs for Runway 6L-24R and Runway 6R-24L at LAX would still fail to meet applicable FAA airport design standards, and safety would not be enhanced as required by P.L. 109-115. In addition, FAA and LAWA do not have the authority to divert air transportation activity from LAX to other area airports. The Use of Other Public Airports Alternative was, therefore, eliminated from further consideration in this EA.

### 2.2.2.3 Use of Alternative Aircraft Alternative

The primary purpose of the Proposed Action is to enhance RSAs for Runway 6L-24R and Runway 6R-24L consistent with FAA airport design standards. The use of alternative aircraft to replace some or all of the transportation activity at LAX does not meet the purpose and need of the Proposed Action because the RSAs for Runway 6L-24R and Runway 6R-24L would still fail to meet the applicable FAA airport design standards, and safety would not be enhanced, as required by P.L. 109-115. In addition, FAA and LAWA do not have the authority to compel airlines to use alternative aircraft. The Use of Alternative Aircraft Alternative was, therefore, eliminated from further consideration in this EA.

Off-site and operational alternatives such as alternative modes of transportation, use of other public airports or the use of alternative aircraft would not meet the purpose and need of the Proposed Action. The implementation of off-site or operational alternatives would fail to enhance the RSAs for Runway 6L-24R and Runway 6R-24L at LAX, which would still fail to meet applicable FAA airport design standards, as required by

P.L. 109-115. Off-site and operational alternatives have therefore been eliminated from further consideration in this Draft EA.

## 2.2.3 DESCRIPTION OF ON-SITE ALTERNATIVES CONSIDERED

In developing the alternatives to improve the RSAs of Runway 6L-24R and Runway 6R-24L, consideration was given to an appropriate balance of improvements allocated to each runway end based on predominant direction of runway use, site constraints, environmental considerations, and implementation costs. The key FAA documents that have provided guidance in developing the conceptual alternatives include FAA Order 5200.8, *Runway Safety Area Program*; FAA AC 150/5220-22A, *Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns*; and FAA Order 5200.9 *Financial Feasibility and Equivalency of Runway Safety Area Improvements and Engineered Material Arresting Systems*.

Based on the guidelines in FAA Order 5200.8, *Runway Safety Area Program*, six RSA conceptual alternatives were developed for Runway 6L-24R and Runway 6R-24L for comparative purposes. These alternatives include the alternatives identified in the FAA's *Runway Safety Area Evaluation and Analysis* for LAX<sup>5</sup>:

- No Action Alternative
- Construct Standard RSA Alternative
- Reduce Runway Length Alternative
- Implement Declared Distances Alternative
- Relocate, Shift or Realignment the Runway Alternative(s)
- Install Standard EMAS Alternative
- Combination of the above alternatives

### 2.2.3.1 Construct Standard RSA Alternative

According to Section 4, *Considerations in Assessing Alternatives* of Appendix 2 of FAA Order 5200.8, *Runway Safety Area Program*, establishing a traditional, graded RSA that fully meets the dimensional and gradient requirements must be the first option considered. At a minimum, land acquisition, fill, soil improvement, and grading requirements must be identified and evaluated.<sup>6</sup> This alternative often involves the greatest unavoidable impacts on natural resources and surrounding communities, and therefore, the greatest potential costs for environmental mitigation.

### 2.2.3.2 Reduce Runway Length Alternative

Under this alternative, RSA dimensions compliant with FAA airport design standards may be obtained by shortening the length of a runway to achieve the required RSA length. This is a feasible alternative if the

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<sup>5</sup> Federal Aviation Administration, *Runway Safety Area Evaluation and Analysis, Los Angeles International Airport*, June 14, 2006.

<sup>6</sup> Federal Aviation Administration, FAA Order 5200.8 *Runway Safety Area Program*, effective date: October 1, 1999.

current aircraft serving LAX require less runway length than what is presently available, and the difference can accommodate the required RSA, or other runways, if available, can accommodate the larger aircraft without resulting in major impacts to airport operations.

### 2.2.3.3 Implement Declared Distances Alternative

Where it is impracticable to provide the clearances and dimensions for RSAs in accordance with FAA design standards, the implementation of declared distances is another alternative that may provide an acceptable means of providing an equivalent RSA. Declared distances are defined in Chapter 1, of FAA AC 150/5300-13A, *Airport Design*, as "...the distances the Airport owner declares available for a turbine-powered aircraft's takeoff run, takeoff distance, accelerate-stop distance, and landing distance requirements." Typically, this concept involves declaring that some portion of the existing runway pavement is unavailable for specific operations, and is instead used to provide an RSA meeting applicable FAA airport design standards. **Appendix A** provides further explanation of declared distances.

Declared distances are also used where different runway lengths are defined for each direction of operation (i.e., when displaced thresholds are present). Pilots use these declared distances, along with weather data and aircraft performance characteristics, to make determinations such as the maximum allowable takeoff or landing weight of the aircraft or the maximum payload and range for a flight. Declared distances at airports are considered in the Operations Specifications of commercial aircraft operations that are part of the air carrier certificates and operations certificates issued by FAA under 14 CFR Part 119, as well as in the internal operations manuals of those operators. Pilots of commercial aircraft are required to comply with such specifications and manuals.

In this situation, the specified distance available for a particular operation such as landing may be different in each direction on the same runway pavement. As discussed in Section 1, *Purpose and Need*, declared distances include Takeoff Run Available (TORA), Takeoff Distance Available (TODA), Accelerate-Stop Distance Available (ASDA), and Landing Distance Available (LDA). The application of declared distances at a specific airport requires prior FAA approval on a case-by-case basis. FAA approval would be secured through the Airport Layout Plan (ALP) approval process set forth in FAA AC 150/5300-13A, *Airport Design*.<sup>7</sup>

### 2.2.3.4 Relocate, Shift or Realign the Runway Alternative(s)

When a traditional, standard RSA is determined not to be practicable, an option to meet RSA standards can involve relocating, shifting, realigning, or otherwise changing a runway. In some cases the environmental impacts and construction/implementation costs of these types of RSA improvements may not be practicable.

### 2.2.3.5 Install Standard Engineered Materials Arresting System (EMAS) Alternative

When it is not practicable to provide a standard RSA that meets FAA standards, consideration may be given to enhancing runway safety through the use of an Engineered Materials Arresting System (EMAS). An EMAS is

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<sup>7</sup> Federal Aviation Administration, Advisory Circular 150/5300-13A, *Airport Design*, September 28, 2012.

an aircraft arresting system comprised of a specialized concrete material that is designed to crush under the weight of an aircraft. An EMAS can decelerate and stop an aircraft over a short distance. When an aircraft overruns the runway, these materials are crushed, absorbing the forward momentum of the aircraft and decelerating and arresting the aircraft's movement. The FAA requires that EMAS be engineered to decelerate the runway's design aircraft at exit speeds of 70 knots, without causing significant damage to the aircraft or injuries to the passengers. Section 4 of FAA AC 150/5220-22B, *Engineered Materials Arresting Systems for Aircraft Overruns*, indicates that a standard EMAS provides a level of safety that is generally equivalent to a full RSA built to the dimensional standards in the latest version of FAA AC 150/5300-13A, *Airport Design*. For purposes of installing an EMAS, the FAA defines the design aircraft as an aircraft having at least 500 annual operations (takeoffs and landings) on the runway, and having the most demand on EMAS. This is usually, but not always, the heaviest aircraft that regularly uses the runway. Photographs of sample EMAS installations are provided in **Exhibit 2-2**.

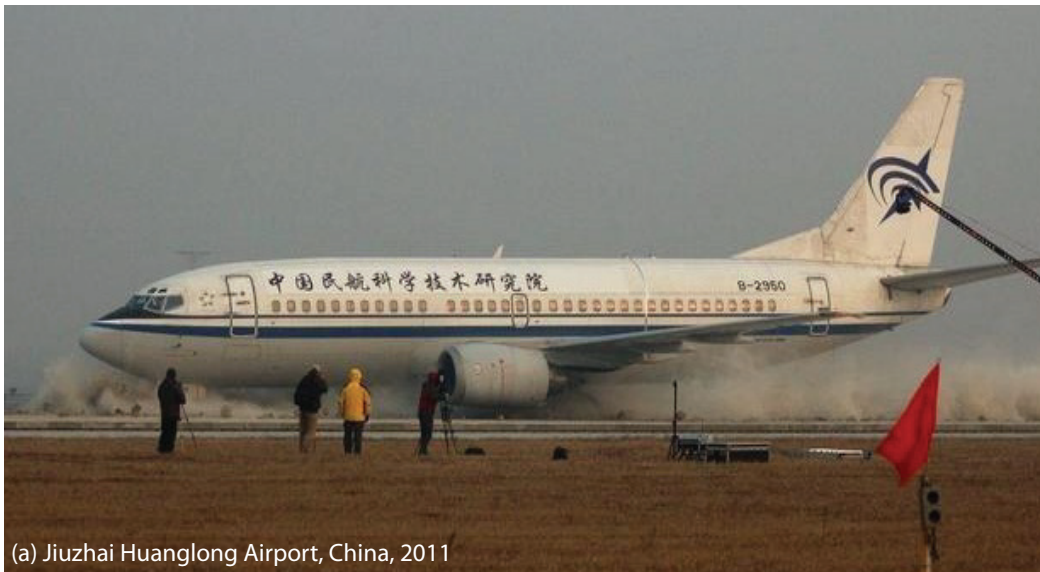
#### 2.2.4 EVALUATION OF ON-SITE RSA DEVELOPMENT ALTERNATIVES

The FAA completed a RSA determination in June 2006 that evaluated the existing Runway 6L-24R and Runway 6R-24L RSAs and practicable options to address deficiencies in the RSAs. In the evaluation, entitled *Runway Safety Area Evaluation and Analysis*, the FAA made a determination for each runway that "the existing RSA does not meet standards but is practicable to improve." Furthermore, the FAA determined that the existing RSA could be incrementally improved:<sup>8</sup>

- Runway 6L-24R - For take-offs and landings to the east, the FAA identified the following practicable alternative:
  - Relocating the Runway 6L localizer;
  - Relocating the service road and perimeter fence; and
  - The application of declared distances.
- Runway 6R-24L - For landings on Runway 24R, the FAA identified the following practicable alternative:
  - The application of declared distances;
  - Displace threshold for landings;
  - Install Engineered Materials Arresting System (EMAS);
- Relocate perimeter barrier fence.

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<sup>8</sup> Ricondo and Associates, Inc., *Runways 6L-24R & 6R-24L Safety Area (RSA) Practicability Study for Los Angeles International Airport*, January 2010.



SOURCE: (a) Gizmodo Australia, <http://www.gizmodo.com.au/2011/12/why-did-this-airplane-landing-gear-destroy-this-concrete-runway>, 2011; (b) Port Authority of New York and New Jersey, 2004.  
PREPARED BY: Ricondo & Associates, Inc., May 2014.

**EXHIBIT 2-2**

## Sample Engineered Materials Arresting System (EMAS) Installations

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Subsequently, in the 2009 *Runways 6L-24R & 6R-24L Safety Area (RSA) Practicability Study for Los Angeles International Airport* the Runway Safety Area Technical Team developed and evaluated practicable alternatives based on the FAA determination. Additional RSA development alternatives were included based on key FAA documents that provided guidance in developing the conceptual alternatives, including FAA Order 5200.8 *Runway Safety Area Program*, FAA AC 150/5220-22A *Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns*, and FAA Order 5200.9 *Financial Feasibility and Equivalency of Runway Safety Area Improvements and Engineered Material Arresting Systems*.

Consistent with the processes outlined in these documents, the conceptual alternatives for mitigating the RSA deficiencies include the following:

- Construct standard runway safety areas
- Reduce runway length
- Implement declared distances
- Relocate, shift, or realign the runway
- Install EMAS
- Develop a combination of alternatives to achieve a preferred alternative

The RSA improvement alternatives for Runway 6L-24R and Runway 6R-24L were subjected to an evaluation process in accordance with FAA Order 5200.8, *Runway Safety Area Program* and FAA Order 5200.9, *Financial Feasibility and Equivalency of Runway Safety Area Improvements and Engineered Material Arresting System*. This guidance ensures that the preferred alternative is operationally sound, environmentally safe, and financially feasible.

The comparative evaluation in this section is based primarily on qualitative measures identified in the preliminary review. The criteria used in the comparative evaluation focuses on aircraft operational impacts during construction, operational impacts after construction (end state), potential cost impacts, and environmental impacts.

- **Pavement Reconstruction Alternative Analysis:** The Proposed Action includes the partial reconstruction of the eastern portion of the Runway 6L-24R pavement and the Taxiway AA pavement (see Section 1.3). Pavement reconstruction activities would necessitate temporary closure of the runway and taxiway, and given that LAX's runways operate on a 24-hour basis, the closure of a runway could adversely affect operations. As implementation of the proposed RSA improvements would require closure of Runway 6L-24R (which would also prohibit aircraft movements on Taxiway AA), LAWA determined that concurrent reconstruction of portions of the Runway 6L-24R and Taxiway AA pavement was the only feasible build alternative that would meet the objectives of the Pavement Reconstruction component. Therefore, the Pavement Reconstruction alternatives considered for further analysis in this EA are the reconstruction of pavement as proposed, and the required No Action Alternative.

- **Realignment of Taxiway Holdbars Alternative Analysis:** The realignment of the Taxiway Y, Z, and AA holdbars is being proposed to meet FAA standards. Realignment of the holdbars would require temporary closure of these taxiways. Because these taxiways connect Runway 6L-24R to the rest of the airfield, it makes sense to perform this work during the closure of Runway 6L-24R. LAWA determined that concurrent realignment of the holdbars was the only feasible build alternative that would meet the objectives of this component of the Proposed Action. Therefore, the Realignment of Taxiway Holdbars alternatives considered for further analysis in this EA are the realignment of taxiway holdbars as proposed, and the required No Action Alternative.

#### 2.2.4.1 No Action Alternative

The No Action alternative would not involve any changes to the current configurations of Runway 6L-24R and Runway 6R-24L. Under this alternative, Runway 6L-24R and Runway 6R-24L would not meet standard RSA dimensions for runways accommodating Approach Category C and D aircraft. These runways would fail to comply with FAA airport design standards that are required by P.L. 109-115 to be met by December 31, 2015. Additionally, the No Action alternative would not address the deteriorating condition of the Runway 6L-24R pavement. Under this alternative, the pavement would not be rehabilitated and could potentially pose a safety hazard for aircraft. This alternative has been included to provide a basis for comparing the environmental consequences of the Proposed Action as required by 40 CFR § 1502.14(d). The No Action Alternative (existing condition) for the Runway is provided in Exhibit 1-3.

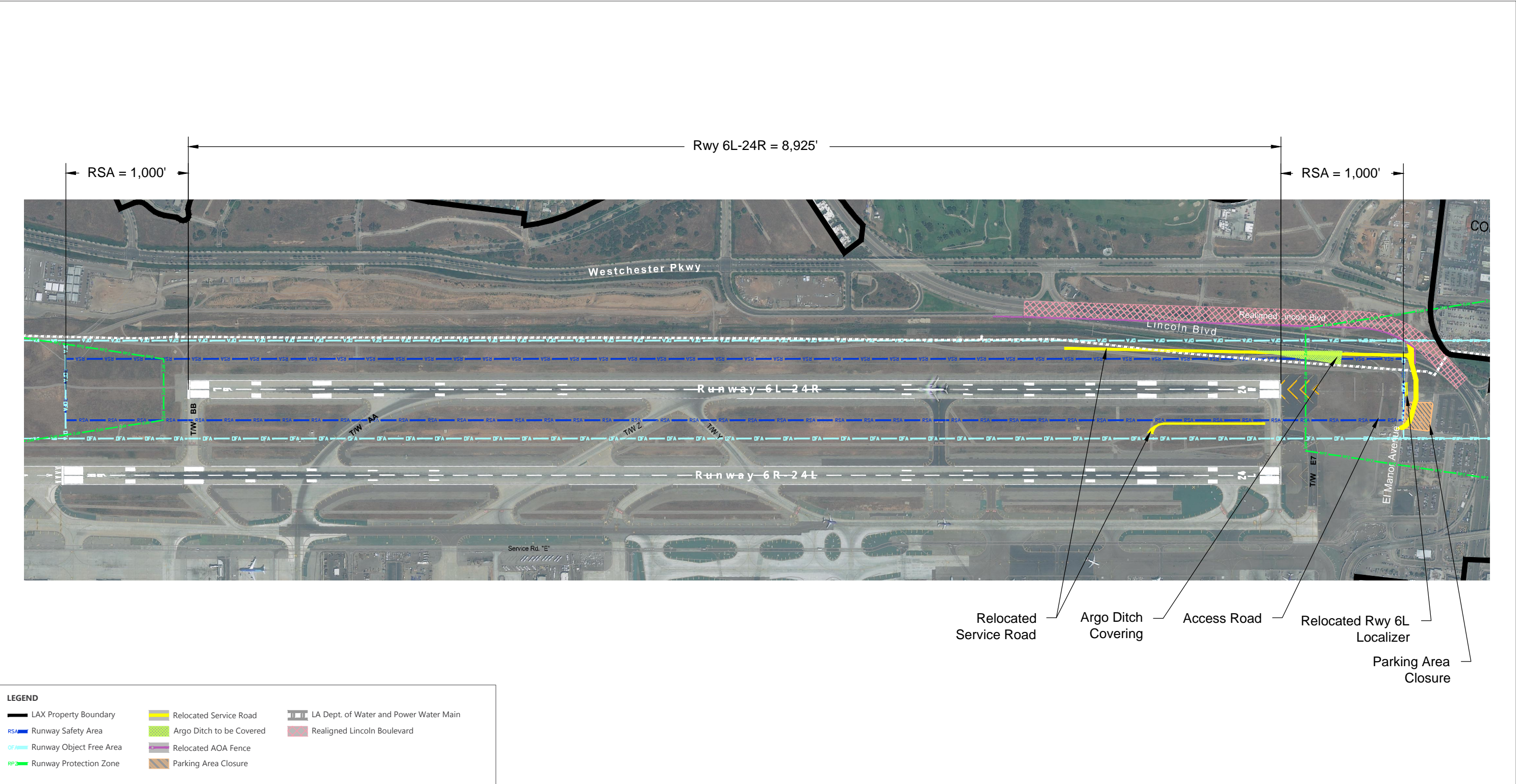
#### 2.2.4.2 Construct Standard RSA Alternative

##### *Runway 6L-24R*

As depicted in **Exhibit 2-3**, this alternative proposes the construction of a standard RSA. It removes all objects within the RSA as defined by the 500-foot width and 1,000-foot length beyond the ends of the runway. At the east end, the Runway 6L localizer, an access road, and a perimeter fence would be relocated outside of the RSA. Additionally, the commercial vehicle holding lots located east of the runway would require reconfiguration to accommodate the relocation of the Runway 6L localizer and service road. Along the northern edge of the RSA, portions of a service road would be relocated and a portion of the Argo Ditch would be covered. Lincoln Boulevard would be realigned to allow for the relocated service road and to remain clear of the runway object free area (OFA). This alternative would maintain all current take-off and landing distances (**Table 2-2**).

##### *Runway 6R-24L*

As depicted in **Exhibit 2-4**, this alternative proposes the construction of a standard RSA. It would extend the RSA at the east end 115 feet and at the west end 835 feet to obtain a standard 1,000- by 500-foot RSA beyond each runway end. All objects that are in the current RSAs or that would fall within the extended RSAs would be relocated. At the east end, the Runway 6R localizer, a service road, a perimeter fence and parking facilities would be relocated outside the RSA. At the west end, a section of Pershing Drive would be tunneled under the RSA, and portions of the service road and perimeter fence would be relocated outside the RSA. An extensive amount of earthwork would be necessary in the dunes to comply with RSA grading standards. This alternative maintains all existing take-off and landing distances for Runways 6R and 24L (see **Table 2-3**).



SOURCE: Federal Aviation Administration, *Advisory Circular 150/5300-13A, Airport Design*, September 28, 2012; Landrum & Brown, *Los Angeles International Airport, Airport Layout Plan*, 2005; Los Angeles World Airports, April 2013 (aerial photography).  
PREPARED BY: Ricondo & Associates, Inc., May 2014.

EXHIBIT 2-3



Runway 6L-24R  
Construct Standard RSA Alternative

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Table 2-2: Runway 6L-24R RSA Alternatives Comparison Matrix

ALTERNATIVE	RUNWAY END	RUNWAY SHIFT/ EXTENSION (FEET)	DISPLACED THRESHOLD (FEET)	USE OF DECLARED DISTANCES	STANDARD RSA	AVAILABLE DISTANCES (FEET)			
						TAKE OFF RUN AVAILABLE (TORA)	TAKE OFF DISTANCE AVAILABLE (TODA)	ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)	LANDING DISTANCE AVAILABLE (LDA)
No Action	6L					8,925	8,925	8,925	8,925
	24R				X	8,925	8,925	8,925	8,925
Construct Standard RSA	6L				X	8,925	8,925	8,925	8,925
	24R				X	8,925	8,925	8,925	8,925
Reduced Runway	6L				X	7,532	7,532	7,532	7,532
	24R		1,393		X	7,532	7,532	7,532	7,532
Declared Distances	6L			X	X	8,925	8,925	8,566	8,566
	24R				X	8,925	8,925	8,925	8,925
Shift Runway	6L	615 (Westward)			X	8,925	8,925	8,925	8,925
	24R	615 (Westward)			X	8,925	8,925	8,925	8,925
EMAS	6L					8,925	8,925	8,925	8,925
	24R					8,925	8,925	8,925	8,925
Refinement #1	6L	359 (Westward)		X	X	9,284	9,284	8,925	8,566
	24R				X	9,284	9,284	9,284	9,284
Refinement #2	6L			X	X	8,925	8,925	8,566	8,566
	24R				X	8,925	8,925	8,925	8,925

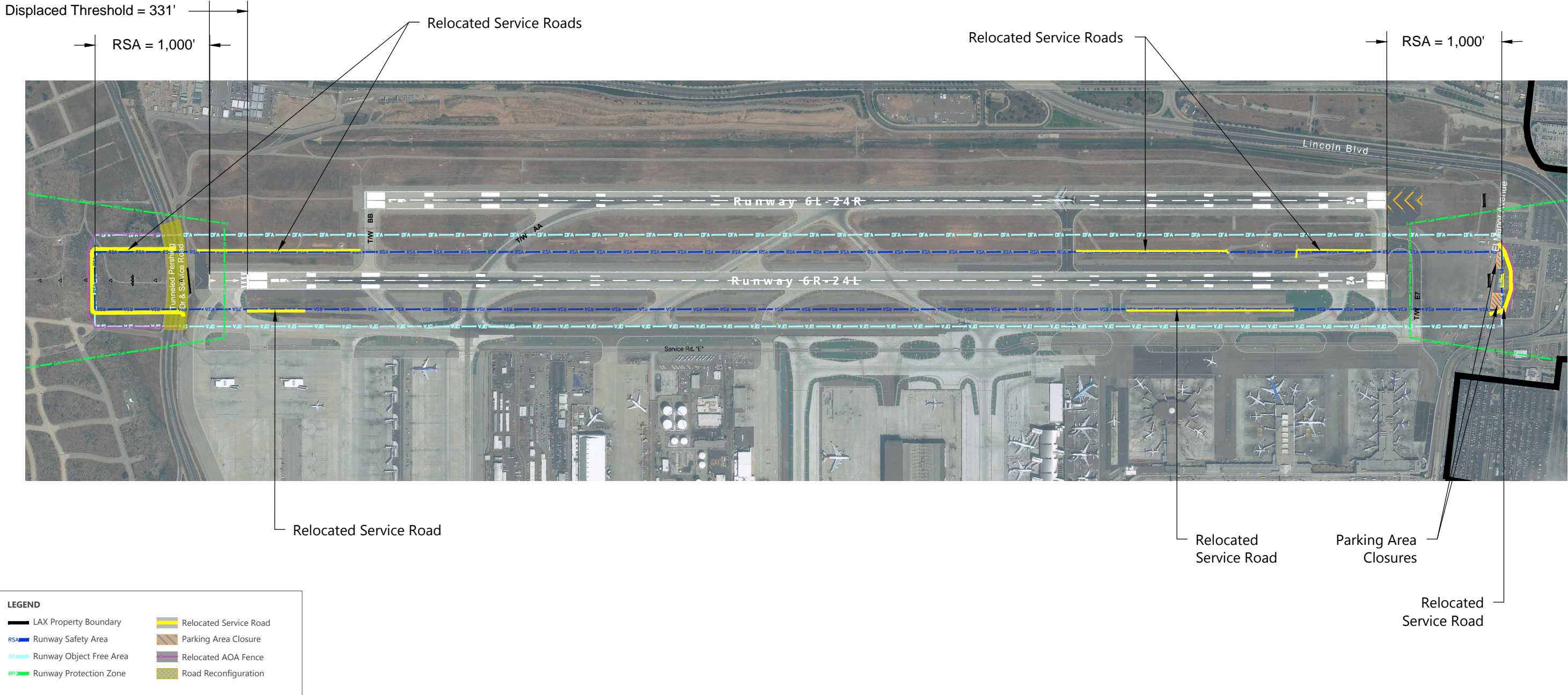
NOTES: Numbers in RED indicate different numbers than existing conditions.

X = Alternative satisfies this condition.

SOURCE: Ricondo and Associates, Runway 7L-25R Safety Area (RSA) Practicability Study for Los Angeles International Airport, December 2009

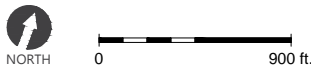
PREPARED BY: Ricondo & Associates, Inc., September 2013.

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SOURCE: Federal Aviation Administration, *Advisory Circular 150/5300-13A, Airport Design*, September 28, 2012; Landrum & Brown, *Los Angeles International Airport, Airport Layout Plan*, 2005; Los Angeles World Airports, April 2013 (aerial photography).  
PREPARED BY: Ricondo & Associates, Inc., May 2014.

EXHIBIT 2-4



Runway 6R-24L  
Construct Standard RSA Alternative

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Table 2-3: Runway 6R-24L RSA Alternatives Comparison Matrix

ALTERNATIVE	RUNWAY END	RUNWAY SHIFT/ EXTENSION (FEET)	DISPLACED THRESHOLD (FEET)	USE OF DECLARED DISTANCES	STANDARD RSA	AVAILABLE DISTANCES (FEET)			
						TAKE OFF RUN AVAILABLE (TORA)	TAKE OFF DISTANCE AVAILABLE (TODA)	ACCELERATE- STOP DISTANCE AVAILABLE (ASDA)	LANDING DISTANCE AVAILABLE (LDA)
No Action	6R		331			10,285	10,285	10,285	9,954
	24L					10,285	10,285	10,285	10,285
Construct Standard RSA	6R		331		X	10,285	10,285	10,285	9,954
	24L				X	10,285	10,285	10,285	10,285
Reduced Runway	6R		835		X	9,335	9,335	9,335	9,335
	24L		115		X	9,335	9,335	9,335	9,335
Declared Distances	6R		331	X	X	10,285	10,285	10,170	9,839
	24L			X	X	10,285	10,285	9,450	9,450
Shift Runway	6R				X	10,285	10,285	10,285	10,285
	24L				X	10,285	10,285	10,285	10,285
EMAS	6R		455			10,095	10,095	10,095	10,095
	24L		265			10,095	10,095	10,095	10,095
Refinement #1	6R		331	X	X	10,285	10,285	10,285	9,954
	24L			X	X	11,120	11,120	10,285	9,450
Refinement #2	6R		331	X	X	10,285	10,285	10,170	9,839
	24L			X	X	10,285	10,285	10,285	10,285

## NOTES:

Numbers in RED indicate different numbers than existing conditions. X = Alternative satisfies this condition

1/ THE EXISTING DECLARED DISTANCES ARE NOT PUBLISHED DECLARED DISTANCES.

SOURCE: Ricondo and Associates, Runway 7L-25R Safety Area (RSA) Practicability Study for Los Angeles International Airport, December 2009

PREPARED BY: Ricondo & Associates, Inc., September 2013.

### *Evaluation*

Because this alternative would provide standard RSAs, it met the Step 1 Purpose and Need criteria. In addition, Runway 6L and Runway 24R would maintain current take-off and landing distances. However, this alternative did not satisfy the Step 2 practicality and implementation schedule criteria. At the east end of Runway 6L-24R, this alternative would require a portion of Lincoln Boulevard to be realigned to accommodate the standard RSA as well as realignment of a service road. At the west end of Runway 6R-24L this alternative would require tunneling of Pershing Drive to accommodate the standard RSA.

It is highly unlikely that this alternative could be constructed by the required completion date of December 31, 2015 and the modifications to Lincoln Boulevard and Pershing Drive were considered too costly to be feasible. Because of the substantial complexities and cost associated with this alternative, it was not retained for detailed study in this EA.

## **2.2.4.3 Reduce Runway Length Alternative**

### *Runway 6L-24R*

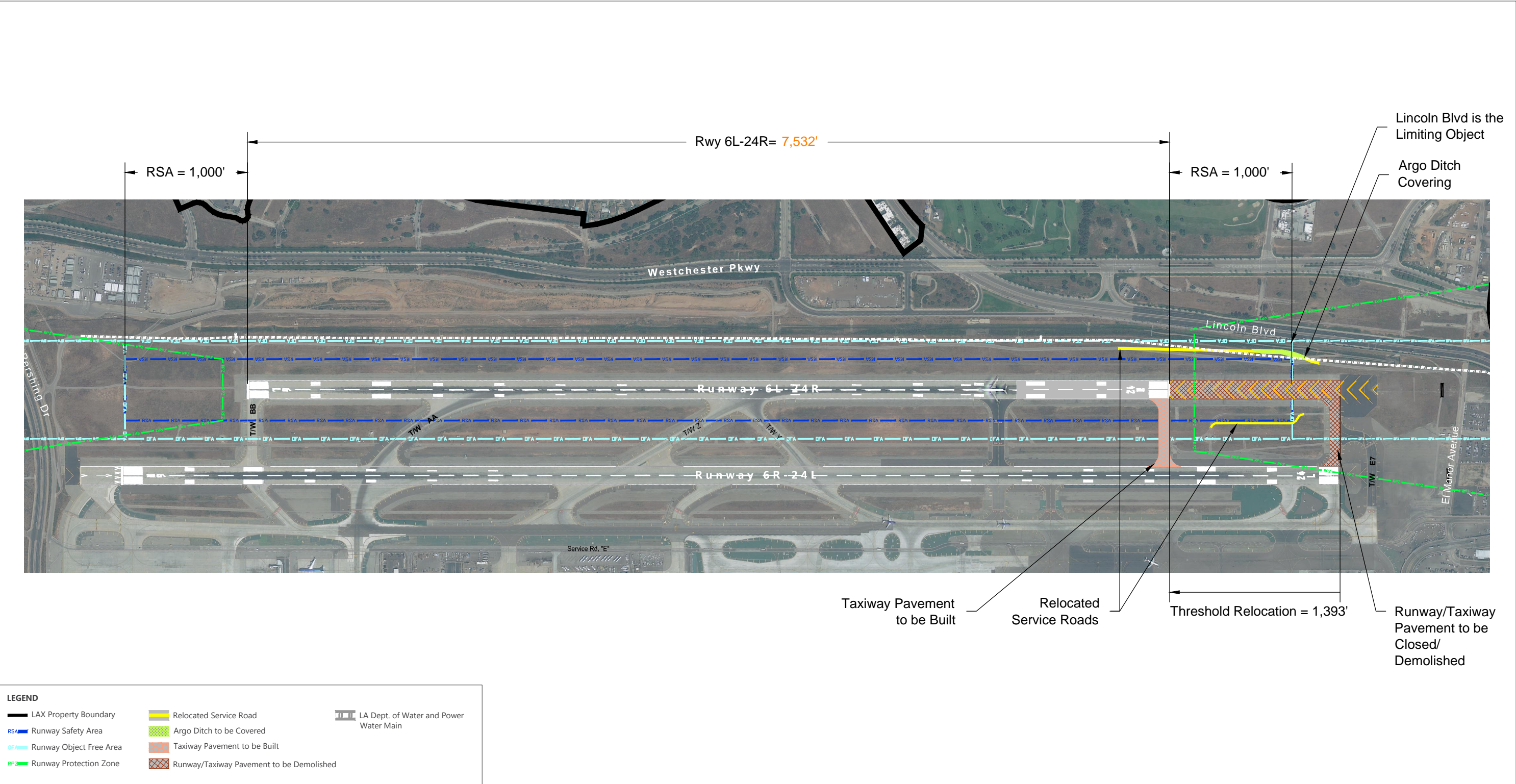
As depicted in **Exhibit 2-5**, this alternative meets all RSA requirements by reducing the runway length to 7,532 feet (see Table 2-2). At the east end, the Runway 24R threshold would be relocated 1,393 feet west to provide for 1,000 feet of RSA and allow Lincoln Boulevard to remain outside the OFA. The runway pavement east of the Runway 24R threshold would be demolished, portions of two service roads would be relocated, and a new connecting taxiway would be constructed.

### *Runway 6R-24L*

As depicted in **Exhibit 2-6** this alternative meets all RSA requirements by reducing the length of the runway from 10,285 feet to 9,335 feet (see Table 2-3). At the east end, the Runway 24L threshold is relocated west 115 feet to provide 1,000 feet of RSA beyond the east end of the runway. At the west end, the Runway 6R threshold is relocated east 835 feet to provide 1,000 feet of RSA beyond the west end of the runway. The 835 feet of runway west of the relocated threshold would be demolished and graded to RSA standards. The Runway 6R and 24L approach lights would require relocation. This alternative reduces the overall length of Runway 6R-24L by 950 feet.

### *Evaluation*

This alternative would satisfy the Step 1 Purpose and Need criteria. This alternative would also satisfy the Step 2 criteria regarding practicality and implementation schedule. However, this alternative did not satisfy the Step 3 screening criteria regarding the minimization of impacts on airfield and aircraft operations. This alternative had the largest adverse impact on usable runway length among all alternatives considered. Because the existing runway pavement beyond the relocated thresholds would not be available for any aircraft operations, this alternative would impose operational restrictions on certain large aircraft that use the runway. For Runway 6L-24R the available takeoff and landing lengths of the runway, for both 6L and 24R departures, would be reduced by 1,393 feet. For Runway 6R-24L the available takeoff and landing lengths of the runway, for both 6R and 24L departures, would be reduced by 950 feet.



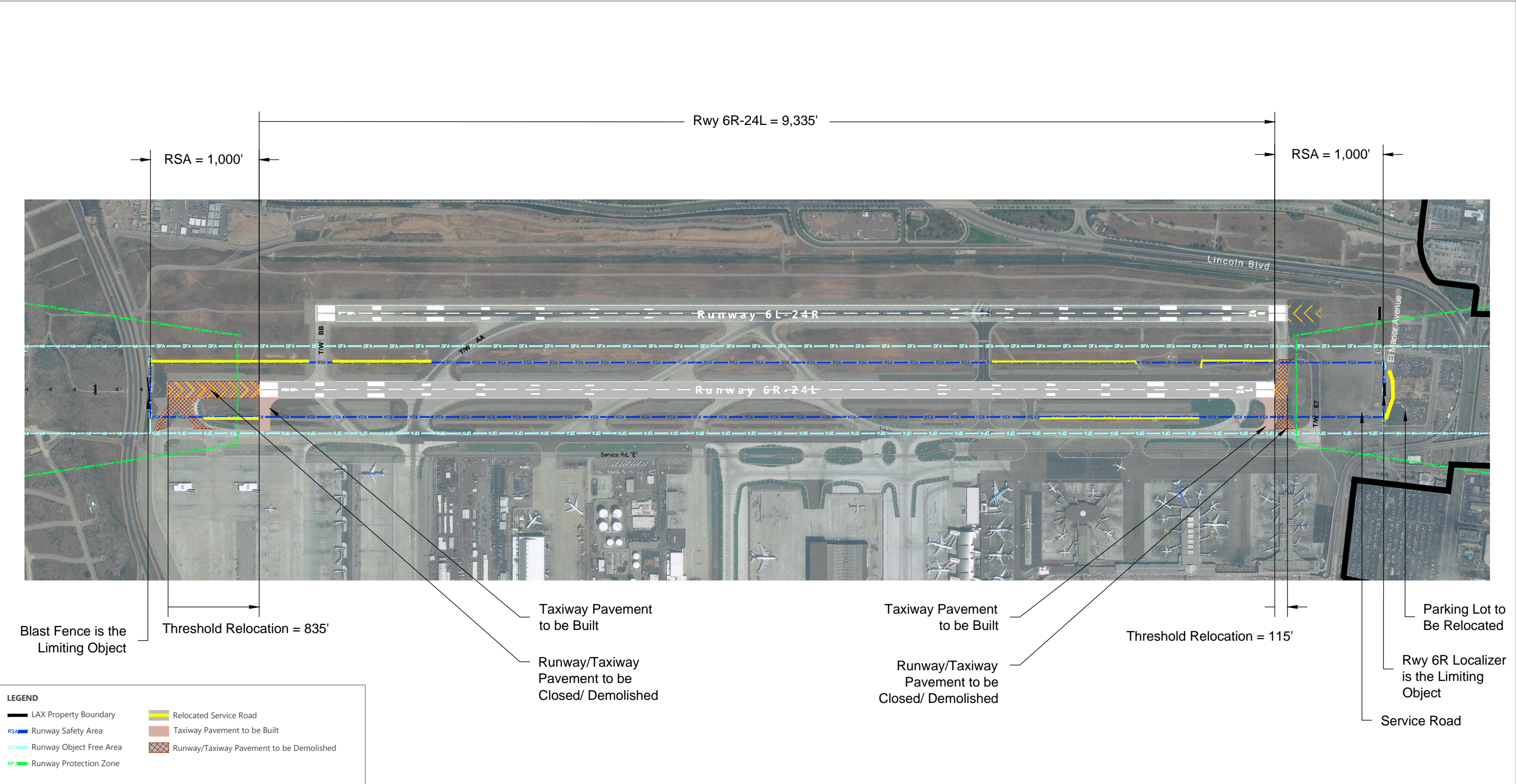
SOURCE: Federal Aviation Administration, Advisory Circular 150/5300-13A, Airport Design, September 28, 2012; Landrum & Brown, Los Angeles International Airport, Airport Layout Plan, 2005; Los Angeles World Airports, April 2013 (aerial photography).  
PREPARED BY: Ricondo & Associates, Inc., May 2014.

EXHIBIT 2-5



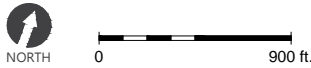
Runway 6L-24R  
Reduce Runway Length Alternative

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NOTE: Declared distances obtained from Airport Layout Plan, Landrum & Brown, 2005.  
SOURCE: Federal Aviation Administration, *Advisory Circular 150/5300-13A, Airport Design*, September 28, 2012; Landrum & Brown, *Los Angeles International Airport, Airport Layout Plan*, 2005; Los Angeles World Airports, April 2013 (aerial photography).  
PREPARED BY: Ricondo & Associates, Inc., May 2014.

EXHIBIT 2-6



Runway 6R-24L  
Reduce Runway Length Alternative

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LAX accommodates a substantial amount of long-haul and international air carrier arrivals and departures, including passenger and all-cargo flights. A reduction in runway length would impose operational restrictions on these aircraft, which would include, but not be limited to, reduced fuel loads, reduced number of passengers, and/or reduced cargo to meet weight restrictions and performance requirements of a reduced runway. Because the reduced runway length resulting from this alternative would reduce the utility of Runways 6L-24R and 6R-24L and have a negative impact on aircraft operations at LAX, this alternative was removed from further consideration in this EA.

#### 2.2.4.4 Implement Declared Distances Alternative

##### *Runway 6L-24R*

The use of declared distances, as shown on **Exhibit 2-7**, can also be used to meet RSA requirements. This alternative proposes the covering of a portion of the Argo Ditch and the relocation of a service road along Lincoln Boulevard. The relocated service road would become the limiting object, providing for a 641-foot RSA beyond the Runway 24R end. In order to provide a 1,000-foot standard RSA on that end, declared distances would be implemented, reducing the Runway 6L ASDA and LDA by 359 feet, from 8,925 feet to 8,566 feet (see Table 2-2). This alternative would also provide the required minimum 600 feet of RSA prior to the Runway 24R landing threshold. A portion of Lincoln Boulevard would remain within the OFA. No improvements would be required on the Runway 6L end.

##### *Runway 6R-24L*

**Exhibit 2-8** depicts the use of declared distances necessary to meet RSA requirements. A 1,000-foot RSA from the Runway 6R localizer on the east side reduces the Runway 6R ASDA by 115 feet from 10,285 feet to 10,170 feet, and the Runway 6R LDA by 115 feet from 9,954 feet to 9,839 feet (see Table 2-3). A service road would also be relocated around the east end of the RSA. A 1,000-foot RSA from the blast fence on the west side reduces the Runway 24L ASDA and LDA by 835 feet from 10,285 feet to 9,450 feet.

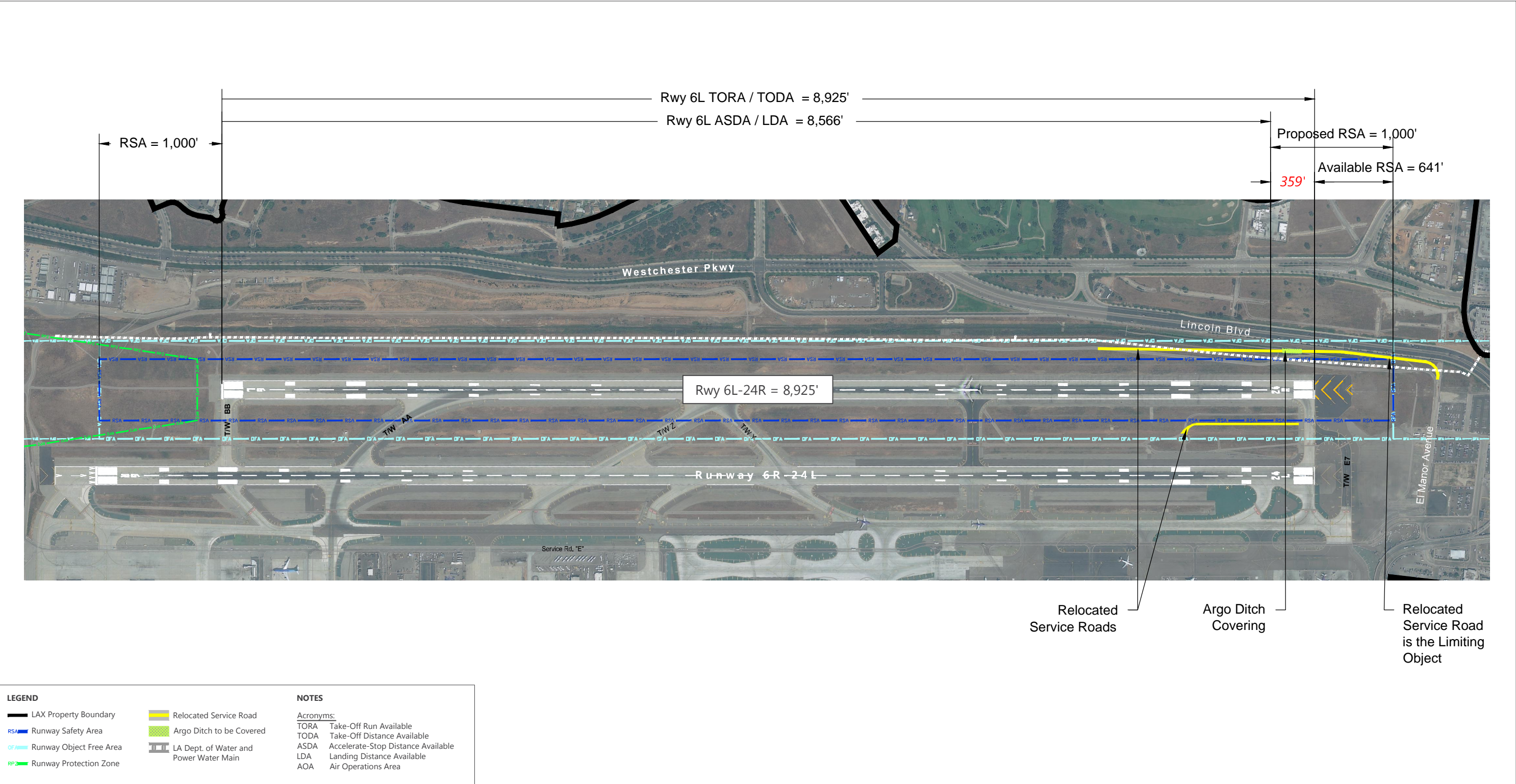
##### *Evaluation*

This alternative satisfied the Step 1 Purpose and Need criteria. Because no substantial construction, practicality, or schedule issues are associated with this alternative, it also satisfied Step 2 criteria. Declared distances would reduce ASDA and LDA on Runway 6L by 359 feet. However, total arrivals and departures on Runway 6L occur less than 1 percent on an annual basis.<sup>9</sup> The ASDA and LDA for Runway 6R would be reduced by 115 feet; arrivals on Runway 6R occur approximately 2 percent annually and departures occur less than 1 percent on an annual basis. The Runway 24L ASDA and LDA would be reduced by 835 feet; while only about 2 percent of arrivals occur on Runway 24L on an annual basis, approximately 37 percent of departures occur from Runway 24L annually. The impacts associated with implementation of declared distances on Runway 6L-24R and Runway 6R were determined to be minimal. However, the implementation of declared distances on Runway 24L would reduce the utility of Runway 6R-24L, which the RSA Technical Team determined would have a negative impact on airport operations at LAX.

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<sup>9</sup> Runway use percentages based on LAWA's Aircraft Noise and Operations Monitoring System (ANOMS) radar data.

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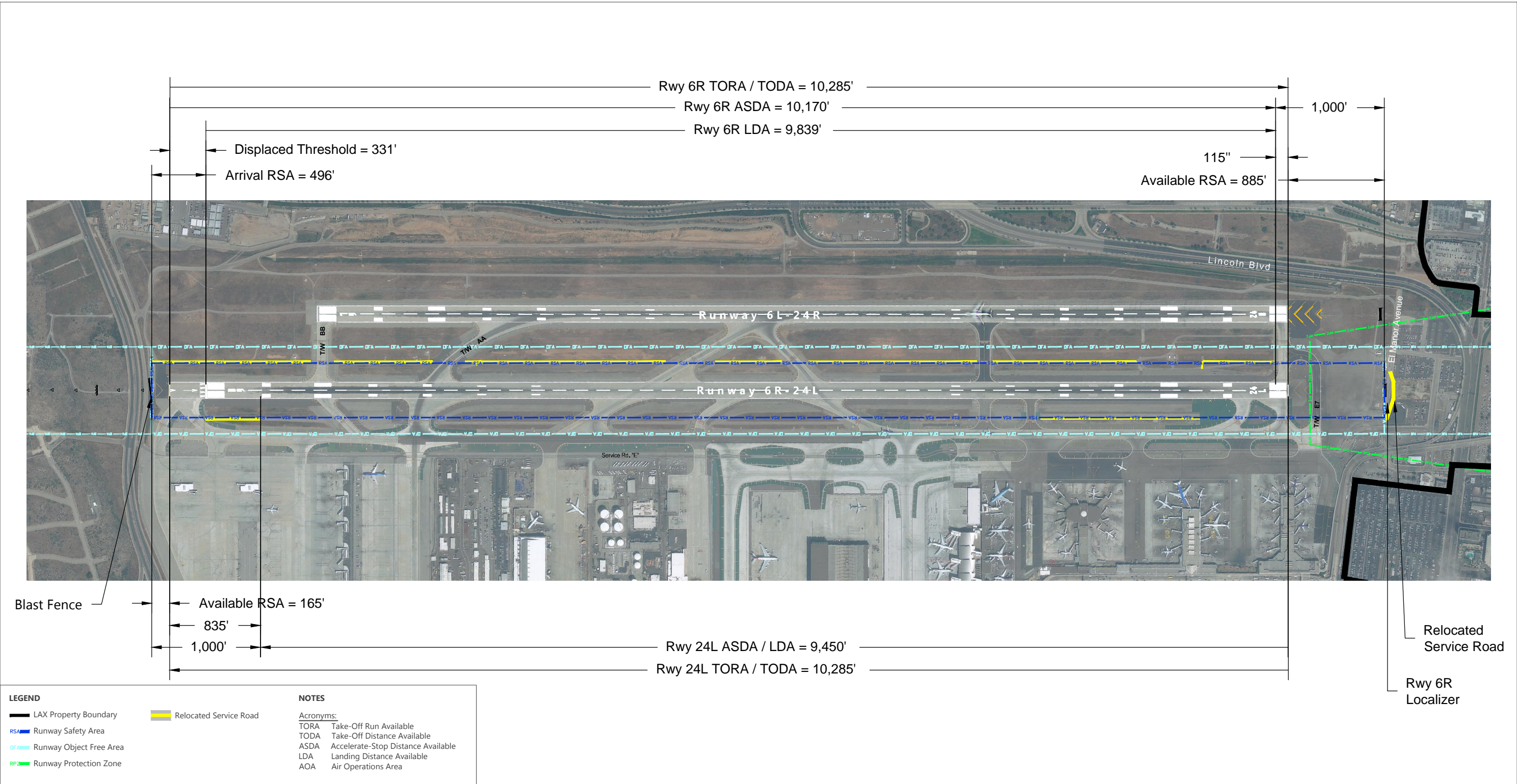
SOURCE: Federal Aviation Administration, *Advisory Circular 150/5300-13A, Airport Design*, September 28, 2012; Landrum & Brown, *Los Angeles International Airport, Airport Layout Plan*, 2005; Los Angeles World Airports, April 2013 (aerial photography).  
PREPARED BY: Ricondo & Associates, Inc., May 2014.

EXHIBIT 2-7

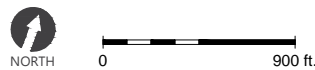


Runway 6L-24R  
Declared Distances Alternative

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NOTE: Declared distances obtained from Airport Layout Plan, Landrum & Brown, 2005.  
SOURCE: Federal Aviation Administration, *Advisory Circular 150/5300-13A, Airport Design*, September 28, 2012; Landrum & Brown, *Los Angeles International Airport, Airport Layout Plan*, 2005; Los Angeles World Airports, April 2013 (aerial photography).  
PREPARED BY: Ricondo & Associates, Inc., May 2014.



Runway 6R-24L  
Declared Distances Alternative

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Implementation of declared distances on Runway 6L-24R met the purpose and need criteria and was retained for further consideration in this EA. Implementation of declared distances on Runway 6R-24L did not meet all purpose and need criteria for Runway 6R-24L and was eliminated from consideration.

#### 2.2.4.5 Relocate, Shift or Realign the Runway Alternative(s)

##### *Runway 6L-24R*

As depicted in **Exhibit 2-9**, this alternative proposes the shift of the runway to the west to ensure all objects at the east end remain clear of the RSA. The service road around the west end of the runway would need to be relocated outside the RSA. The existing service road just east of Pershing Drive would become the limiting object and allow for a runway shift of 615 feet to the west. This would require 615 feet of new runway pavement at the west end and the demolition of 615 feet of runway pavement on the east end. New connector taxiways would be required at both ends of the shifted runway. At the east end, a portion of two service roads would be relocated outside the RSA and a portion of the Argo Ditch along Lincoln Boulevard would be covered. However, as shown, a section of Lincoln Boulevard would remain inside the OFA. This alternative would maintain all current take-off and landing distances (see Table 2-2).

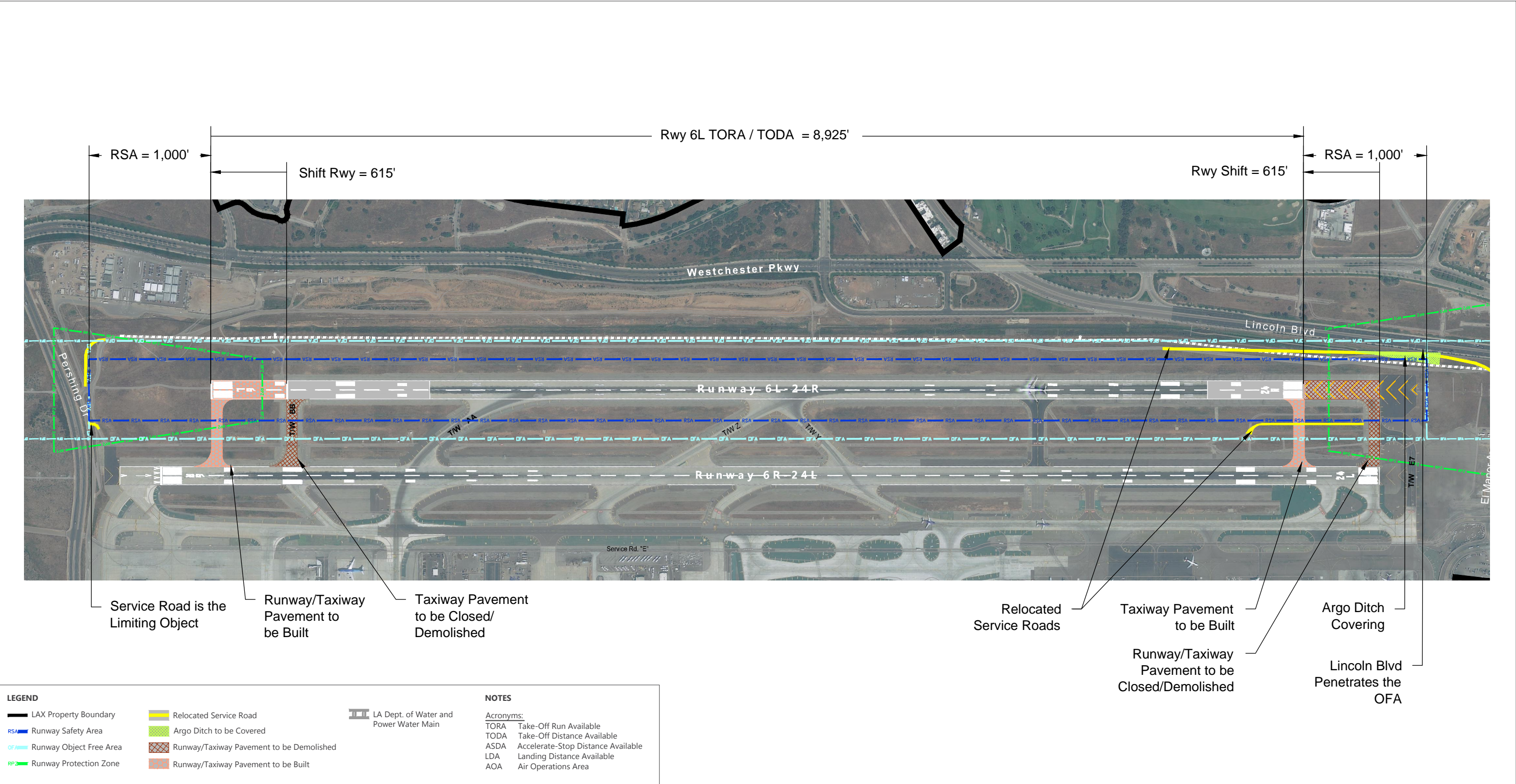
##### *Runway 6R-24L*

As depicted in **Exhibit 2-10**, the existing blast fence at the west end is the limiting object and requires a runway shift 835 feet east to obtain a 1,000-foot standard RSA at the west end. The 835 feet of runway pavement west of the new Runway 6R threshold and Taxiways E-16 and E-17 would be demolished and the Runway 6R approach lights relocated. The equivalent 835-foot shift of the east runway end would require the tunneling of Sepulveda Boulevard and the relocation of the Runway 6R localizer, as well as relocation or closure of numerous commercial parking/staging lots, a service road, and the perimeter fence. This alternative would increase the Runway 6R LDA to 10,285 feet and maintain all other take-off and landing distances (see Table 2-3).

##### *Evaluation*

Shifting the runway would meet the Step 1 Purpose and Need criteria by providing standard RSA distances and maintaining take-off and landing distances. However, this alternative did not satisfy the Step 2 practicality and implementation schedule criteria. Staggering the runway thresholds causes operational impacts to the airport by increasing the time aircraft must wait to takeoff in order to avoid aircraft wake turbulence. Additionally, it is highly unlikely that this alternative could be constructed by the required completion date and it was considered to be too expensive when compared to other alternatives. Because of the length of time and cost associated with implementation of this alternative, it was not retained for detailed study in this EA.

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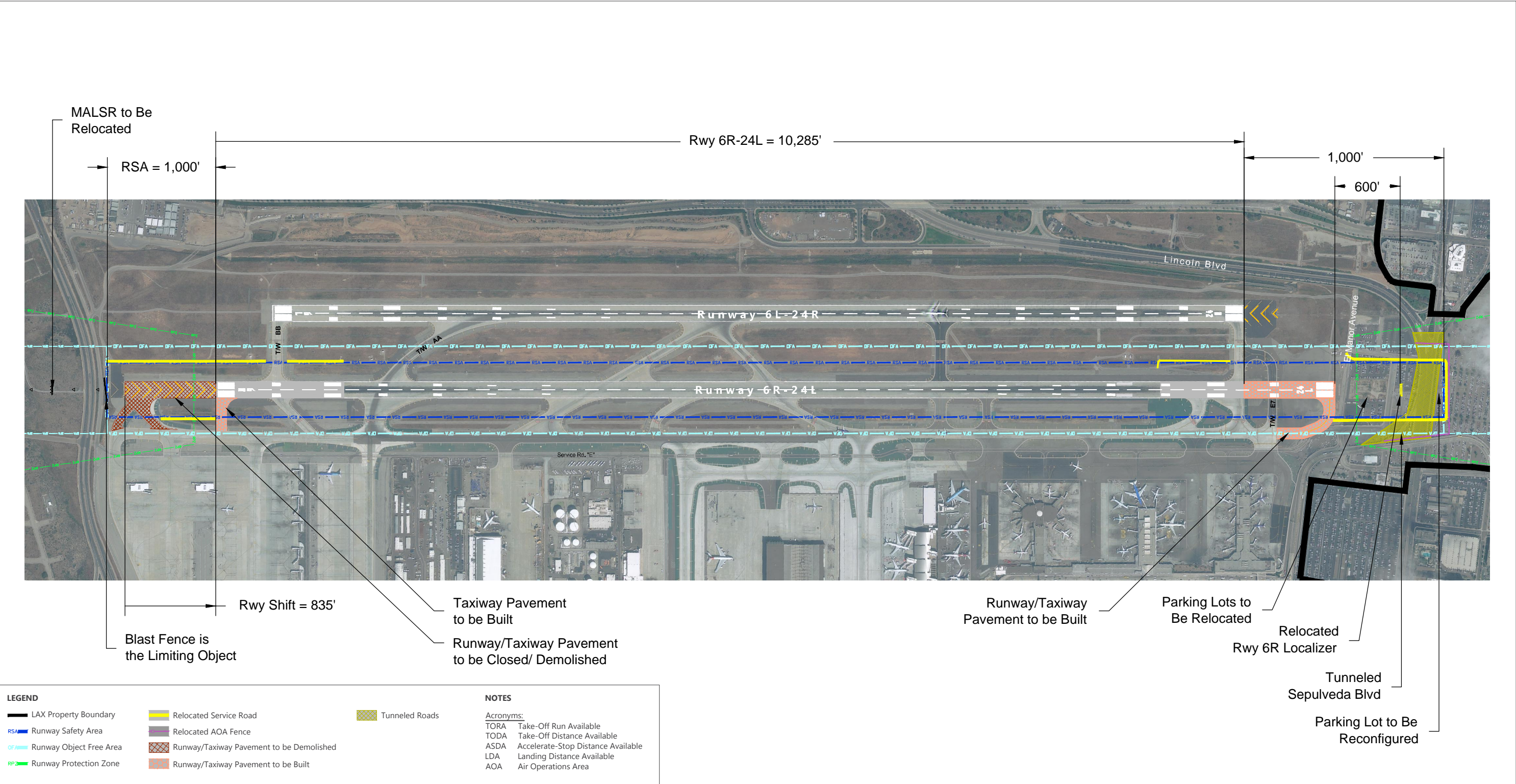
SOURCE: Federal Aviation Administration, *Advisory Circular 150/5300-13A, Airport Design*, September 28, 2012; Landrum & Brown, *Los Angeles International Airport, Airport Layout Plan*, 2005; Los Angeles World Airports, April 2013 (aerial photography).  
PREPARED BY: Ricondo & Associates, Inc., May 2014.

EXHIBIT 2-9

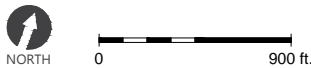


Runway 6L-24R  
Relocate, Shift or Realign the Runway Alternative(s)

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NOTE: Declared distances obtained from Airport Layout Plan, Landrum & Brown, 2005.  
SOURCE: Federal Aviation Administration, Advisory Circular 150/5300-13A, Airport Design , September 28, 2012; Landrum & Brown, Los Angeles International Airport, Airport Layout Plan , 2005; Los Angeles World Airports, April 2013 (aerial photography).  
PREPARED BY: Ricondo & Associates, Inc., May 2014.



Runway 6R-24L  
Relocate, Shift or Realign Runway Alternative(s)

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### 2.2.4.6 Install Standard EMAS Alternative

#### *Runway 6L-24R*

As depicted in **Exhibit 2-11**, a standard 550-foot EMAS bed would be installed behind the Runway 24R end under this alternative. This EMAS bed assumed a 50-foot setback from the Runway 24R threshold. Although the EMAS bed length is shown to be 550 feet, the ultimate length would be determined during the design phase and could be different than assumed. Installation of a standard EMAS bed would require a 600-foot RSA on the east end, necessitating the covering of a portion of the Argo Ditch along Lincoln Boulevard and relocation of the service road. A portion of Lincoln Boulevard would remain inside the OFA. This alternative would maintain all current take-off and landing distances (see Table 2-2).

#### *Runway 6R-24L*

As depicted in **Exhibit 2-12**, standard EMAS beds would be installed at both runway ends. Although the EMAS bed length is shown to be 550 feet, the ultimate length would be determined during the design phase and could be different than what is assumed for this study. These beds assume a 50-foot setback from the runway ends, requiring a total length of 600 feet for the RSA. The existing blast fence is the limiting object on the west end, requiring the Runway 6R threshold to be relocated east 455 feet to provide a 600-foot long area for the installation of the EMAS bed. The 455 feet of runway pavement west of the new Runway 6R threshold and Taxiways E-16 and E-17 would be demolished and the Runway 6R approach lights relocated. The existing Runway 6R localizer is the limiting object on the east end, allowing for a Runway 24R end shift of 265 feet to the east. A service road would be relocated to the east around the RSA. The Standard EMAS configuration for Runway 6R-24L results in a net runway length reduction of 190 feet from 10,285 feet to 10,095 feet (see Table 2-3).

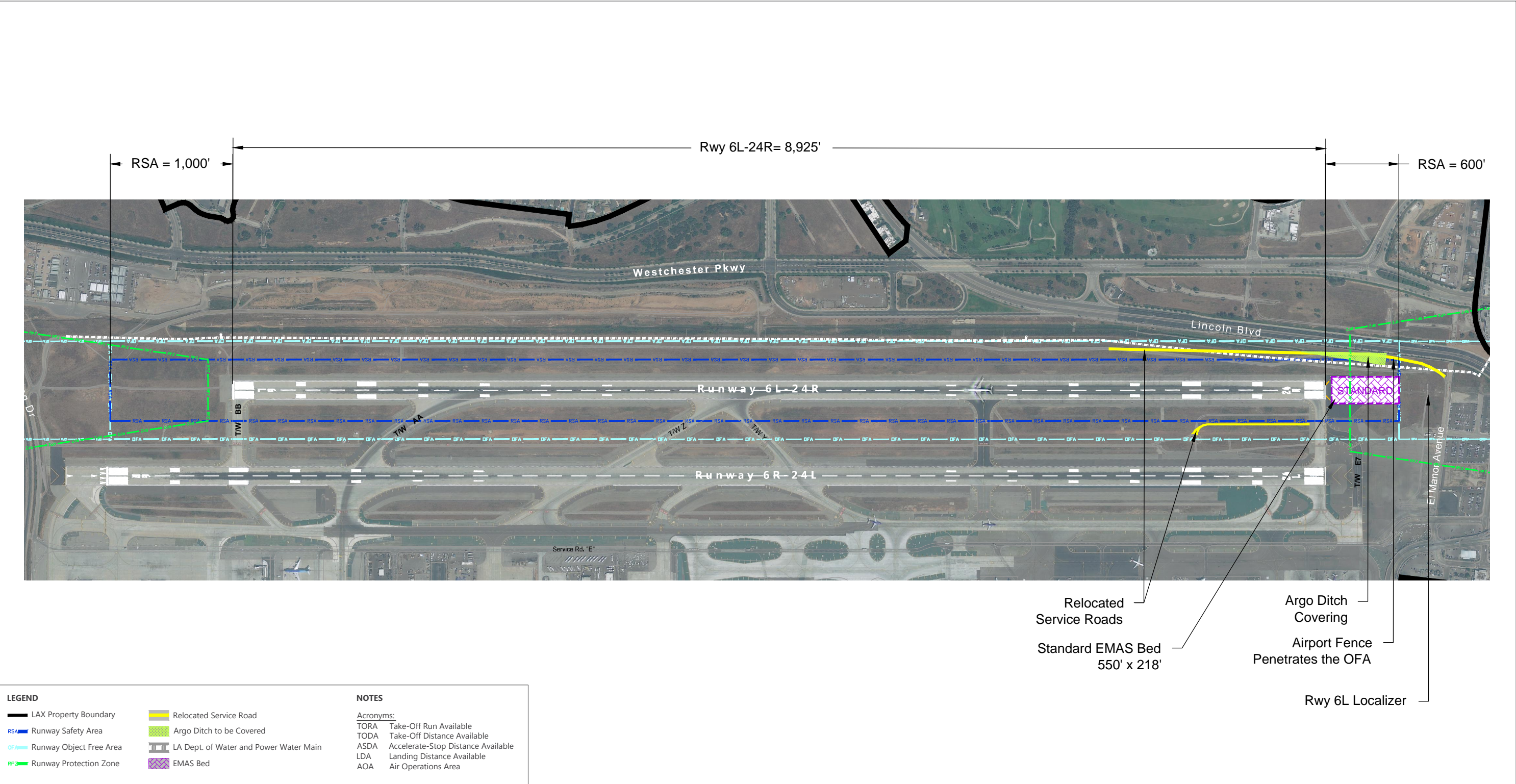
#### *Evaluation*

Installation of standard EMAS beds would meet the Step 1 Purpose and Need criteria. While the required standard RSA distances would not be obtained, a standard EMAS in accordance with Section 4 of FAA AC 150/5220-22B provides a level of safety that is generally equivalent to a full RSA built to the dimensional standards. However, it is highly unlikely that this alternative could be constructed by the required completion date. Additionally, installation of an EMAS on three runway ends would be cost prohibitive. Because of the substantial complexities and cost associated with this alternative, it was not retained for detailed study in this EA.

### 2.2.5 PRELIMINARY REVIEW AND REFINEMENT OF RSA ALTERNATIVES

Preliminary review of the conceptual alternatives was conducted by the RSA Technical Team and consisted of a general evaluation of engineering practicability, site constraints, the extent for which the RSAs would comply with standards, the benefits achieved, and potential costs incurred for each of the alternatives. The objective of the preliminary review was to identify key elements for eliminating alternatives and identifying the most feasible alternative(s) for satisfying RSA standards. During the review, FAA representatives stated that improvement alternatives included in the *Runway Safety Area Evaluation and Analysis* document for LAX were suggested solutions and were not necessarily required as long as the ultimate preferred RSA alternative could meet the RSA standard in accordance with FAA criteria. LAWA officials requested that the preferred alternative not reduce take-off length or airlines' operational capabilities.

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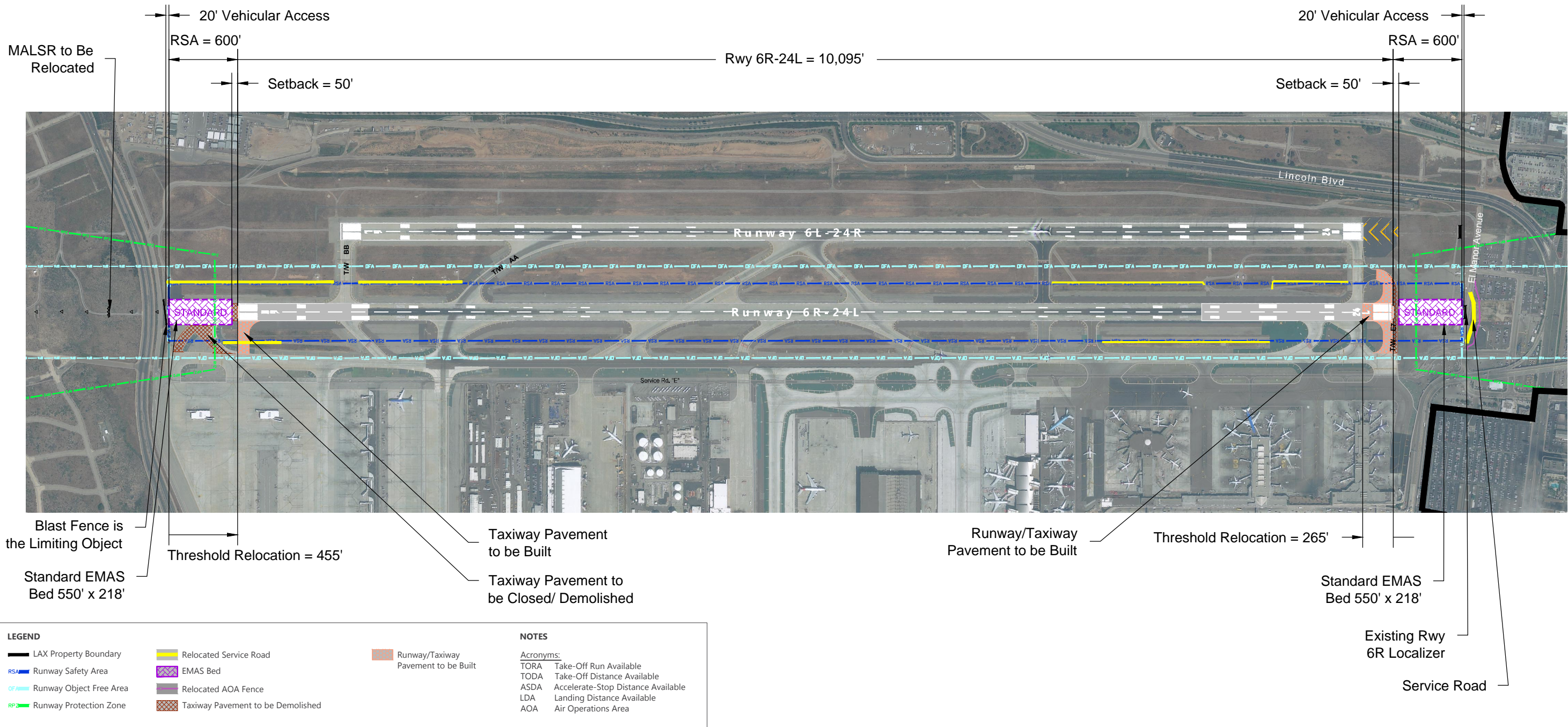
SOURCE: Federal Aviation Administration, *Advisory Circular 150/5300-13A, Airport Design*, September 28, 2012; Landrum & Brown, *Los Angeles International Airport, Airport Layout Plan*, 2005; Los Angeles World Airports, April 2013 (aerial photography).  
PREPARED BY: Ricondo & Associates, Inc., May 2014.

EXHIBIT 2-11



Runway 6L-24R  
Standard EMAS Alternative

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NOTE: Declared distances obtained from Airport Layout Plan, Landrum & Brown, 2005.  
SOURCE: Federal Aviation Administration, *Advisory Circular 150/5300-13A, Airport Design*, September 28, 2012; Landrum & Brown, *Los Angeles International Airport, Airport Layout Plan*, 2005; Los Angeles World Airports, April 2013 (aerial photography).  
PREPARED BY: Ricondo & Associates, Inc., May 2014.

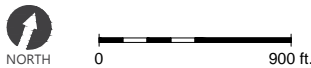


EXHIBIT 2-12

Runway 6R-24L  
Standard EMAS Alternative

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Following are the RSA Technical Team's initial review comments for the conceptual alternatives:

- Construct Standard RSA and Reduce Runway Alternatives - A consensus was reached by the RSA Technical Team that these two alternatives would not be practicable to implement. The Construct Standard RSA alternative was considered too costly and difficult because of the need to modify portions of Lincoln Boulevard and Pershing Drive, and the Reduce Runway alternative would likely increase operational restrictions to unacceptable levels.
- Shift Runway and Install Standard EMAS Alternatives - The RSA Technical Team recognized that although these two alternatives do not have any operational impacts, their development cost would likely be significantly higher than the Declared Distances alternative.
- Implement Declared Distances Alternative - The RSA Technical Team recognized that the reduction of Runway 6L LDA from 8,925 feet to 8,566 feet in this alternative may have negligible operational impact since most commercial aircraft generally do not need more than 8,000 feet for landing operations, and that landing operations on Runway 6L occur less than 1 percent annually. The Runway 6R ASDA would be reduced 115 feet from 10,285 feet to 10,170 feet, and the Runway 6R LDA would be reduced by 115 feet from 9,954 feet to 9,839 feet, which were also considered negligible since landings on Runway 6R occur less than 2 percent annually and departures occur less than 1 percent on an annual basis. However, the implementation of declared distances on Runway 24L would reduce the Runway 24L ASDA and LDA by 835 feet, reducing the utility of Runway 6R-24L which would have a negative impact on airport operations at LAX. Thus, the declared distances was determined feasible for Runway 6L-24R and for Runway 6R but infeasible for Runway 24L.
- Combination – The RSA Technical Team agreed to consider for refinement a combination of specific elements from the Declared Distances, Shift Runway, and Standard EMAS alternatives.

### 2.2.5.1 Refinement #1 Alternative

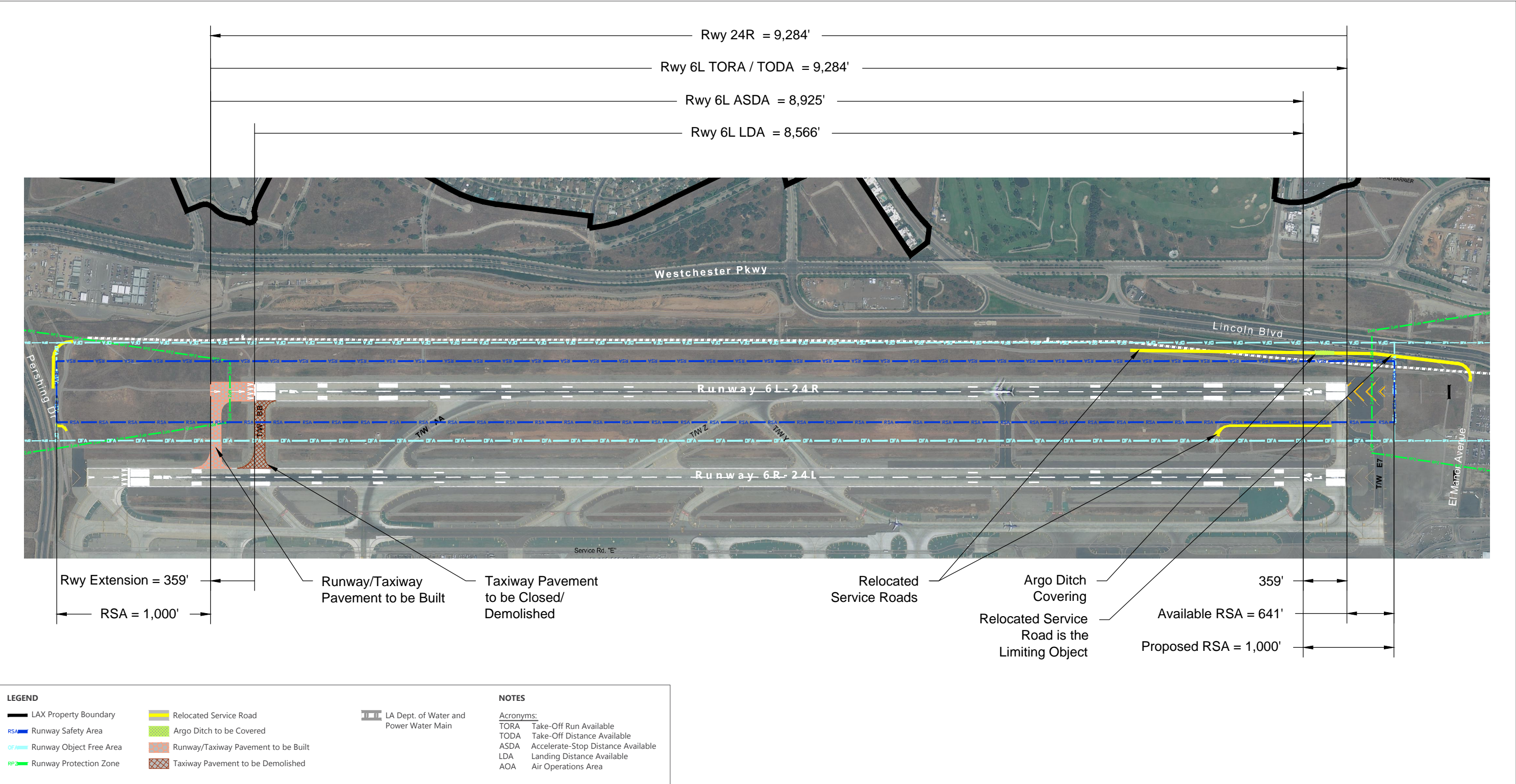
#### *Runway 6L-24R*

As depicted in **Exhibit 2-13**, the Runway 6L-24R Refinement #1 Alternative is a combination of the Declared Distances and the Shift Runway Alternatives. The RSA improvements to the east end would be identical to the Declared Distances alternative as described in Section 2.2.4.4. The improvements to the west end are similar to the Shift Runway alternative in Section 2.2.4.5, but would require a runway extension of 359 feet rather than 615 feet. A section of Taxiway BB would also be demolished. This refined alternative increases the runway length by 359 feet to 9,284 feet. The Runway 6L ASDA would be retained, whereas the Runway 6L LDA would be reduced to 8,566 feet (see Table 2-2).

#### *Runway 6R-24L*

As depicted in **Exhibit 2-14**, the Runway 6R-24L Refinement #1 Alternative is a combination of the Declared Distances and the Shift Runway Alternatives. The RSA improvements to the east end would include an 835-foot extension but the Runway 24L threshold would remain in its existing location. The improvements to the west end would include implementation of declared distances, which would reduce the Runway 24L LDA to 9,450 feet and increase the Runway 6R TORA and TODA to 11,120 feet; all other runway distances would be maintained (see Table 2-3).

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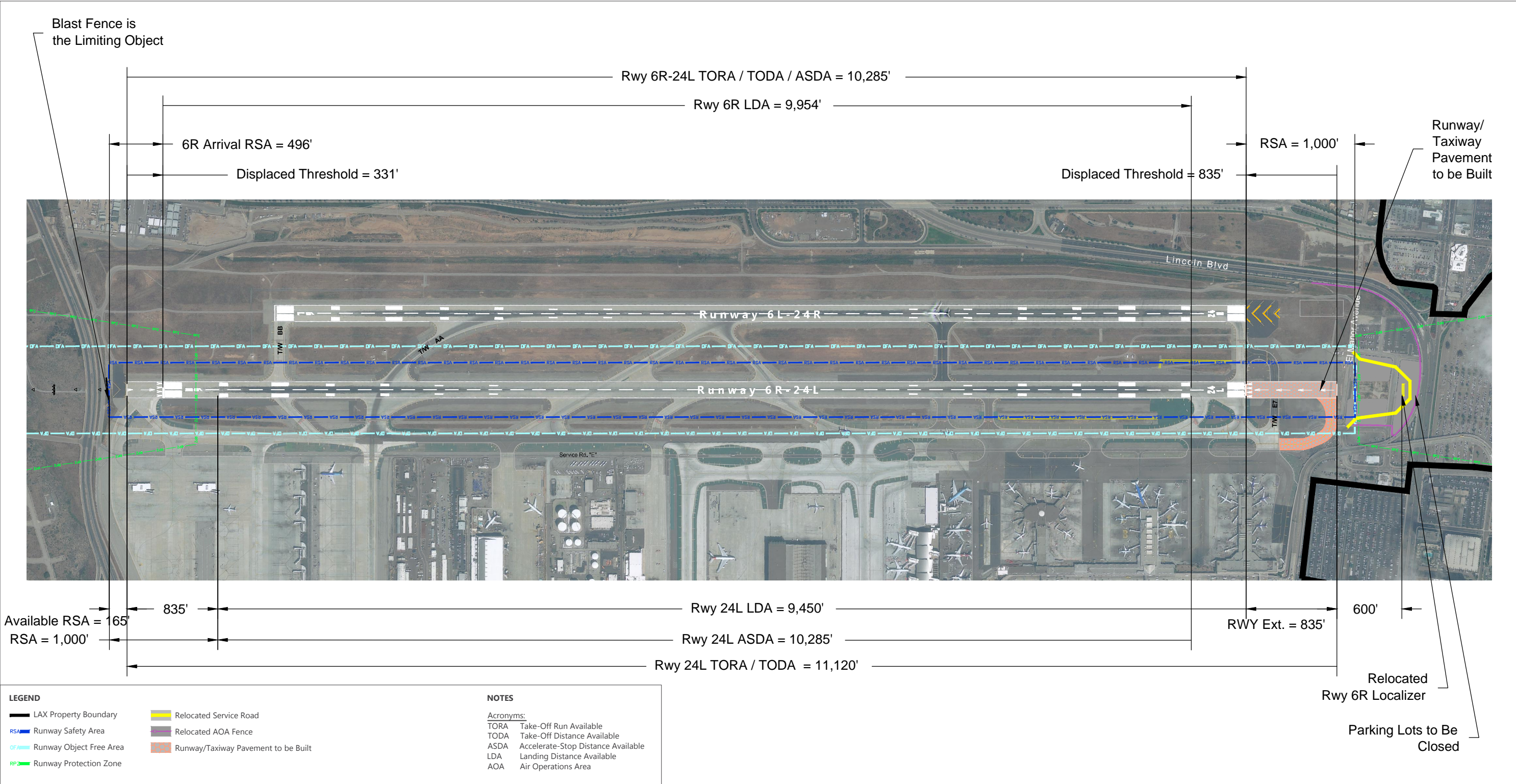
SOURCE: Federal Aviation Administration, *Advisory Circular 150/5300-13A, Airport Design*, September 28, 2012; Landrum & Brown, *Los Angeles International Airport, Airport Layout Plan*, 2005; Los Angeles World Airports, April 2013 (aerial photography).  
PREPARED BY: Ricondo & Associates, Inc., May 2014.

EXHIBIT 2-13



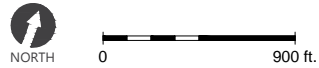
Runway 6L-24R  
Refinement #1 Alternative

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NOTE: Declared distances obtained from Airport Layout Plan, Landrum & Brown, 2005.  
SOURCE: Federal Aviation Administration, Advisory Circular 150/5300-13A, Airport Design , September 28, 2012; Landrum & Brown, Los Angeles International Airport, Airport Layout Plan , 2005; Los Angeles World Airports, April 2013 (aerial photography).  
PREPARED BY: Ricondo & Associates, Inc., May 2014.

EXHIBIT 2-14



Runway 6R-24L  
Refinement #1

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### *Evaluation*

The Refinement #1 Alternative would meet the Step 1 Purpose and Need criteria by providing standard RSA distances. However, this alternative did not satisfy the Step 2 practicality and implementation schedule criteria. It is highly unlikely that this alternative could be constructed by the required completion date and it was considered to be too expensive when compared to other alternatives. Because of the length of time and cost associated with implementation of this alternative, it was not retained for detailed study in this EA.

## 2.2.5.2 Refinement #2 Alternative

### *Runway 6L-24R*

As depicted in **Exhibit 2-15**, the Refinement #2 Alternative is essentially the Declared Distances alternative, with a few modifications. The RSA improvements to the east end would include those identified in the Declared Distances Alternative as described in Section 2.2.4.4, as well as moving the AOA fence and service road further east. The Refinement #2 Alternative would also involve the covering of portions of the Argo Ditch for the relocation of a portion of a service road along Lincoln Boulevard. Two additional service roads would be constructed to provide access from the new service road to the nav aids located east of the north runways. These modifications were made to improve the roadway geometry of the service road and eliminate parking located within the Runway Protection Zone (RPZ) of Runway 24R. The Runway 6L TORA and TODA would be retained, whereas the Runway 6L ASDA and LDA would be reduced to 8,566 feet (see Table 2-2). This refined alternative also includes the demolition and removal of two service roads located within the RSA at the west end of the runway.

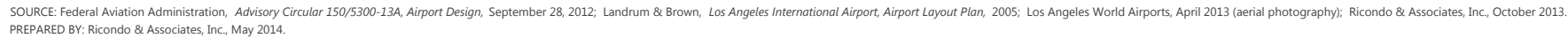
### *Runway 6R-24L*

As depicted in **Exhibit 2-16**, the Refinement #2 Alternative includes closure and relocation of service road segments between the Runway 6L-24R RSA and Runway 6R-24L RSA to provide a continuous service road between the north runways that would satisfy RSA requirements. For Runway 6R-24L the TORA and TODA distances would be retained. The Runway 6R ASDA and LDA distances would be reduced by 115 feet

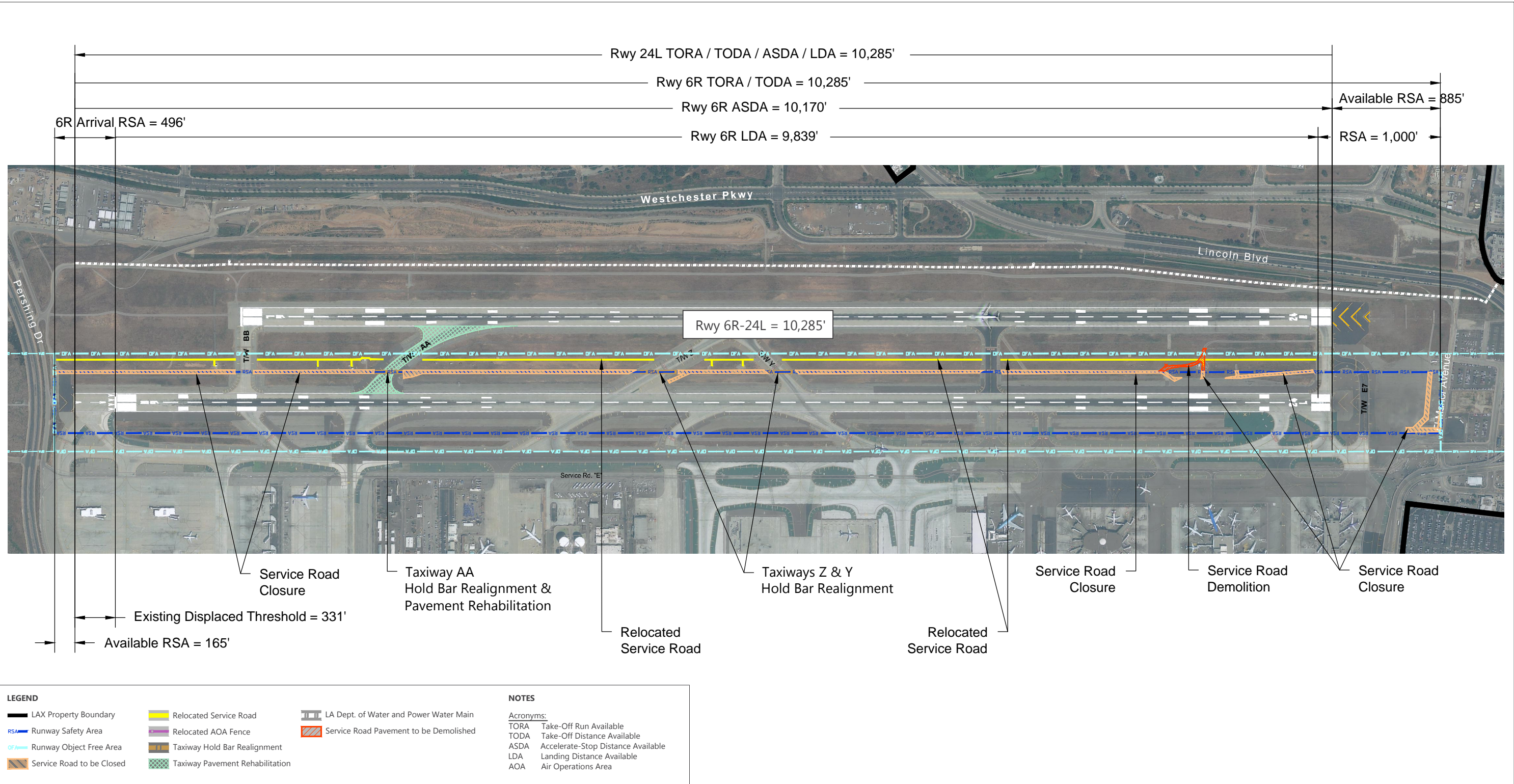
### *Evaluation*

This alternative satisfied the Step 1 Purpose and Need criteria for both Runway 6L-24R and Runway 6R-24L. Because no substantial construction, practicality, or schedule issues are associated with this alternative, it also satisfied Step 2 criteria for both runways. Although declared distances would reduce ASDA and LDA on Runway 6L by 359 feet and on Runway 6R by 115 feet, the impact to airfield operations would be minimal since arrivals on Runway 6L occur less than 1 percent on an annual basis and arrivals on Runway 6R occur less than 2 percent on an annual basis. Therefore, this alternative satisfies Step 3 criteria for both Runway 6L-24R and Runway 6R-24L and was retained for further consideration in this EA.

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SOURCE: Federal Aviation Administration, *Advisory Circular 150/5300-13A, Airport Design*, September 28, 2012; Landrum & Brown, *Los Angeles International Airport, Airport Layout Plan*, 2005; Los Angeles World Airports, April 2013 (aerial photography); Ricondo & Associates, Inc., October 2013.  
PREPARED BY: Ricondo & Associates, Inc., May 2014.

EXHIBIT 2-16



Runway 6R-24L  
Refinement #2 Alternative

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The RSA Technical Team evaluated different combined alternatives including EMAS, runway shifts, declared distances, runway extensions, and displaced thresholds. However, none were selected as a preferred alternative due to cost and schedule implications. FAA recognized that modifications necessary to fully comply with RSA standards by December 31, 2015 may not be practicable. However, FAA believed that incremental improvements of the RSAs could be implemented in the short-term.<sup>10</sup>

LAWA is continuing to develop alternatives to improve the Runway 6R-24L RSA. However, in order to comply with Public Law 109-115, they have elected to implement Refinement Alternative #2 for Runway 6R-24L by December 31, 2015 (as identified above), which will improve the RSA to the extent practicable, in compliance with FAA Order 5200.8. Any future RSA improvements proposed by LAWA would undergo environmental evaluation as required by NEPA and the California Environmental Quality Act (CEQA).

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## 2.3 RSA Alternatives Carried Forward for Evaluation

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**Table 2-4** summarizes the results of the alternatives screening evaluation. Because the Refinement #2 Alternative for Runway 6L-24R includes the runway elements of the Runway 6L-24R Declared Distances Alternative, and only differs in the alignment of the relocated service road and closure of LAWA-owned construction equipment parking areas, the Runway 6L-24R Refinement #2 Alternative replaces the Declared Distances Alternative and was carried forward for further analysis in this Draft EA.

As stated above, the Runway 6R-24L Refinement #2 Alternative was carried forward for further analysis in this Draft EA, because it is the only alternative that provides incremental improvements to the Runway 6R-24L RSA and can be implemented by December 31, 2015. While the proposed improvements to Runway 6R-24L would not address all RSA non-compliance issues by the December 31, 2015 deadline, the improvements proposed by LAWA for both runways provide safety enhancements that would be implemented by December 31, 2015. The Runway 6R-24L Refinement #2 Alternative would remove currently active service roads and construction equipment parking areas from the RSA and implement declared distances to improve the Runway 6R-24L RSA as much as practicable. These incremental improvements would provide improved RSA dimensions when compared with existing conditions and allow for additional RSA space in the event of an aircraft's excursion from the runway during an overrun, undershoot, or veer-off. LAWA is continuing to develop alternatives to address all of the RSA non-compliance issues for Runway 6R-24L and will undertake those improvements in the future after they have been thoroughly analyzed and undergone NEPA review.

Although the No Action alternative does not meet the purpose and need for the proposed project, it was retained for further consideration as required by 40 CFR § 1502.14(d) and paragraph 706(d) of FAA Order 5050.4B.

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<sup>10</sup> Ricondo and Associates, Inc., *Runway 6L-24R & 6R-24L Safety Area (RSA) Practicability Study for Los Angeles International Airport*, April 9, 2010.

**Table 2-4: Summary of RSA Alternatives Screening Evaluation**

LOCATION	ALTERNATIVE	ALTERNATIVE PASS TO THE NEXT STEP			RETAINED FOR FURTHER ANALYSIS IN THE DRAFT EA?
		STEP 1	STEP 2	STEP 3	
<b>Off-Site/Operational Alternatives</b>	Use of Other Modes of Transportation	No			No
	Use of Other Public Airports	No			No
	Use of Alternative Aircraft	No			No
	No Action Alternative <sup>1/</sup>	No			Yes
<b>On-Site Alternatives</b>	Construct Standard RSA Alternative	Yes	No		No
	Reduce Runway Length Alternative	Yes	Yes	No	No
	Declared Distances (Refinement #2 Alternative, Proposed Action)	Yes	Yes	Yes	Yes
	Relocate, Shift or Realign the Runway Alternative(s)	Yes	No		No
	Implement EMAS Alternative	Yes	No		No
	Refinement #1 Alternative	Yes	No		No

NOTE:

1/ Analysis of the No Action Alternative is required by 40 CFR § 1502.14(d).

SOURCE: Ricondo &amp; Associates, Inc., August 2013.

PREPARED BY: Ricondo &amp; Associates, Inc., August 2013.

### 2.3.1 SPONSOR'S PREFERRED ALTERNATIVE

The Proposed Action (Refinement #2 Alternative) for Runway 6L-24R would be a variation of the Declared Distances alternative. This would involve the covering of portions of the Argo Ditch, the relocation of a portion of a service road along Lincoln Boulevard, closure of a portion of a service road located within the Runway 6L-24R RSA south of the runway. The relocated service road along Lincoln Boulevard would become the limiting object, providing for a 641-foot RSA beyond the Runway 24R end. In order to provide a 1,000-foot standard RSA on that end, declared distances would be implemented, reducing the Runway 6L Accelerate-Stop Distance Available and Landing Distance Available by 359 feet, from 8,925 feet to 8,566 feet. This alternative would also provide the required minimum 600 feet of RSA prior to the Runway 24R landing threshold. No improvements are required on the Runway 6L end. The Proposed Action for Runway 6L-24R is depicted in Exhibit 1-6.

The Proposed Action (Refinement #2 Alternative) for Runway 6R-24L includes relocation of a portion of a service road within the Runway 6R-24L RSA north of the runway, and closure of parking areas located within the Runway 6R-24L RSA. Declared distances would also be implemented on Runway 6R-24L. The Runway 6R ASDA and LDA would be reduced by 115 feet to provide a 1,000-foot RSA from the Runway 6R localizer. The

proposed improvements would not correct the 104-foot deficiency for the Runway 6R arrival RSA, the 835-foot deficiency for Runway 24L arrivals and departures, or the portion of the service road located within the RSA south of the runway. LAWA is considering alternatives to address these RSA issues but due to complexities with interactions for aircraft operating on the two runways, additional analysis and coordination with FAA needs to occur before LAWA can identify an alternative that will address all RSA deficiencies for Runway 6R-24L. The Proposed Action for Runway 6R-24L is depicted in Exhibit 1-7.

The primary components of the Proposed Action include:

- Implementation of declared distances on Runway 6L and Runway 6R
- Service roads in the eastern portion of the 6L-24R RSA would be relocated or realigned outside the RSA
- Service road segments would be constructed between the Runway 6L-24R RSA and the Runway 6R-24L RSA
- Two segments of service roads would be constructed for access to navigational aids (navaids) east of the runways
- Pavement rehabilitation of eastern 7,250 feet of runway
  - Runway centerline and touchdown lighting replacement
  - Runway pavement markings
- Cover a segment of the Argo Ditch
- Relocate security gate(s)
- Relocated Air Operations Area (AOA) Fence
- Closure of LAWA construction equipment parking areas east of Runway 24L/24R
- Protect-in-place Los Angeles Department of Water and Power water line
- Construction Staging Areas
- Taxiway AA (116,000 sf)
  - Pavement Rehabilitation
    - Realignment of centerline lights
    - New striping
  - Realignment of hold bar
    - Relocation of associated lighting (in-pavement hold bar lights and elevated guard lights)
    - Relocation of centerline lights
    - Removal of striping; new striping
    - Relocation of status lights

- Relocation of hold position airfield signage
- Taxiways Y and Z
  - Realignment of hold bars
    - Relocation of associated lighting (in-pavement hold bar lights and elevated guard lights)
    - Relocation of centerline lights
    - Removal of striping; new striping
    - Relocation of status lights
    - Relocation of hold position airfield signage

## 2.4 Permits Required

As required under paragraph 405d (4) of FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures, Change 1*, a preliminary list of permits required for implementation of the Proposed Action is provided in **Table 2-5**.

**Table 2-5: Preliminary List of Permits Required for the Proposed Action**

ISSUING AGENCY	PERMIT NAME/TYPE
U.S. Army Corps of Engineers	Nationwide Permit 39 for Commercial and Institutional Development for covering of portion of Argo Ditch
California Department of Fish and Wildlife	Streambed Alteration Agreement
California State Water Quality Control Board	General Construction Storm Water Permit; and Standard Urban Stormwater Mitigation Plan (SUSMP)
Los Angeles Regional Water Quality Control Board	Water Discharge Requirements Application
Los Angeles Regional Water Quality Control Board	General National Pollutant Discharge Elimination System (NPDES) Stormwater permit under Section 402 of the Clean Water Act (CWA) for construction activities.
Los Angeles Regional Water Quality Control Board	General NPDES Stormwater permit under Section 402 of the CWA for industrial activities.
California Department of Transportation	Amended/Corrected Airport Permit, in accordance with California Code of Regulations (CCR), Title 21 §3530

SOURCE: Ricondo & Associates, Inc., September 2013.

PREPARED BY: Ricondo & Associates, Inc., September 2013.

## 2.5 Federal Laws and Regulations Considered

In accordance with FAA Order 1050.1E, Paragraph 405(d)(4), the relevant federal laws and statutes, executive orders, and other federal regulations considered during preparation of this EA are listed in **Table 2-6**, **Table 2-7**, and **Table 2-8**, respectively.

**Table 2-6 (1 of 2): Federal Laws and Statutes Considered**

	CITATION
National Environmental Policy Act of 1969	42 U.S.C. 4321 <i>et seq.</i>
Clean Air Act of 1970, as amended	42 U.S.C. 7401 <i>et seq.</i>
Department of Transportation Act of 1966, Section 4(f)	49 U.S.C. 303(c)
Vision 100 – Century of Aviation Reauthorization Act of 2003	49 U.S.C. 40101
Airport and Airway Improvement Act of 1982, as amended	49 U.S.C. 47101 <i>et seq.</i>
Airport and Airway Revenue Act of 1987	P.L. 100-223, Title IV
Community Environmental Resource Facilitation Act	42 U.S.C. §9601, <i>et seq.</i>
Policy on Lands, Wildlife and Waterfowl Refuges, and Historic Sites	49 U.S.C. § 303 [formerly known as Section 4(f) of the Department of Transportation Act of 1966]
Section 201(a), Federal Land Policy and Management Act of 1976	43 U.S.C. § 1701, <i>et seq.</i> ; P.L. 94-579
The Archaeological and Historic Data Preservation Act of 1974	P.L. 86-253, as amended by P.L. 93-291, 16 U.S.C. § 469
The Noise Control Act of 1972	P.L. 92-574; 42 U.S.C. § 4901
The Transportation, Treasury, Housing and Urban Development, the Judiciary, The District of Columbia, and Independent Agencies Appropriations Act of 2006	P.L. 109-115
Airport Noise and Capacity Act of 1990	49 U.S.C. 4752 <i>et seq.</i>
Aviation Safety and Noise Abatement Act of 1979	49 U.S.C. 47501 <i>et seq.</i>
Aviation Safety and Capacity Expansion Act of 1990	49 U.S.C. App. 2226
Subtitle VII, Title 49, U.S.C. – “Aviation Programs” recodified from, and formerly known as, the “Federal Aviation Act of 1958” as amended (P.L. 85-726)	49 U.S.C. 40101 <i>et seq.</i>
Endangered Species Act of 1973	16 U.S.C. 1531 <i>et seq.</i>
Fish and Wildlife Coordination Act of 1958	16 U.S.C. 661 <i>et seq.</i>
Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended	16 U.S.C. 1801 <i>et seq.</i>
Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Community Environmental Response Facilitation Act of 1992	42 U.S.C. 6901 <i>et seq.</i>
Resource Conservation and Recovery Act of 1976, as amended by the Solid Waste Disposal Act of 1980	42 U.S.C. 6901 <i>et seq.</i>
Section 106, National Historic Preservation Act of 1966, as amended	16 U.S.C. 470 <i>et seq.</i>
Archaeological and Historic Preservation Act of 1974, as amended	16 U.S.C. 469 <i>et seq.</i>

**Table 2-6 (2 of 2): Federal Laws and Statutes Considered**

	CITATION
Land and Water Conservation Fund Act of 1965	16 U.S.C. 4601 <i>et seq.</i>
Section 404, Federal Water Pollution Control Act of 1972, as amended (commonly referred as the Clean Water Act), as amended by the Clean Water Act of 1977	33 U.S.C. 1251 <i>et seq.</i> , 33 U.S.C. § 1251; P.L. 95-217
Rivers and Harbors Act of 1899, Section 10	33 U.S.C. 403 <i>et seq.</i>
Farmland Protection Policy Act	7 U.S.C. 4201 <i>et seq.</i>
Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970	42 U.S.C. 4601 <i>et seq.</i>
Wild and Scenic Rivers Act of 1968	16 U.S.C. 1271 <i>et seq.</i>
Toxic Substances Control Act	15 U.S.C. 2601 <i>et seq.</i>
Coastal Zone Management Act of 1972	16 U.S.C. 1452 <i>et seq.</i>
Oil Pollution Control Act of 1990	33 U.S.C. 2701 <i>et seq.</i>

SOURCE: Ricondo &amp; Associates, Inc., September 2013.

PREPARED BY: Ricondo &amp; Associates, Inc., September 2013.

**Table 2-7: Executive Orders Considered**

	CITATION
Executive Order 11593, Protection and Enhancement of the Cultural Environment	36 Federal Register (FR) 8921
Executive Order 11988, Floodplain Management	43 FR 6030
Executive Order 11296, Flood Hazard Evaluation Guidelines	31 FR 10663
Executive Order 11514, Protection and Enhancement of Environmental Quality (dated March 4, 1970)	35 FR 4247
Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency	65 FR 50121
Executive Order 11990, Protection of Wetlands	42 FR 26961
Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	59 FR 7629
Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks	62 FR 19883

SOURCE: Ricondo &amp; Associates, Inc., September 2013.

PREPARED BY: Ricondo &amp; Associates, Inc., September 2013.

**Table 2-8 (1 of 2): FAA Orders, Advisory Circulars, and Federal Regulations Considered****U.S. Department of Transportation and FAA Orders**

U.S. Department of Transportation (DOT), FAA Order 1050.1E: *Environmental Impacts: Policies and Procedures*

U.S. DOT, FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*

U.S. DOT, FAA Order 5200.5A, *FAA Guidance Concerning Sanitary Landfills On or Near Airports*

U.S. DOT, FAA Order 5200.8, *Runway Safety Area Program*

U.S. DOT, FAA Order 5200.9, *Financial Feasibility and Equivalency of Runway Safety Area Improvements and Engineered Materials Arresting Systems*

U.S. DOT, Order 5650.2: *Floodplain Management and Protection*

U.S. DOT Order 5610.1C, *Procedures for Considering Environmental Impacts* (44 FR 56420, October 1, 1979) and Order DOT 5610.1C, *Change 1* (July 13, 1982)

U.S. DOT, Order 5660.1A: *Preservation of the Nation's Wetlands*

U.S. DOT, Order 5680.1: *Final Order to Address Environmental Justice in Low-Income and Minority Populations*

U.S. DOT, FAA Joint Order 7110.65T, *Air Traffic Control*

**FAA Advisory Circulars**

U.S. DOT, FAA Advisory Circular (AC) A/C 91-53A, *Noise Abatement Departure Profile*

U.S. DOT, FAA AC 150/5020-1: *Noise Control and Compatibility Planning for Airports*

U.S. DOT, FAA AC 150/5070-6B, *Airport Master Plans*

U.S. DOT, FAA AC 150/5070-7, *Airport System Planning Process*

U.S. DOT, FAA AC 150/5200-33B: *Hazardous Wildlife Attractants on or near Airports*

U.S. DOT, FAA AC 36-3H: *Estimated Airplane Noise Levels in A-Weighted Decibels*

U.S. DOT, FAA AC 150/5300-13A: *Airport Design*

U.S. DOT, FAA AC 150/5320-6E, *Airport Pavement Design and Evaluation*

U.S. DOT, FAA AC 150/5370-10F: *Standards for Specifying Construction of Airports*

**Code of Federal Regulations**

Title 7 CFR Part 657 (43 FR 4030, January 31, 1978), *Prime and Unique Farmlands*

Title 14 CFR Part 36, *Noise Standards Type and Airworthiness Certificates*

Title 14 CFR Part 71: *Designation of Class A, Class B, Class C, Class D, and Class E Airspace Areas; Airways; Routes; and Reporting Points*

Title 14 CFR Part 75, *Establishment of Jet Routes and Area High Routes*

Title 14 CFR Part 77: *Objects Affecting Navigable Airspace*

Title 14 CFR Part 135: *Operating Requirements: Commuter and On-Demand Operations and Rules Governing Persons on Board Such Aircraft*

Title 14 CFR Part 139, *Airport Operations Specifications*

**Table 2-8 (2 of 2): FAA Orders, Advisory Circulars, and Federal Regulations Considered****U.S. Department of Transportation and FAA Orders**


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Title 14 CFR Part 150: Airport Noise Compatibility Planning

Title 14 CFR Part 151, *Federal Aid to Airports*

Title 14 CFR Part 152, *Airport Aid Program*

Title 14 CFR Part 153, *Acquisition of U.S. Land for Public Airports*

Title 14 CFR Part 154, *Acquisition of U.S. Land for Public Airports under the Airport and Airway Development Act of 1970*

Title 14 CFR Part 155, *Release of Airport Property from Surplus Property Disposal Restrictions*

Title 14 CFR Part 157, *Notice of Construction, Alteration, Activation, and Deactivation of Airports*

Title 14 CFR Part 169, *Expenditures of Federal Funds for Non-Military Airports or Air Navigational Facilities Thereon*

Title 36 CFR Part 800 (39 Federal Register [FR] 3365, January 25, 1974, and 51 FR 31115, September 2, 1986), *Protection of Historic Properties*

Title 40 CFR Part 93: Determining Conformity of Federal Actions to State or Federal Implementation Plans, Subpart B

Title 40 CFR Part 122: EPA Administered Permit Programs: The National Pollutant Discharge Elimination System

Title 40 CFR Part 123: State Program Requirements

Title 40 CFR Part 124: Procedures for Decision making

Title 40 CFR Part 172: Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements

Title 40 CFR Parts 1500-1508: President's Council on Environmental Quality

Title 49 CFR Part 24 (March 2, 1989), *Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs*

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SOURCE: Ricondo & Associates, Inc., September 2013.

PREPARED BY: Ricondo & Associates, Inc., September 2013.

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