2.0 PROJECT DESCRIPTION AND BACKGROUND

2.1 Project Objective

Oakland International Airport (OAK, or Airport), like many airports in the United States, was built before the current Federal Aviation Administration (FAA) design standards for Runway Safety Areas (RSAs) were adopted in the late 1980s. In the late 1990s and early 2000s, a series of aircraft accidents resulted in the loss of human life and highlighted the need for airports to comply with RSA standards. These accidents stimulated the passage of Public Law [PL] 109-115, which states that "*not later than December 31, 2015, the owner or operator of an airport certificated under 49 United States Code (USC) 44706 shall improve the airport's RSAs to comply with the FAA design standards required by 14 (Code of Federal Regulation Part 139"* (PL 109-115, November 30, 2005 [119 Statute 2401]).

The purpose of the OAK RSA Improvement Project is to bring the existing RSAs into compliance with the RSA standards included in FAA Advisory Circular (AC) 150/5300-13, *Airport Design*, as required by PL 109-115, while concurrently complying with all other applicable design standards of the AC (e.g., Navigational Aid Systems [NAVAIDS]), and maintaining the existing operational capacity and efficiency of the Airport. The project sponsor (the Port of Oakland [Port]) must either implement RSA safety improvements as defined in FAA AC 150/5300-13, *Airport Design,* as required by PL 109-115, or provide an equivalent level of safety in accordance with FAA Orders 5200.8, *Runway Safety Area Program*, and 5200.9, *Financial Feasibility and Equivalency of RSA Improvements and Engineered Materials Arresting System (EMAS)* (FAA, 1999; FAA, 2004). As indicated above, these requirements must be met by no later than December 31, 2015.

2.2 Project Background

2.2.1 DESCRIPTION OF EXISTING AIRPORT

The Port owns and operates OAK, a medium hub airport. OAK is certificated under 14 CFR Part 139 and accommodates both commercial service aircraft and general aviation operations. The Airport, located in the City of Oakland, with a small portion in the City of Alameda in Alameda County, California, is approximately 2 miles west of Interstate 880 (I-880) and is adjacent to San Francisco Bay. OAK provides airfield, terminal, and support facilities for commercial flights, air charter/taxi operations, air cargo, military, and general aviation operations. The location of OAK is shown on **Figure 1**. OAK is a critical component of the transportation network serving the San Francisco Bay Area, the region, the California Aviation System Plan, and the National Airspace System. The Airport also provides international air service. The Bay Area relies on aviation as a major means of travel, and for the shipment of goods. In 2010, approximately 9.5 million passengers and 510,963 metric tons of air cargo, including freight and mail, were transported through the Airport (OAK, 2011).

The Airport encompasses approximately 2,600 acres, including 517 acres of wetlands and waters of the U.S. under jurisdiction of the U.S. Army Corps of Engineers (USACE) and the San Francisco Regional Water Quality Control Board (RWQCB). The primary Airport features are illustrated on **Figure 2**.

OAK is a primary commercial service airport with four runways: three runways at North Field (Runways 9R-27L, 9L-27R, and 15-33) and one runway at South Field (Runway 11-29). **Table 1** shows the use of each runway as a percentage of total operations at the Airport.

Table 1
Percent Use of Total Airport Operations for Each Runway (2010)

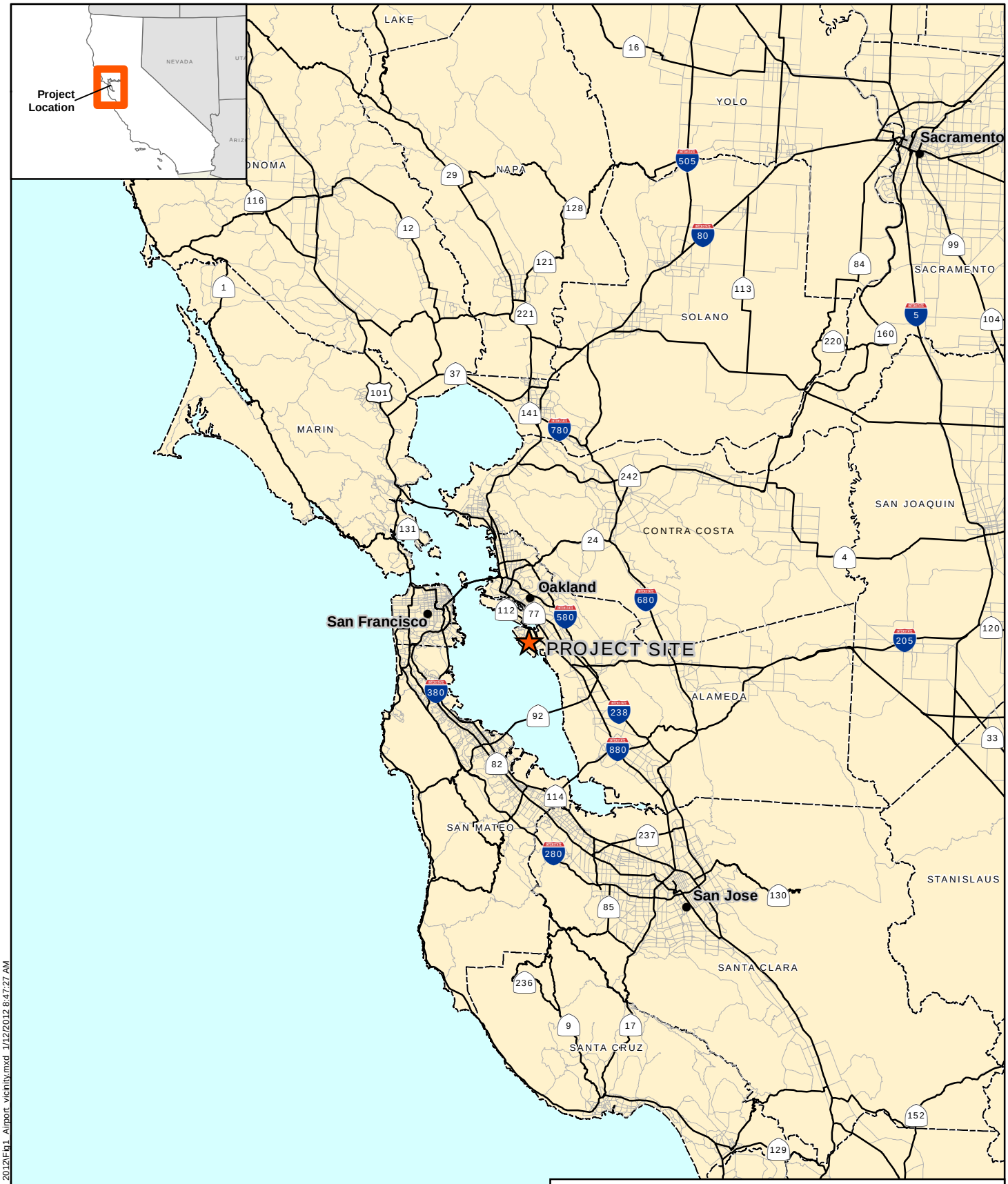
Runway	Percent Use
North Field	
Runway 15	<0.1
Runway 33	8.02
Runway 9L	0.74
Runway 27R	9.62
Runway 9R	1.69
Runway 27L	13.63
North Field Total	**33.69**
South Field	
Runway 29	60.19
Runway 11	6.12
South Field Total	**66.31**
Total Airport Use	**100.00**

Source: HMMH, 2011

The three North Field runways are Runway 9R-27L, Runway 9L-27R, and Runway 15-33. These runways primarily serve general aviation aircraft. Runways 9R-27L and 9L-27R serve as alternative commercial runways during emergencies and maintenance shutdowns of Runway 11-29 in South Field. Runway 15-33 is used for small aircraft, such as those shown on **Figure 3**.

South Field has one runway, Runway 11-29, which serves commercial air carriers, business jets, and cargo aircraft.

A runway can be used in either direction, depending on wind direction, and has a name for each direction. Runways are identified based on their magnetic orientation and are named by a number between 01 and 36. As an example, Runway 11-29 at OAK is oriented along a line extending approximately 110° southeast and 290° in the opposite direction (northwest). Thus, Runway 11-29 operates as Runway 11 when planes are landing or departing to the southeast, and as Runway 29 when planes are landing and departing to the northwest.



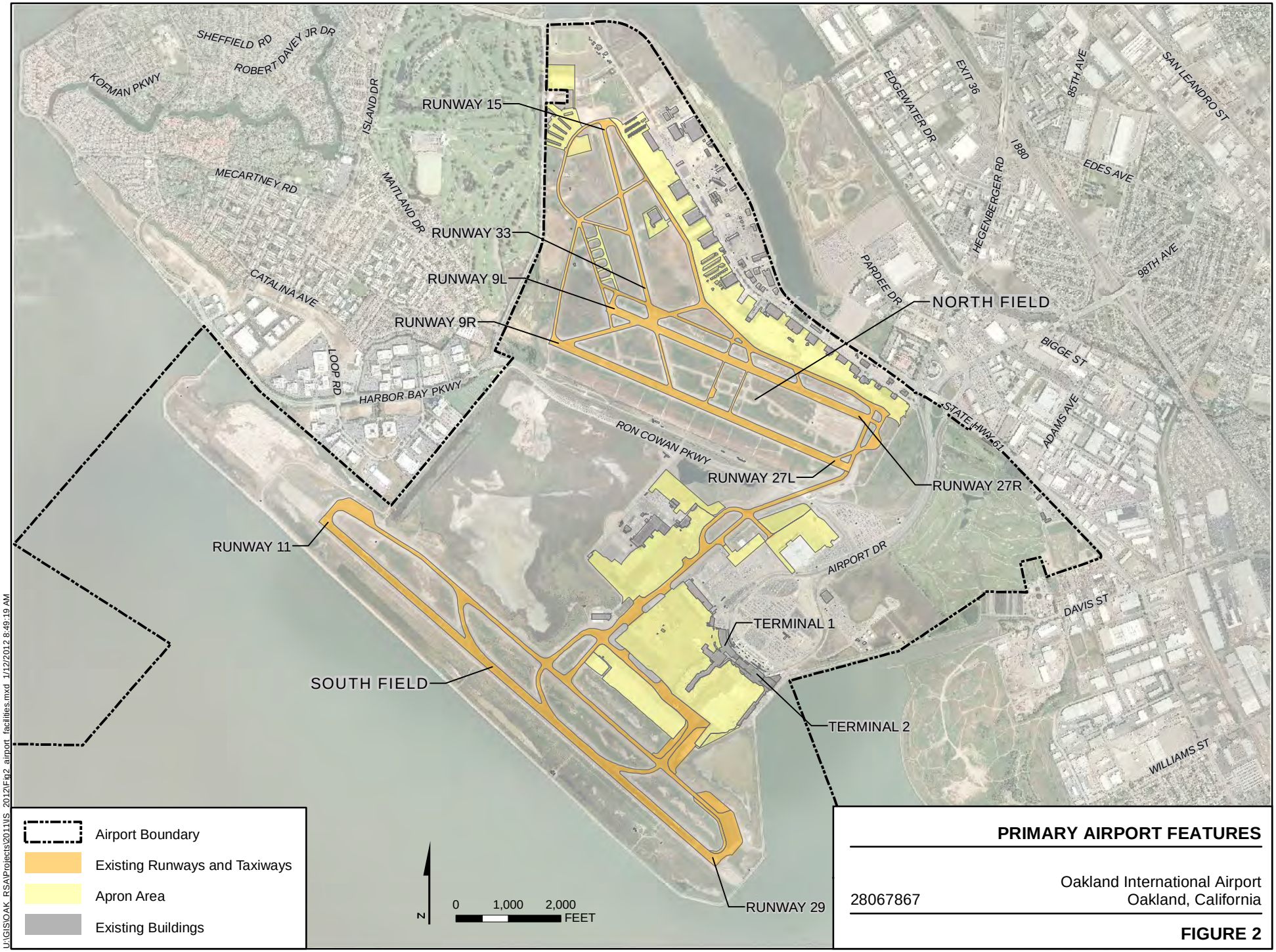
OAKLAND INTERNATIONAL AIRPORT LOCATION

28067867

Oakland International Airport
Oakland, California

FIGURE 1

U:\GIS\OAK_RSA\Projects\2011\IS_2012\Fig1_Airport_vicinity.mxd 1/12/2012 8:47:27 AM



PRIMARY AIRPORT FEATURES

28067867

Oakland International Airport
Oakland, California

FIGURE 2

U:\GIS\OAK_RSA\Projects\2011\S_2012\Fig2_airport_facilities.mxd 1/12/2012 8:49:19 AM

Source: Aerial Photo, Digital Globe, April 2007.

CESSNA 421

CESSNA 172

Source:
Cessna 421: Airliners.net
Cessna 172: Cessna.com

TYPICAL AIRCRAFT USING RUNWAY 15-33

Oakland International Airport
Oakland, California

28067867

FIGURE 3

3/7/12 vsa ...T:\Port of Oakland_ RSA\Graphics 2012\OAK RSA IS\Fig3_typ_aircraft_15-33.ai

The Airport has 29 aircraft gates at two terminals that accommodate the domestic and international passenger airlines. Terminal 1 includes 16 aircraft gates, and Terminal 2 includes 13 aircraft gates (Port, 2006). The FAA's 2011 Terminal Area Forecast (TAF) shows that OAK had a total of 225,692 annual aircraft operations in 2010 (FAA, 2012). The TAF is the FAA's official published forecast of the airports in the National Plan of Integrated Airport Systems. The TAF includes historical and forecast data. Data are presented on a U.S. Government fiscal year basis (October through September). Aircraft operations provided by TAF for 2010 are actual data and not forecast data. These are the most recent data available at the time of the preparation of this Initial Study (IS). An aircraft operation is defined in Appendix A of FAA AC 150/5070-6B, *Airport Master Plans*, as one landing, takeoff, or touch-and-go procedure. Airlines that currently serve OAK include Southwest Airlines, which provides the greatest number of flights, followed by Alaska Airlines and JetBlue Airways. The primary carriers that currently provide air cargo service are FedEx, United Parcel Service, and Ameriflight. Three fixed-based operators, KaiserAir, Business Jet Center, and Landmark Aviation, provide general aviation facilities in North Field. Approximately 300 corporate and privately owned aircraft are based at OAK, using various aircraft hangars and outdoor tie-downs.

Additional facilities include an Aircraft Rescue and Firefighting station, aircraft maintenance and storage hangars, three fuel farms (two in North Field and one in South Field), vehicle service roads, rental car facilities, vehicle parking lots, and connections to public transit, including Bay Area Rapid Transit.

2.2.2 Definition of Runway Safety Areas

FAA defines an RSA as an "identified surface surrounding the runway prepared and suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway." The FAA has established specific design standards for RSAs in Section 305 of the AC. Pursuant to FAA AC 150/5300, Section 305 A, RSAs should be:

1. Cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations;

2. Drained by grading or storm sewers to prevent water accumulation;

3. Capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft; and

4. Free of objects, except for objects that need to be located in the RSA because of their function. Objects higher than 3 inches (7.6 centimeters) above grade should be constructed, to the extent practicable, on low-impact-resistant supports (frangible-mounted structures) of the lowest practical height, with the frangible point no higher than 3 inches (7.6 centimeters) above grade. Other objects, such as manholes, should be constructed at grade. In no case should their height exceed 3 inches (7.6 centimeters) above grade.

The applicable dimensional requirements for RSAs are included in FAA AC 150/5300-13, *Airport Design*, Table 3-3. The Airplane Design Group (ADG) and the Aircraft Approach Category together form the basis

for establishing the standard RSA dimensions for a runway. However, for runways that carry Approach Category C aircraft (which generally include narrow-body jet aircraft such as the Boeing 737) and Approach Category D aircraft (which generally include wide-body jet aircraft such as the MD-11 and Boeing 747), RSA dimensions are constant regardless of ADG.

Table 2 summarizes the RSA dimensional requirements for all of the runways at OAK. All of the runways at OAK can be used in either direction depending on wind conditions, which means that the RSA requirement for distance beyond the runway end applies to both ends of each runway. The RSA for Runways 9R-27L, 9L-27R, and 11-29 extends 250 feet either side of the runway centerline (an overall width of 500 feet), continuing to the end of the RSA beyond each runway end. For Runway 15-33, the RSA is 150 feet wide centered on the runway centerline.

Table 2
Standard Runway Safety Area Dimensions

RSA Dimensions (feet)	ARC B-II (Runway 15-33)	ARC C-IV and D-V (Runways 9R-27L, 9L-27R, and 11-29)
RSA Width	150	500
RSA Length Prior to Landing Threshold	300	600
RSA Length Beyond the Runway	300	1,000

Notes:
ARC = Airport Reference Code (includes both the Airplane Design Group and Aircraft Approach Category)
RSA = Runway Safety Area
Source: Table 3-3 from FAA Advisory Circular 150/5300-13, *Airport Design*.

2.2.3 Description of Existing Runway Safety Areas

Based on the requirements of PL 109-115, the FAA requested that the Port evaluate and determine whether all of the RSAs at the Airport met current FAA design standards. The Port prepared two RSA studies to review existing conditions, identify deficiencies relative to current RSA standards, and develop recommendations for improvements. The first study was prepared in 2005, evaluating the possible approaches for correcting any deficiencies for all four runways at the Airport (URS, 2005). A second study was completed in 2011 for Runways 9R-27L, 9L-27R, and 11-29 in response to revised FAA screening criteria. The 2011 study incorporated the relevant data from the 2005 study, and revised the information to match the new screening criteria (URS, 2011).

As part of the 2005 RSA study, an inventory of existing RSA conditions at OAK was compiled. RSA deficiencies were identified, and to the extent feasible, quantified (URS, 2005). The existing RSAs are constrained by San Francisco Bay, the perimeter dike surrounding portions of the Airport, major roadways adjacent to the Airport property, wetlands, and vehicle service roads. In addition, some signs and NAVAIDS located within the RSAs require relocation or redesign, and several areas require grading or fill to comply with current FAA design standards. A detailed tabulation of these items is compiled in the 2005 RSA study and potential means to correct these items is included in the project description.

Key RSA existing conditions at OAK are summarized by runway in **Table 3**. RSA deficiencies (or non-compliance areas) are also listed below and shown on **Figures 4** and **5**.

Table 3
Summary of Existing Runway Safety Area Conditions
Oakland International Airport

Runways and Runways Ends	Meets FAA RSA Standards?	Dimensional Deficiency (feet)[2]	
		Prior to Landing	Beyond Runway End
Runways 9R-27L and 9L-27R			
9R	No[1]	None	None
27L	No[1]	None	210
9L	No[1]	None	115
27R	No[1]	None	None
Runway 15-33			
15	Yes	None	None
33	No	None	62
Runway 11-29			
11	No[1]	None	515
29	No[1]	115	None

Notes:

1 The existing RSAs of Runways 9L-27R, 9R-27L, and 11-29 are substandard due to soil conditions and the presence of roadways within standard dimensions of the RSAs, regardless of the dimensional sufficiency.

2 The RSAs for all runways except Runway 15-33 are 500 feet wide, centered along the runway centerline, which complies with the width dimensions required in FAA Advisory Circular 150/5300-13, *Airport Design*. The RSA for Runway 15-33 is 150 feet wide.

FAA = Federal Aviation Administration
RSA = Runway Safety Area

In addition to the dimensional deficiencies listed above, the following is a summary of other areas of non-compliance noted in the 2005 RSA Study.

Runway 15-33

- A vehicle service road is located approximately 230 feet northwest of the runway, within the existing RSA.

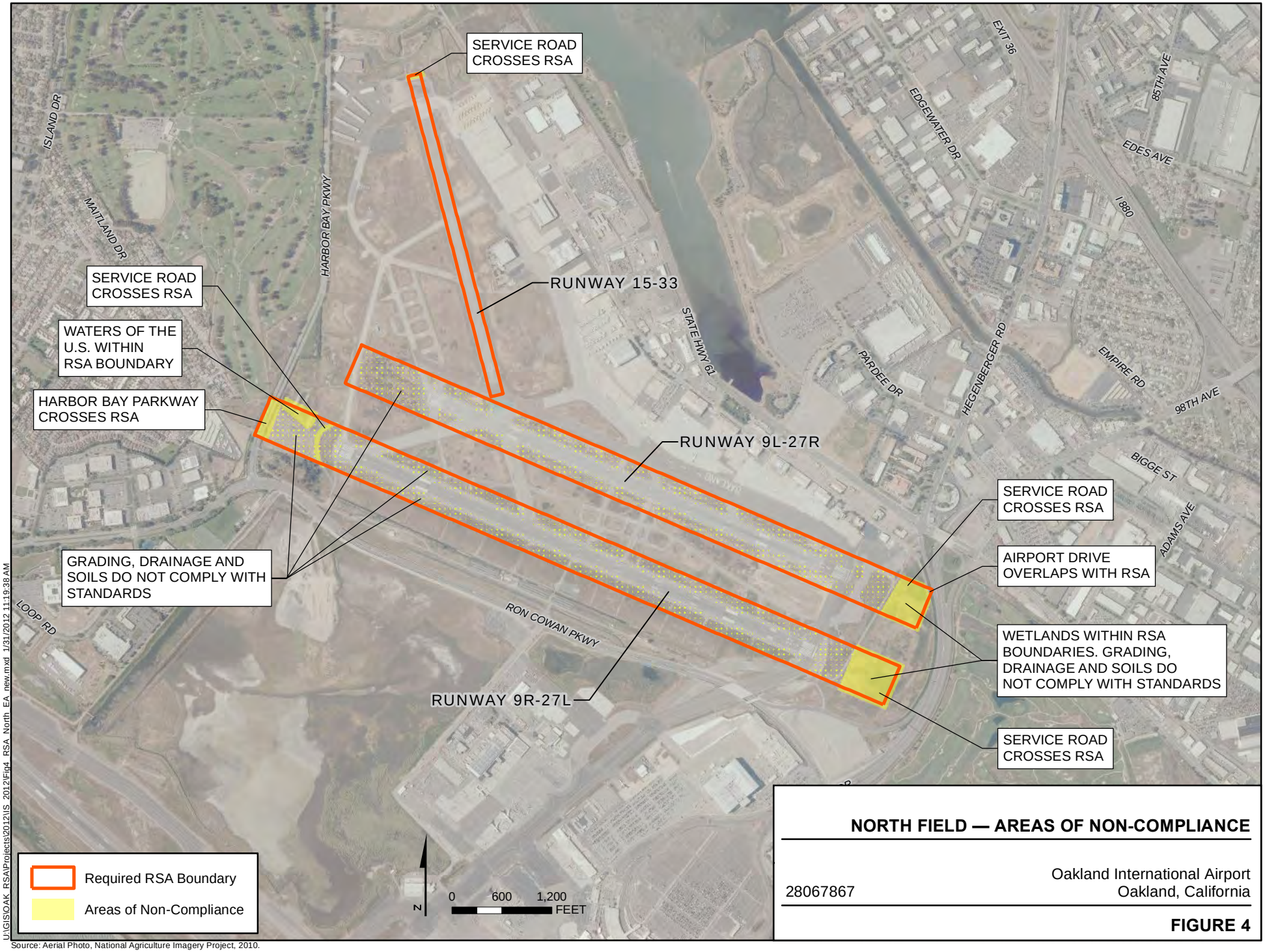
Runways 9R-27L and 9L-27R

- A vehicle service road is located approximately 270 feet west of the Runway 9R threshold, within the dimensions of a standard RSA;

- Harbor Bay Parkway is located less than 1,000 feet west of the Runway 9R threshold, within the dimensions of a standard RSA;
- A vehicle service road runs through the area, within the dimensions of a standard RSA for both the Runway 27L and 27R RSAs. The vehicle service road is located approximately 400 feet from the Runway 27L threshold and approximately 520 feet from the Runway 27R threshold;
- The Airport perimeter fence and Airport Drive are located 885 feet east of the Runway 27R threshold, within the dimensions of a standard RSA, resulting in a tapered corner at the northeast end of the existing RSA for Runway 9L-27R;
- Some areas in the existing RSAs comprise wetlands and waters within Clean Water Act (CWA) jurisdiction (herein referred to as wetlands and waters of the U.S.) and do not currently provide sufficient support for emergency equipment and aircraft in compliance with FAA AC 150/5300-13, *Airport Design*; and
- There are additional non-compliant conditions regarding surface grades, soil conditions, and frangibility of signs and NAVAIDS in the lateral RSAs and the RSAs beyond the runway ends.

Runway 11-29

- The Runway 11 localizer antenna array is located 485 feet from the Runway 29 threshold, within the dimensions of a standard RSA, as presented in **Table 2**;
- A vehicle service road and perimeter dike are located within the dimensions of a standard RSA, east of the Runway 29 threshold. Beyond the perimeter dike, the dimensions of a standard RSA would extend into San Francisco Bay;
- Some areas in the existing RSAs comprise wetlands and waters of the U.S., and do not currently provide sufficient support for emergency equipment and aircraft in compliance with FAA AC 150/5300-13, *Airport Design*; and
- For both Runway 29 and 11 ends, the RSAs overlap with the glide slope antenna critical areas, which are areas located adjacent to the runway extending away from the glide slope antenna toward the direction of approaching aircraft. The glide slope antenna critical area must be clear and leveled so as to accurately reflect the glide slope signal that provides vertical guidance to approaching aircraft. A condition exists on the Runway 11 end that does not meet FAA standards for NAVAIDS. Specifically, on the Runway 11 end, the glide slope antenna critical area overlaps with a portion of the RSA and Taxiway W. Aircraft that transit the RSA, entering or leaving the runway on Taxiway W, create a temporary obstruction that interferes with the glide slope antenna signal. This condition does not meet FAA standards in FAA AC 150/5300-13, *Airport Design*, Section 602, which states that a glide slope and critical area should be “located on the side of the runway offering the least possibility of signal reflections from buildings, power lines, vehicles, and aircraft, so as to avoid interference.”



U:\GIS\OAK_RSA\Projects\2012\IS_2012\Fig4_RSA_North_EA_new.mxd 1/31/2012 11:19:38 AM

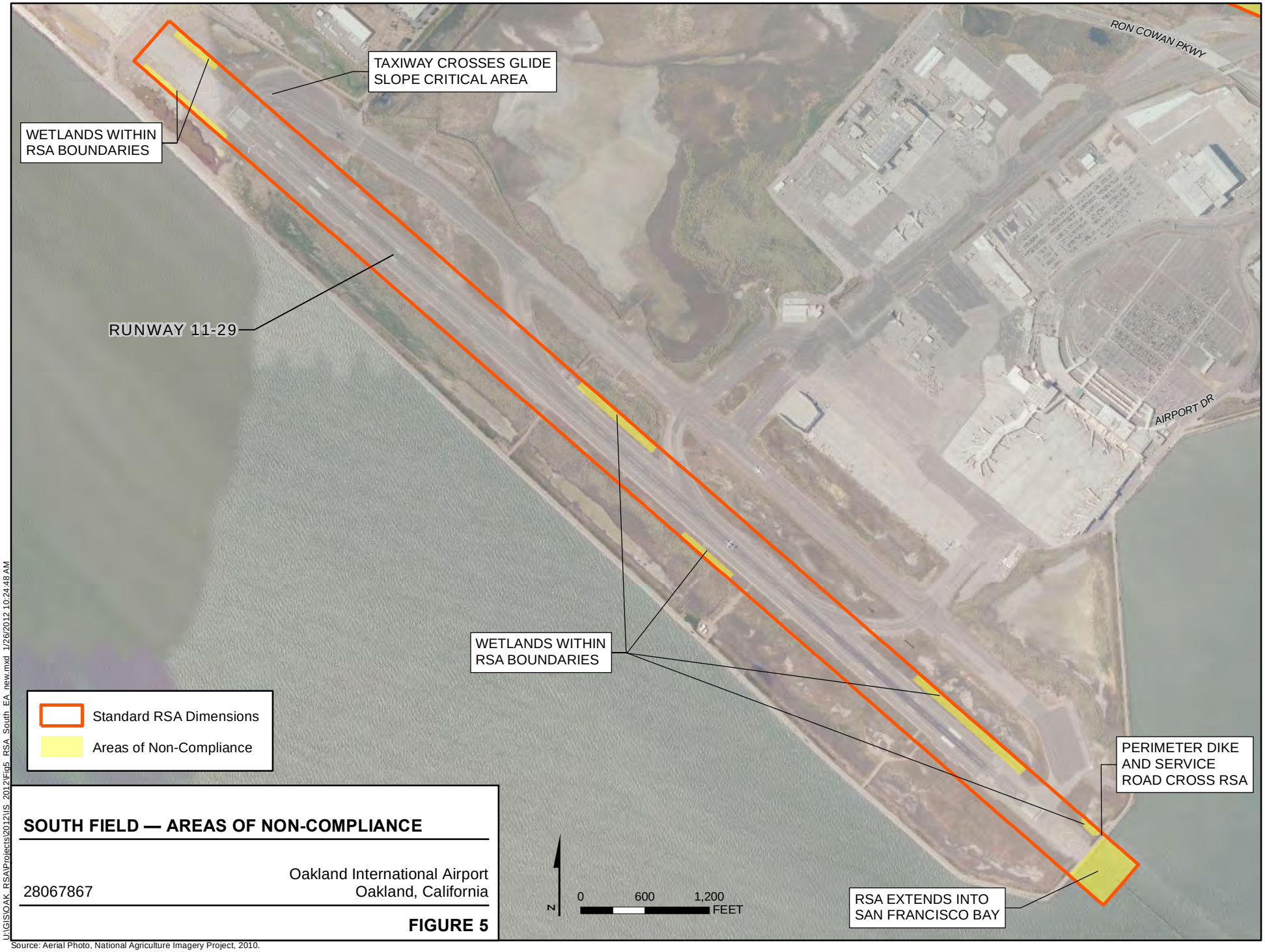
Source: Aerial Photo, National Agriculture Imagery Project, 2010.

NORTH FIELD — AREAS OF NON-COMPLIANCE

28067867

Oakland International Airport
Oakland, California

FIGURE 4



SOUTH FIELD — AREAS OF NON-COMPLIANCE

28067867

Oakland International Airport
Oakland, California

FIGURE 5

U:\GIS\OAK_RSA\Projects\2012\IS_2012\Fig5_RSA_South_EA_new.mxd 1/26/2012 10:24:48 AM

Source: Aerial Photo, National Agriculture Imagery Project, 2010.

2.3 Existing Setting – Regional and Local

The project site is located in the East Oakland Area in the City of Oakland, as defined by the General Plan of the City of Oakland. The City of Oakland is bounded by the cities of Berkeley and San Leandro to the north and south, respectively. San Francisco Bay and the island of Alameda bound the City of Oakland to the west. The East Oakland Area comprises Central East Oakland, Elmhurst, and the Airport, and is characterized by a mix of detached housing units and mixed housing types outside of the Airport environs; open space and recreational areas; and service industrial and commercial areas.

Regional access to the Airport is provided by I-880. Major roadways serving OAK include Hegenberger Road, 98th Avenue, Doolittle Drive (State Route 61), Harbor Bay Parkway, Ron Cowan Parkway, and Davis Street (State Route 61).

2.4 Existing Setting – Project Site

OAK, owned and operated by the Port, provides airfield, terminal, and support facilities for commercial flights, air charter/taxi operations, air cargo, military and general aviation operations. The original Airport was built in 1927 at North Field and is still in operation today, serving smaller aircraft for air cargo, general aviation, and corporate jet activities. Commercial passenger and cargo jet aircraft operate from South Field, which opened in 1962.

According to the City of Oakland General Plan, the Airport is located in the Seaport and Airport/Gateway Showcase District, which serves to attract related and compatible commercial and industrial uses. The planned land uses in the area of the Airport are consistent with existing land use patterns, and land use changes in this part of Oakland are not anticipated.

Figure 2 shows a map of existing primary features at OAK. The largest aviation land use at OAK is Airfield, which is approximately 1,078 acres. South Field (defined as the Airport area south of Ron Cowan Parkway, and including the Runway 11-29) is dominated by passenger facilities (approximately 208 acres), including Terminals 1 and 2, and air cargo facilities (approximately 104 acres). North Field (the Airport area north of Ron Cowan Parkway, including the Runways 9R-27L, 9L-27R, and 15-33) contains a variety of aviation land uses, the largest of which is general aviation (85 acres), including aircraft hangars, ramps, and three fixed-base operators. North Field also accommodates approximately 30 acres of air cargo facilities.

2.5 Project Description

The Proposed Project's improvements are described below and shown on **Figures 6 and 7.**[7] The Proposed Project would enhance the safety conditions of the runways. The Proposed Project would not cause an increase in either airport operations or the number of passengers or aircraft operations at the Airport. It would not increase the size of aircraft using OAK, or cause any changes to airspace characteristics, flight paths, or their use.

[7] The figures presented in this document are intended to describe the overall nature and intent of the Proposed Project and technical information of environmental impacts. These figures show dimensions of project elements at a planning level of detail. The subsequent design of these elements will result in dimensional refinement. The final design of project elements may result in dimensional requirements that vary slightly from those herein.

RSA Proposed Improvements for Runway 15-33

Runway 15-33 is used by small aircraft such as those shown on **Figure 3**. The proposed components of the RSA enhancements to Runway 15-33 are limited to shifting the runway by 75 feet to the south through repainting threshold markings.

RSA Proposed Improvements to Runways 9L-27R, 9R-27L

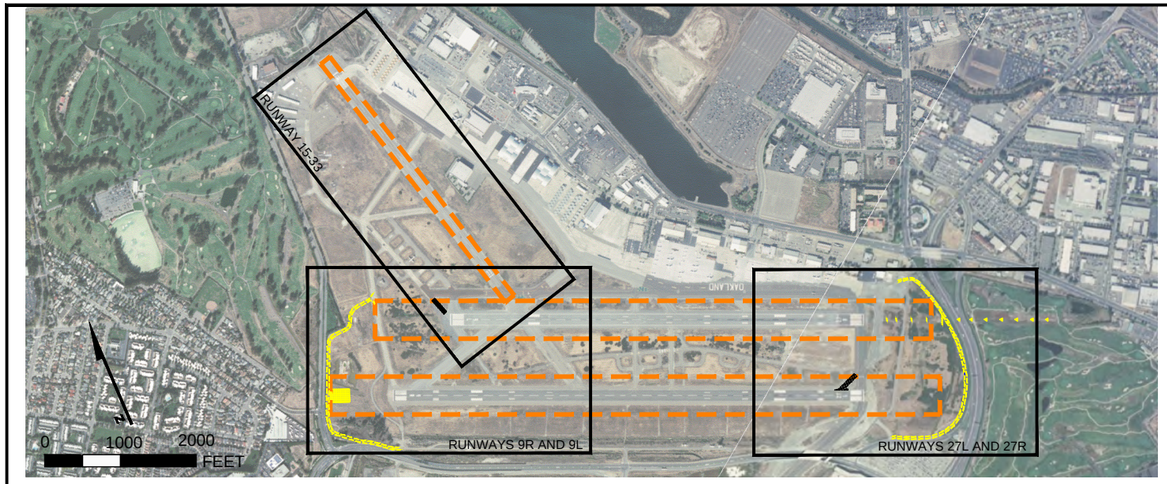
Proposed RSA improvements to Runways 9L-27R and 9R-27L would maximize the available standard, graded RSA on the eastern (27R) end of Runway 9L-27R (the northern parallel runway), and install an EMAS bed on the western (9R) end of Runway 9R-27L (the southern parallel runway) (**Figure 6**). Photographs of EMAS installations are provided on **Figure 8**. The proposed EMAS would be installed as far west as possible to provide maximum protection for any aircraft that undershoots Runway 9R arrival. The EMAS bed would be approximately 250 feet in length and 170 feet in width, and would be set back 580 feet from the landing threshold of Runway 9R. The EMAS size was based on the design aircraft for this runway pursuant to the OAK Airport Layout Plan which is a B-747, as well as the fact that Runway 9R-27L is used as a backup runway for Runway 11-29. The back of the EMAS would be approximately 25 feet from a proposed service road adjacent to Harbor Bay Parkway. The 25-foot separation would provide adequate space for proper grading and drainage, as well as the relocated service road. The resulting EMAS installation would provide 70-knot exit-speed stopping capability for a B-747 landing or departing on Runway 27L.[8] It would also provide the maximum practical distance between the EMAS and the Runway 9R landing threshold.

Declared distances would be used to reduce the operational length of Runway 9L by 118 feet, resulting in an increase of 118 feet in the space available at the Runway 27L approach end RSA. This additional space would be used to accommodate a dimensionally compliant RSA.

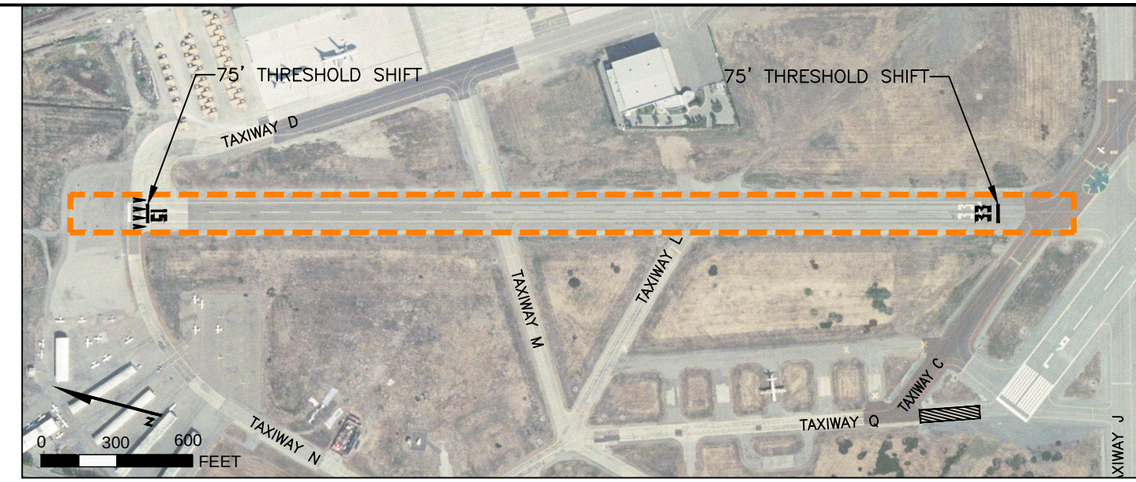
The proposed improvements to Runways 9L-27R and 9R-27L also include rerouting the service roads near the approach ends of Runways 9R, 9L, 27R, and 27L; removing non-tidal wetlands in the approaches to Runways 27L and 27R; and improving soft soils where needed throughout the RSAs of both runways. These improvements would result in partially filling the non-tidal waters of the U.S. in the approach end RSA of Runway 9R.

The existing soils are composed of granular fill placed over Young Bay Mud. The sand layer varies in thickness from less than 1 foot to more than 10 feet. Soil stabilization would involve excavating existing soils to depths ranging from 1 foot to 4 feet below current ground surface; mixing the excavated soil with materials such as lime, cement, and gravel to improve its material properties; and re-placing the soil, with compaction and possibly with layers of reinforcing geotextile materials. Drainage improvements may include the installation of stormwater collection and conveyance features, including drains and pipes, and operation and maintenance of existing and new features in accordance with the Port's Stormwater Management Implementation Plan (Kimley Horn, 2009).

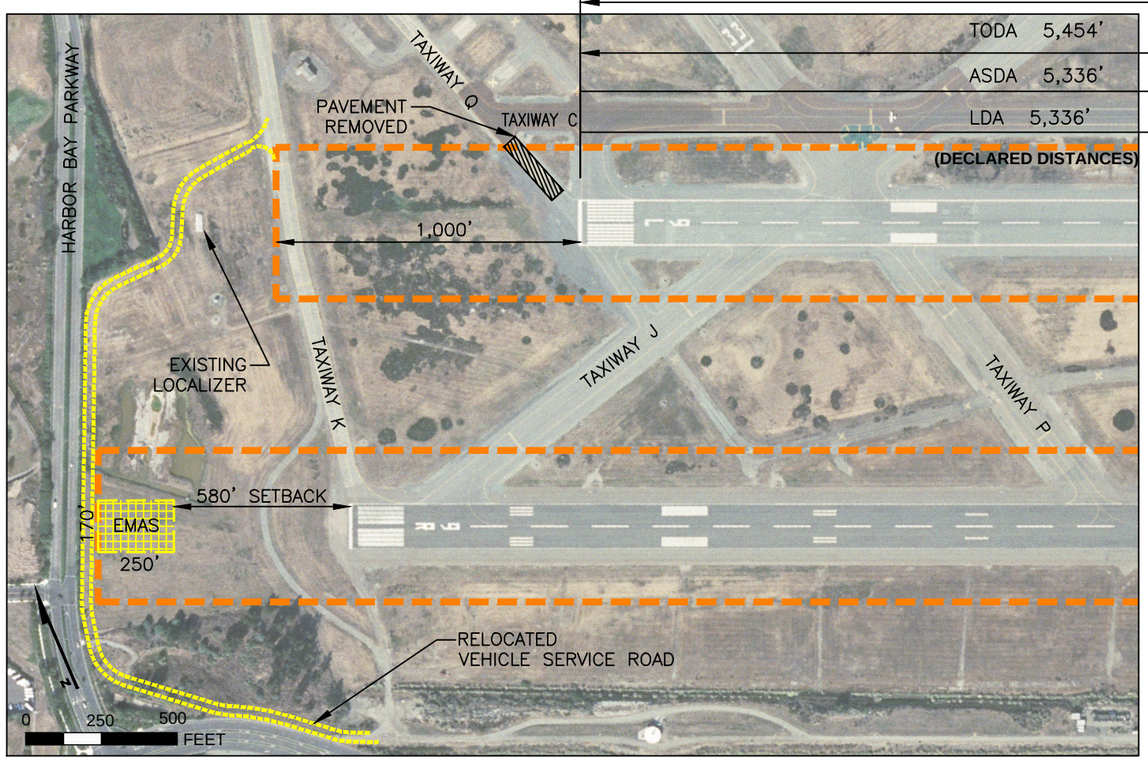
[8] Per FAA AC 150/5220-22A, EMAS for Aircraft Operations, paragraph 7.b. and Figure A.1-1, the RSA for Runway 9R is considered standard because an EMAS installation such as for Runway 9R, which provides at least 600 feet between the runway threshold and the far end of the EMAS bed, is considered to meet FAA RSA standards if the approach end of the runway has vertical guidance.



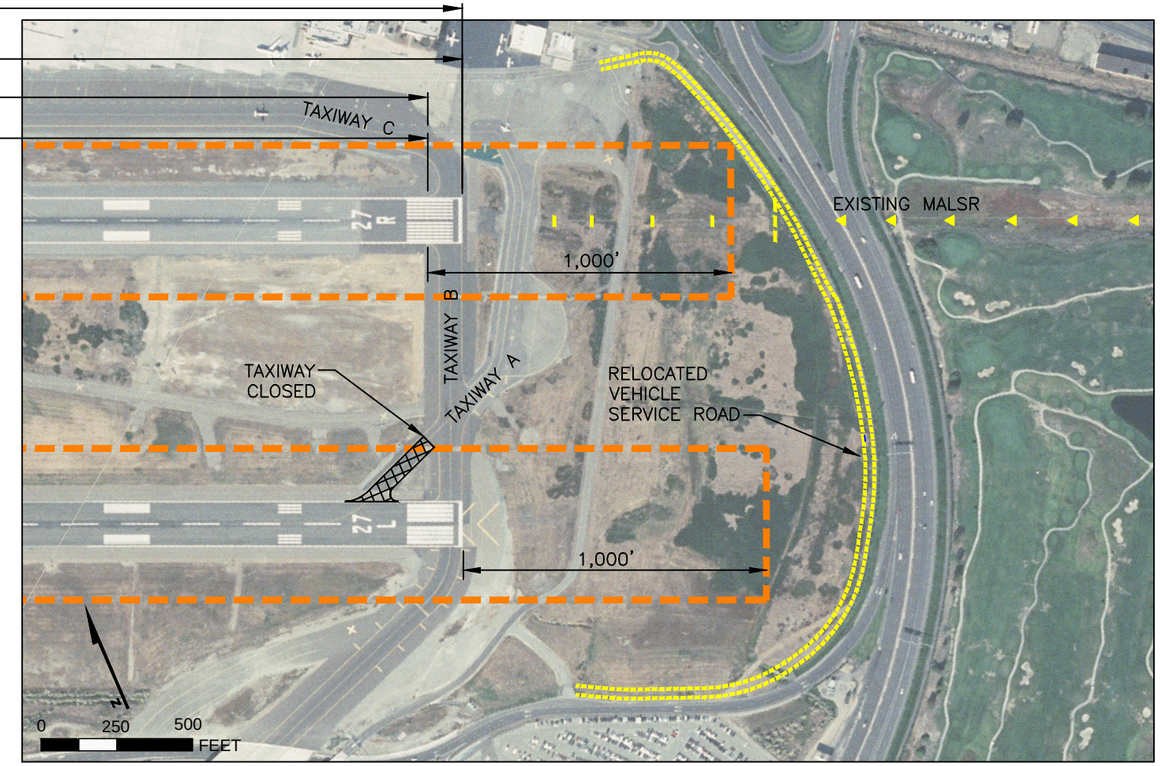
OVERVIEW



RUNWAY 15-33



RUNWAYS 9R AND 9L



RUNWAYS 27L AND 27R

LEGEND

RUNWAY SAFETY AREA

PROPOSED PROJECT - NORTH FIELD IMPROVEMENTS

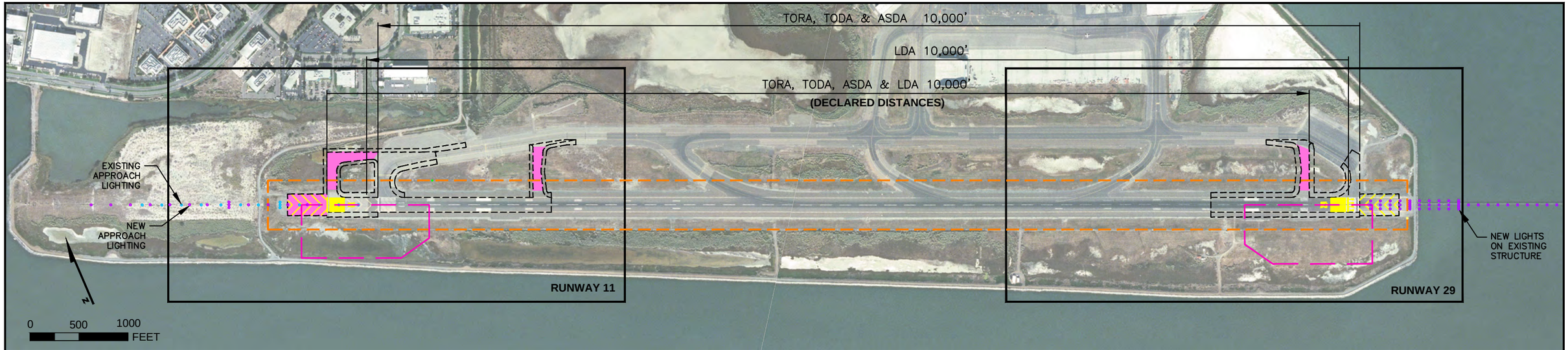
Oakland International Airport
Oakland, California

28067867

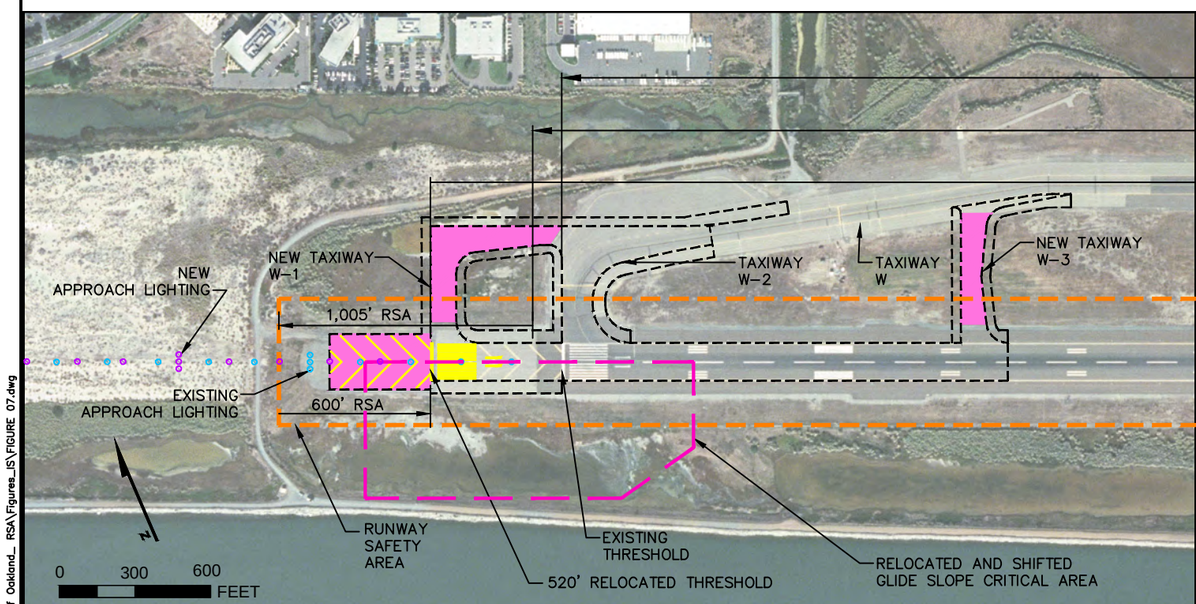
FIGURE 6

agnes_katonics Feb 03, 2012 – 8:55am C:\DOCUME~1\AGNES_~1.R02\LOCALS~1\Temp\AcPublish_1376\FIGURE 06.dwg

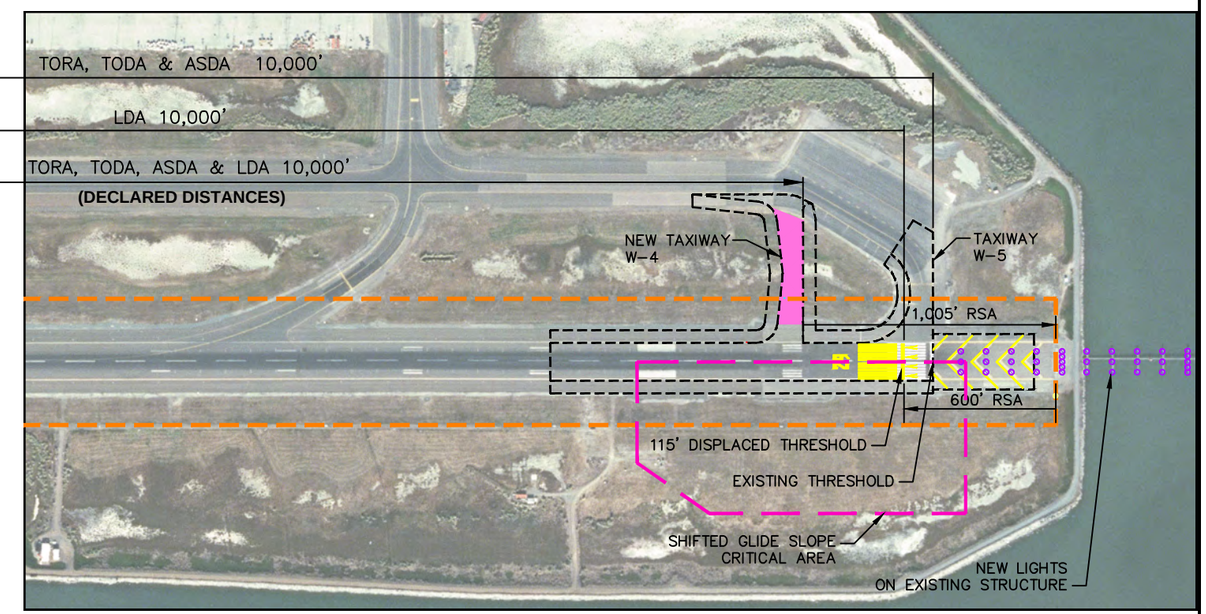
XREFS: Figures TB – IS.dwg\ XSite_North Fied Improvements.dwg\ XTopo_Aerial_HA2006.dwg\ XPVMT-RMVE.dwg



OVERVIEW



RUNWAY 11



RUNWAY 29

LEGEND

- EXISTING APPROACH LIGHTING
- NEW APPROACH LIGHTING
- RELOCATED THRESHOLD
- RUNWAY SAFETY AREA
- RELOCATED AND/OR SHIFTED GLIDE SLOPE CRITICAL AREA
- NEW OR RECONSTRUCTED PAVEMENT
- NEW RUNWAY/TAXIWAY PAVEMENT

NOTES:

1. "W" TAXIWAY DESIGNATIONS USED FOR THE PURPOSE OF THIS ANALYSIS ONLY.

PROPOSED PROJECT - SOUTH FIELD IMPROVEMENTS

Oakland International Airport
Oakland, California

28067867

FIGURE 7

dahlia_mendoza Mar 08, 2012 – 10:15am T:\Port of Oakland_ RSA\Figures_IS\FIGURE 07.dwg

XREFS: Figures TB – IS.dwg\ XTopo_Aerial_HA2006.dwg\ XALP_EX.dwg\ XSite_South IS.dwg\ XGlide Slope_South_ALT.dwg\ XALP_South Field Improvement.dwg

Source:
Engineered Arresting Systems Corporation

Notes:
1. Upper photo shows typical installation during construction.
2. Lower photo portrays actual incident at Charleston Yeager Airport.

SAMPLE INSTALLATIONS –
ENGINEERED MATERIALS ARRESTING SYSTEM

Oakland International Airport
28067867 Oakland, California

FIGURE 8

1/12/12 vsa ...T:\Port of Oakland_ RSA\Graphics 2012\OAK RSA IS\Fig7_sample_inst_EMAS.ai

In addition, extensive re-grading of existing RSAs is needed to comply with FAA standards for terrain, and to correct existing deficiencies that allow water to collect within the RSAs. In particular, there are significant areas of grade non-compliance in the RSAs for Runways 9R (including bodies of standing water), 27R, and 27L.

RSA Proposed Improvements for Runway 11-29

The proposed RSA improvements to Runway 11-29 implement a variety of RSA solutions to achieve full compliance, as shown on **Figure 7**.

Runway Thresholds: The Runway 29 landing threshold would be displaced 115 feet toward the northwest to provide the 600-foot RSA required for landing aircraft. The full strength pavement at the east end of Runway 11-29 would remain in its current location.

The Runway 11 end threshold for landing and departure would be relocated 520 feet to the northwest. New full-strength pavement would be added. The primary purpose for this threshold relocation is to create the required RSA length on the Runway 29 end to allow aircraft landing or departing on Runway 11 to have a full 1,000-foot RSA. The current dimension is 485 feet. A 515-foot Runway 11 threshold relocation would provide full compliance. An additional 5 feet were added to minimize the impact of the improvements on the runway in-pavement lights.

NAVAIDS: The glide slope antenna and Glide Slope Critical Area for Runway 29 would be shifted 115 feet to the northwest, and would remain on the southwestern side of the runway. The existing Approach Lighting System with Sequenced Flashing Configuration 2 (ALSF-2) for Runway 29 consists of 24 stations, located at 100-foot intervals on-center, starting from the runway threshold and extending into San Francisco Bay. There are 24 stations in total. Five existing stations are on land and 19 are in San Francisco Bay. There is a pedestrian bridge (also called trestle) structure that connects each in-the-Bay station to the adjacent stations and to land. At in-the-Bay Stations 6 through 10, the lights are mounted on a structure orientated perpendicular to the pedestrian bridge. All of these structures are constructed of heavy timber and are supported by timber piles driven into the bottom of San Francisco Bay. As part of the Proposed Project, the ALSF-2 for Runway 29 would be modified to accommodate the displaced landing threshold on Runway 29. The ALSF-2 equipment would be removed from ALSF-2 Station 10, the ALSF-2 station furthest from the runway threshold. The structure of the existing Station 9 (which would become Station 10 in the new configuration) would need to be widened by approximately 5 feet on each side, and new equipment would be installed. Driving new piles in San Francisco Bay would not be necessary; no in-water construction would be required for this Proposed Project. The widening can be accomplished by a cantilever extension on both ends of the existing structure. New land-based ALSF-2 light stations would need to be added.

The glide slope antenna and Glide Slope Critical Area serving Runway 11 would be relocated from the northeastern side of the runway to the southwestern side of the runway, and shifted 520 feet to the northwest, to comply with FAA standards for placement of glide slope facilities (FAA AC 5300-13, *Airport Design*, Section 602). The possibility of shifting the glide slope antenna 520 feet to the northwest on the northeastern side of the runway was investigated. However, doing so would require extending Taxiway W to the northwest and relocating a portion of Taxiway W to the northeast. This construction

could possibly require filling of tidal wetlands (depending on the final alignment of Taxiway W), and would result in a configuration that would not meet FAA design standards regarding aircraft passage through the Glide Slope Critical Area.

In addition, as part of these proposed RSA improvements, the medium-intensity approach lighting system with runway alignment indicator lights (MALSR) for Runway 11 would be replaced and shifted 520 feet to the northwest. The condition of the existing equipment was evaluated by FAA personnel and judged not likely capable of functioning after relocation. Therefore, a new MALSR is needed. The new equipment would need to be shifted northwest to accommodate the new landing threshold for Runway 11.

Taxiways: Three new connector taxiways (designated in this IS as W1, W3 and W4) would be needed as part of these proposed RSA improvements. New connector Taxiways W1 and W4 would be constructed to align with the relocated Runway 11 threshold, and displaced Runway 29 thresholds, respectively. New connector Taxiway W3 would be located approximately 2,000 feet from the existing Runway 11 end threshold to provide access for aircraft during and after construction.

Runway Lengths: After construction of the RSA improvements, the future physical length of Runway 11-29 would be 10,520 feet. However, with the application of declared distances, the usable runway length for takeoffs and landings on Runway 11-29 would remain at the current length of 10,000 feet. The declared distances would designate a portion of Runway 11-29 pavement as providing standard RSAs meeting FAA design standards, while designating the remaining 10,000 feet of pavement as available for takeoff and landing operations, as described below under Runway 29 and Runway 11 operations. No additional runway capacity is created by this project.

Runway 29 Operations: Aircraft departing on Runway 29 would begin their takeoff roll at the same point they do today. The distance available for departures on Runway 29 would remain 10,000 feet, through the use of declared distances. The resulting RSA on the northwestern end of the runway would meet the FAA standard of 1,000 feet beyond the departure end of the runway.

For arrivals on Runway 29, the approach threshold would be displaced by 115 feet. This displacement would provide a standard 600 feet of clearance between the landing threshold and the localizer antenna on the southeastern end of the runway. Arrivals on Runway 29 would therefore land 115 feet northwest of their current location. The landing length on Runway 29 would remain 10,000 feet through the use of declared distances.

Runway 11 Operations: Departures on Runway 11 would begin their takeoff roll 520 feet northwest of their current location, and would have 10,000 feet of runway available for takeoffs. A full 1,000-foot RSA would be provided at the far end of the runway, between the end of the runway and the localizer antenna. Arrivals on Runway 11 would be at the same location as departures, have a standard 600 feet of RSA prior to the landing threshold, and have 10,000 feet of runway available for landing.

Other: The proposed improvements to Runway 11-29 would include the removal of non-tidal wetlands and other waters within the limits of the RSA. These actions are needed to comply with FAA RSA design requirements, as stated in FAA AC 150/5300-13.

2.6 Construction Best Management Practices

The Proposed Project would include the following best management practices (BMPs) in order to avoid or minimize environmental impacts. These BMPs include, but are not limited to:

- Construction activities would be limited to areas within 25 feet of the RSA project improvement areas.
- Temporary and permanent erosion control measures would be implemented as specified in the project-specific Stormwater Pollution Prevention Plan. Additionally, all stormwater runoff in the Airport discharges to the detention basins of the pump stations and not directly into San Francisco Bay. Stormwater runoff would be managed as required by the State Water Quality Control Board and the San Francisco RWQCB.
- Discharge of pollutants into San Francisco Bay would be prevented during the modifications to the Runway 29 ALSF-2 approach lights on the existing pile-supported trestle.
- Equipment staging, material storage, and stockpile areas would be located in upland areas so as not to affect jurisdictional wetlands, or any other sensitive habitat.
- A plan for the emergency cleanup of any spills of fuel or other materials would be prepared by the contractor.
- Construction vehicles and equipment would be inspected to prevent discharge and contamination of soil or water (from external grease and oil or from leaking hydraulic fluid, fuel, oil, and grease).
- Equipment would be refueled and serviced at designated construction staging areas.
- All debris materials, sediment, trash, vegetation, or other material removed from the disturbed areas would be disposed of at an approved disposal site. Non-tidal wetlands and waters of the U.S. to be avoided would be marked in the field.

2.7 Construction Schedule

The Proposed Project is expected to be constructed between 2013 and 2015 to comply with the December 31, 2015, deadline established by PL 109-115. The Proposed Project would be constructed in phases to minimize disruption to aircraft operations, and must be coordinated with the FAA with regard to changes in aircraft approach procedures. The anticipated design and construction schedule is presented in **Table 4**.

2.8 Project Approvals and Permits

The Proposed Project would require the following agency approvals and permits:

- USACE CWA Section 404 Permit;
- U.S. Fish and Wildlife Service Federal Endangered Species Act Section 7 Consultation and no effect concurrence from National Marine Fisheries Service;

Table 4
Oakland International Airport Runway Safety Area Improvement Project – Projected Schedule

RSA Project	Anticipated Construction Start Date	Anticipated Construction End Date
Runway 11-29	February 2013	December 2013
Runway 9L-27R and 15-33	March 2014	October 2014
Runway 9R-27L	March 2015	October 2015

Note:
RSA = Runway Safety Area

- State Historic Preservation Officer National Historic Preservation Act Section 106 Consultation;
- California Department of Transportation Amended Airport Permit;
- San Francisco RWQCB CWA Section 401 Permit Water Quality Certification/Waste Discharge Requirements for placement of fill in waters of the State;
- National Pollutant Discharge Elimination System (NPDES)/Order No. 2010-0014-DWQ NPDES No. CAS000002 (General Construction Permit);
- San Francisco Bay Conservation and Development Commission (BCDC) Permit, or amendment of an existing BCDC Permit, and consistency determination under the Coastal Zone Management Act.