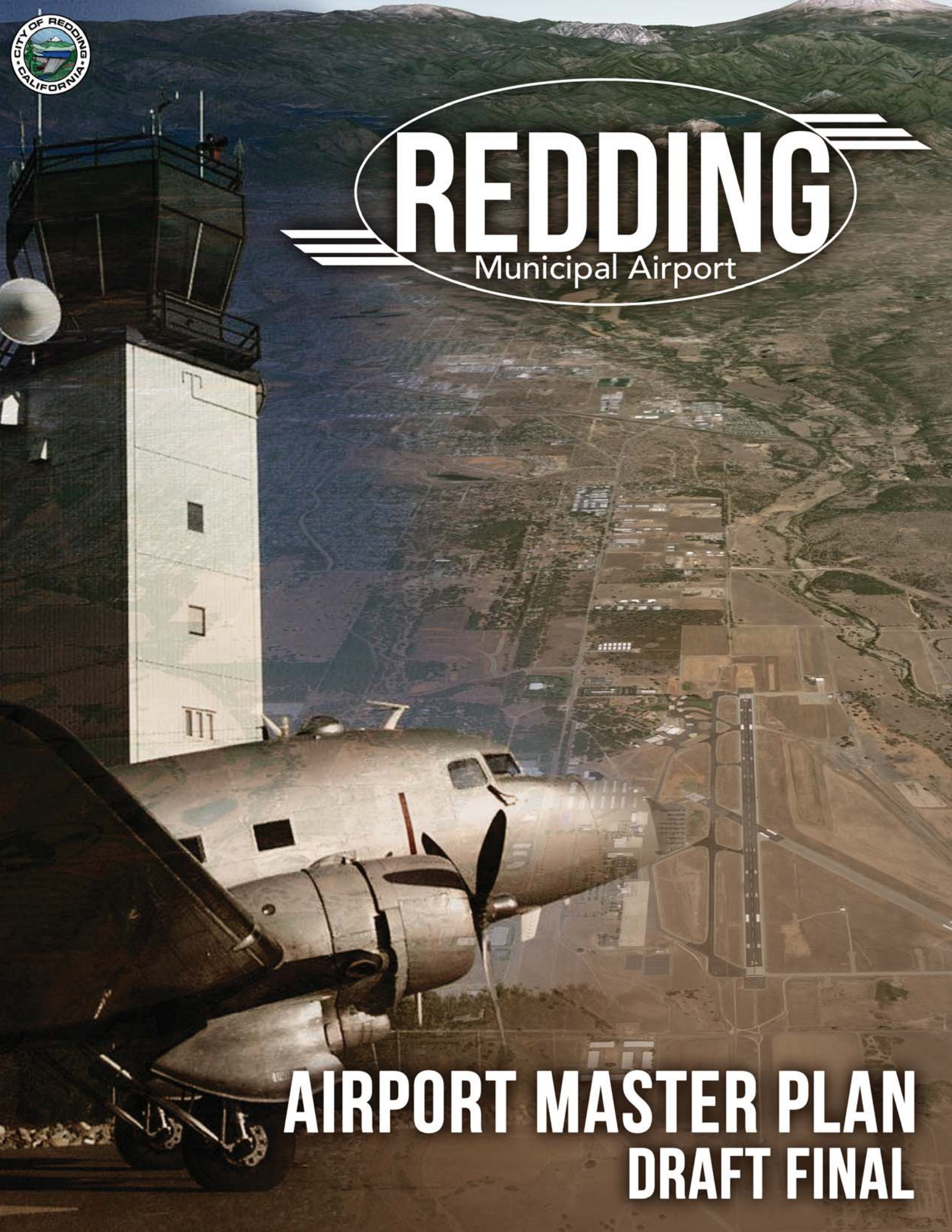

AIRPORT MASTER PLAN
DRAFT FINAL

Draft
AIRPORT MASTER PLAN

for

REDDING MUNICIPAL AIRPORT
Redding, California

Prepared for

the City of Redding

by

Coffman Associates, Inc.

November 2015

"The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration as provided under Title 49, United States Code, section 47104. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of this report by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable in accordance with appropriate public laws."

REDDING
Municipal Airport

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REDDING
Municipal Airport

INTRODUCTION

INTRODUCTION

The Federal Aviation Administration (FAA) recommends that airports update their long term planning documents every seven to 10 years, or as necessary to address local changes at the Airport. The last Master Plan for Redding Municipal Airport (RDD) was finalized in 2005. The City of Redding has received a grant from the FAA to update the Airport Master Plan, including an Aeronautical Survey. The FAA grant covers 90.66 percent of the fixed fee project cost with the City, providing a 9.34 percent match.

Following federal guidelines for consultant selection based on qualifications, the City of Redding selected Coffman Associates, a national aviation planning firm, to undertake consulting and professional services for the City of Redding in December 2011. This Master Plan was negotiated under an Authorization of Services Amendment to the original agreement in May 2014.

The study is designed to provide guidance for future development and provide updated justification for projects for which the Airport may receive funding participation through the federally sponsored Airport Improvement Program. Coffman Associates is an airport consulting firm which specializes in master planning and environmental studies. Coffman Associates has worked for numerous airports in the FAA's Western Pacific Region and has undertaken previous planning studies for the two airports operated by the City of Redding.

The Airport Master Plan is prepared in accordance with FAA requirements, including Advisory Circular (AC) 150/5300-13A, *Airport Design*, AC 150/5070-6B, *Airport Master Plans*, and AC 150/5300-18B, *General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data*

Collection and Geographic Information System (GIS) Standards. The project schedule called for the work elements to be completed in 15 months. The scope of services, budget, and schedule were approved by the City of Redding.

Redding Municipal Airport is a commercial service aviation facility, as defined by the FAA, which is intended to serve the aviation needs of the community. The Airport is included in the FAA's *National Plan of Integrated Airport Systems* (NPIAS). As such, the Airport is eligible for federal development grants—recently receiving approximately $8 million in grants to expand and update the passenger terminal building. The City of Redding owns and operates both Redding Municipal Airport and Benton Airpark. Redding Municipal Airport provides services to commercial, air cargo, military, and private aircraft. IASCO international flight training has contributed to a significant increase in air traffic activity over the past five years. Services and facilities available on the airfield include: hangar storage, tie-downs, fixed base operator services, flight instruction, aircraft rental, aircraft maintenance, and fueling. The airfield also provides support to the California Department of Forestry and Fire Protection (CDF) and the U.S. Forest Service. The Airport encompasses approximately 1,500 acres of land. The Stillwater Business Park, also operated by the City of Redding, lies adjacent to the Airport property along Stillwater Creek. The 700-acre site offers large lots for office and industrial development.

The current runway system consists of two runways, with the primary instrument runway at 7,003 feet. The Airport averages 290 operations (takeoffs and landings) each day.

MASTER PLAN OBJECTIVES

The overall objective of the Airport Master Plan was to provide the sponsor with guidance for future development of the Airport, meeting the needs of existing and future users, while also being compatible with the environment. The most recent comprehensive master planning effort for the Airport was undertaken in 2005. The current planning effort identifies and provides justification for new priorities. The plan was closely coordinated with other existing and on-going planning studies in the area and with aviation plans developed by the FAA and Caltrans. Specific objectives of the study included:

- Research factors likely to affect air transportation demand in the Redding-Shasta County area over the next 20 years and develop new operational and basing forecasts.

- Determine projected needs of Airport users through the year 2034, by which to support airport development alternatives.

- Recommend improvements which will enhance the Airport's safety capabilities and airport capacity to the maximum extent possible.

- Evaluate a future parallel runway (16L-34R) and potential closure of Runway 12-30.

- Develop new airport layout drawings using updated aerial photography and mapping being provided under this contract.

- Establish a schedule of development priorities and a financial program for implementation of development and analyze potential funding sources, consistent with FAA planning.

- Develop robust and productive public involvement throughout the planning process.

MASTER PLAN ELEMENTS AND PROCESS

To achieve the objectives described above, the Airport Master Plan has been prepared in a systematic fashion pursuant to the scope of services that was coordinated with the City of Redding. The study has ten elements:

Study Initiation - Development of the scope of services, budget, and schedule. A kickoff meeting was held with the Planning Advisory Committee (PAC) on August 27, 2014 to obtain a more comprehensive understanding of local issues.

Inventory - Inventory of facility and operational data, wind data, population and economic data, financial data, and new aerial photography and mapping. All of the inventory data was organized in a working paper and reviewed with the PAC on November 5, 2014.

Forecasts - Forecasts for enplaned passengers, based aircraft, operations, and peaking characteristics of the Airport over a 20-year period. The forecasts were distributed to the FAA for review and approval.

Facility Requirements - After establishing critical aircraft and physical planning criteria, facility needs assessments were developed for airside and landside facilities.

Airport Alternatives - Potential airside and landside alternatives were developed for meeting long-term needs. Several alternatives were developed for each of the airside and landside development alternatives and reviewed with the PAC on February 24, 2015.

Master Plan Concept/Financial Plan– The consultant developed a recommended development concept for the Airport. A 20-year capital improvement program was phased over time to various demand milestones. Cost estimates for each project were developed in current (2014) dollars and reviewed with the PAC on June 30, 2015.

Airport Plans - Airport layout plans (the technical drawings) were developed to depict existing and proposed facilities. The drawing set meets the requirements of the FAA's Standard Operating Procedure (SOP).

Environmental Evaluation – The environmental evaluation provides the City of Redding, the community, and public officials with proper guidance regarding *National Environmental Policy Act* (NEPA) environmental documentation.

Public Coordination and Communication – A non-voting Planning Advisory Committee (PAC) met four times during the study to review draft materials. Three public workshops will be conducted to coordinate with the general public. Additional coordination was undertaken with City officials and the FAA.

Final Reports and Approvals - Final documentation includes technical reports (printed and digital formats). The FAA must review and approve the final Airport Layout Plan drawings.

STUDY COORDINATION

The study process has included local participation through the formation of a PAC. The PAC consisted of federal, state, and local agencies, Airport tenants, and general public representatives. The sponsor determined the final makeup of the committee, with the assistance of the consultant. The study schedule called for four points in the study where the PAC would discuss draft working paper submittals. A kickoff meeting was held during the initial inventory process. Other meetings were held following facility requirements, development alternatives, and the capital improvement program.

"Open house" workshops for the general public were held three times during the study to present the preliminary findings and to solicit public comment. The study was completed within approximately 15 months. The draft working papers and other project-related material were available online at www.redding.airportstudy.com for the duration of the study. **Exhibit IA** presents the key study elements, meeting intervals, project schedule, and documentation.

Master Plan Process

INVENTORY

- Airport Facilities
- Airspace and Air Traffic Activity
- Area Socioeconomic Data
- Local Planning and Land Use
- Passenger Traffic
- Airport Access and Parking
- Aerial Photography

PAC #1
8-27-14

FORECASTS

- Enplaned Passengers
- Air Cargo
- Based Aircraft and Fleet Mix
- Annual Operations
- Peaking Factors

FACILITY REQUIREMENTS

- Design Categories
- Runway Length and Strength
- Support Facilities
- Taxiways
- Hangar Facilities
- Terminal Building
- Aprons
- Navigational Aids

PAC #2

Public Information Workshop
11-5-14

AIRPORT ALTERNATIVES

- Evaluate Development Scenarios
  - Airside
  - Landside

PAC #3

Public Information Workshop
2-24-15

RECOMMENDED DEVELOPMENT PLAN

- Detailed Master Plan Facility and Land Use Plans

FINANCIAL PLAN / CAPITAL IMPROVEMENTS

- Airport Development Schedule
- Cost Estimates
- Funding Sources
- Environmental Evaluation

PAC #4

Public Information Workshop
6-30-15

AIRPORT LAYOUT PLANS

- Airport Layout Plan
- Landside Drawing
- Airspace/Approach Drawings
- On-Airport Land Use Plan
- Property Map

REDDING
Municipal Airport

Chapter One

EXISTING CONDITIONS

EXISTING CONDITIONS

The purpose of this update to the Master Plan is to provide the City of Redding, the California Department of Transportation (CALTRANS) - Aviation Division, and the Federal Aviation Administration (FAA) with a document that depicts the currently planned airport improvements for Redding Municipal Airport. This document will focus on the facility changes and development direction of the airport that has occurred since the completion of the last Master Plan in 2004.

This Master Plan will also include an aeronautical survey and an updated Airport Layout Plan (ALP) drawing set, which is a computer drawing of the airport that shows the current and future conditions. Included with this set are updated approach and departure surface drawings for Runways 16-34 and 12-30, meeting the requirements of the FAA's Standard Operating Procedure (SOP), for the review and approval of Airport Layout Plans.

AIRPORT SETTING, HISTORY, AND DEVELOPMENT

Redding Municipal Airport is located in the City of Redding, Shasta County, at the northern end of the Sacramento Valley. The airport, which is situated on approximately 1,500 acres, is one of two airports (the other being Benton Airpark) that are owned and operated by the City of Redding-Airports Division. The airport is bound on the north by Avtech Parkway, on the south by Fig Tree Lane, and on the west by Airport Road. Stillwater Creek separates the airport property from the Stillwater Business Park, a 700-acre site offering large lots for office and industrial development. **Exhibit 1A** depicts the location of the airport and its surroundings.

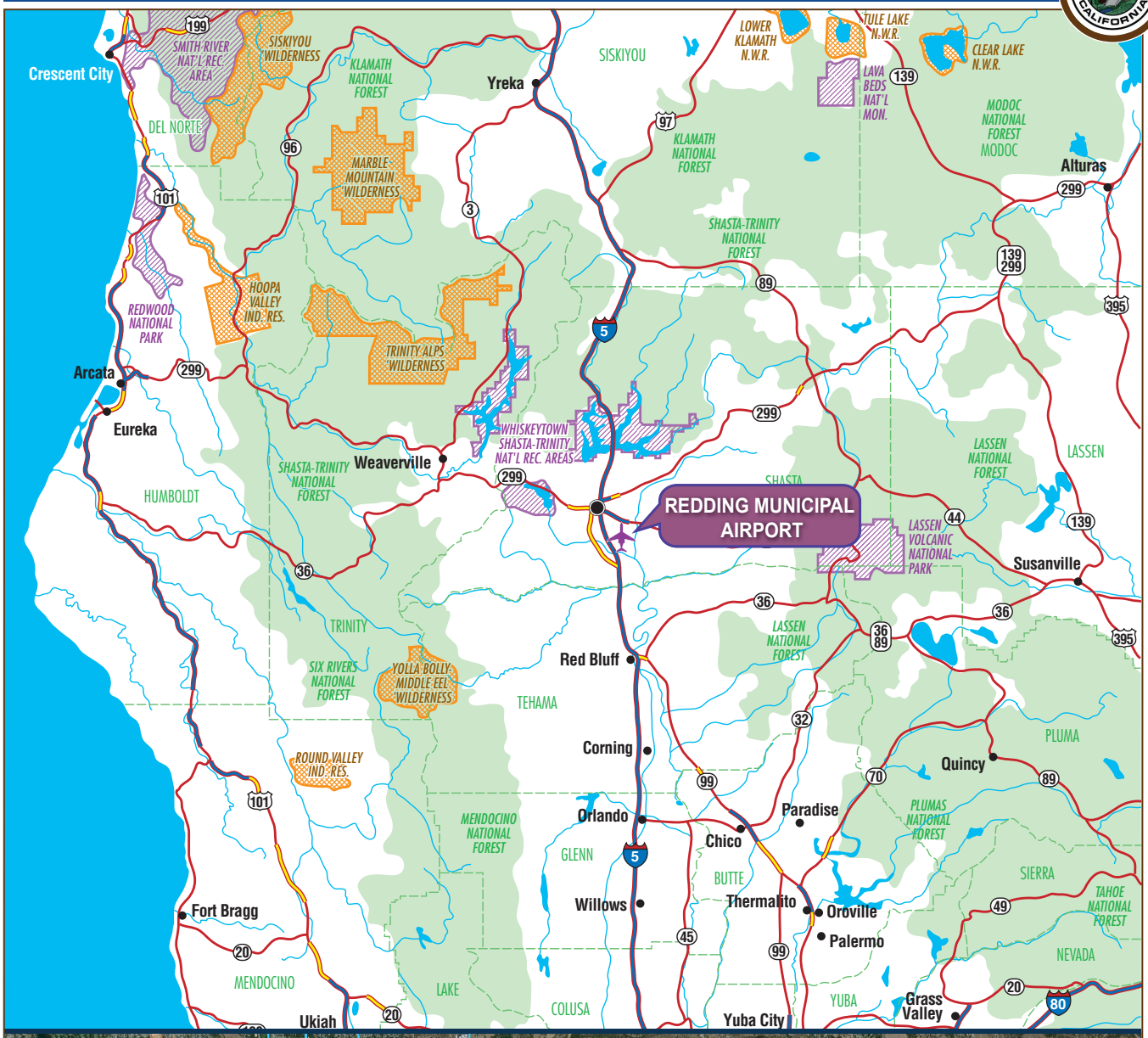

Exhibit 1A
VICINITY/LOCATION MAP

In 1942, land was acquired by the United States Corps of Engineers for the U.S. Army Air Force. Redding Army Airfield was used for advanced flight training of new airmen prior to deployment overseas. By 1944, the local airfield's mission was changed from aircrew training to refueling and maintenance for transient aircraft. Following WWII, the military declared the airfield surplus and in late 1946, the airfield was turned over to the City of Redding for a municipal airport.

Redding has had direct or connecting service to several west coast cities during its history, including San Francisco, Los Angeles, Portland, and Seattle. In mid-2014, SkyWest Airlines (operating as United Express on behalf of United Airlines) was providing three daily commercial passenger flights to San Francisco using the 30-passenger Embraer EMB 120 Brasilia turboprop aircraft. The three departures were spread evenly through the day: early morning, early afternoon, and evening. (Note: SkyWest replaced the turboprop service with two 50-seat regional jets in March 2015.)

Air cargo/freight service is being provided by FedEx (contracted with West Air and operating Cessna 208B Caravans), UPS (operating a mix of piston and turboprop aircraft), and Redding Aero. Services provided by the fixed base operators and other limited service operators include permanent aircraft storage, fuel sales, aircraft rental, transient aircraft parking, aircraft maintenance, avionics, charter flights, and flight instruction. IASCO international flight training has contributed to significant operational growth over the past five years. Thirty-three single and twin-engine aircraft are being used in the international flight training operation.

The airport also provides airfield support to the United States Forest Service (USFS) and the California Department of Forestry and Fire Protection (CALFIRE), although the hangar and office facilities are located outside of airport property. The USFS and CALFIRE operate a variety of aircraft (through contract carriers) on the airfield, with the season generally falling between June 15th and October 15th each year. Aircraft commonly in use during this period include the following air attack platforms: OV-10A "Bronco," Aero Commander, King Air 200, Cessna 337 Sky Master, King Air 90 (lead plane), and Huey "Cobra" helicopter (for infrared mapping/air attack). The following tankers are employed in the fleet: Grumman S-2T (1200-gallon retardant capacity), Lockheed P-2V "Neptune" (2500-gallon retardant capacity), Lockheed C-130Q (3500-gallon retardant capacity), McDonnell Douglas MD-87

(4000-gallon retardant capacity), and BAe-146/RJ-85 (3000-gallon retardant capacity). The current fire season (2014) will match or exceed the previous record (set in 2008) with two million gallons of retardant handled through the Redding Air Attack Base.

RECENT CAPITAL IMPROVEMENTS

To assist in funding capital improvements at the Airport, the FAA has provided funding assistance through the Airport Improvement Program (AIP). The AIP is funded through the Aviation Trust Fund, which was established by the U.S. Congress in 1970 to provide funding for aviation capital investment programs (aviation development, facilities and equipment, and research and development). The Trust Fund also finances a portion of the operation of the FAA. The Trust Fund is funded by user fees, taxes on airline tickets, aviation fuel, and various aircraft parts.

Table 1A summarizes AIP grants for Fiscal Year (FY) 2004 through FY 2013. The FAA has provided $19.263 million for airport improvements at the Airport over the past 10 years.

TABLE 1A
Recent FAA AIP Grant History
Redding Municipal Airport

Year	Grant Number	Description	Grant Amount
2013	44	Expand Terminal Building	$749,146
2012	43	Expand Terminal Building	$677,496
2012	42	Install Guidance Signs & Miscellaneous Navaids	$322,556
2011	41	Expand Terminal Building	$5,800,000
2010	40	Expand Terminal Building	$237,500
2009	39	Wildlife Hazard Assessments	$100,000
2009	38	Rehabilitate Terminal Building	$1,010,595
2009	36	Rehabilitate Runway 16-34	$728,810
2009	35	Acquire ARFF Safety Equipment, Conduct Miscellaneous Study, Install Guidance Signs, Rehabilitate Runway, Rehabilitate Taxiway	$486,996
2008	34	Update Airport Layout Plan	$28,500
2008	33	Construct Building (Storage)	$300,000
2008	32	Acquire Land for Approaches (4 Ac.)	$346,750
2007	31	Acquire Equipment, Expand Access Road (Municipal Blvd.), Expand Terminal Building, Rehabilitate Taxiways	$3,250,000
2006	30	Construct ARFF Building (Phase IV)	$1,382,751
2005	29	Conduct Environmental Study	$168,660
2005	28	Acquire Handicap Passenger Lift Device, Acquire Land for Approaches (148 Ac.)	$2,336,340
2004	27	Construct ARFF Building, Improve Access Road, Rehabilitate Apron, Rehabilitate Taxiway	$1,337,000
TOTAL AIRPORT IMPROVEMENT GRANTS			**$19,263,100**

Source: FAA Records accessed on 8.12.14
http://www.faa.gov/airports/aip/grantapportion_data/

CURRENT AIRPORT CAPITAL IMPROVEMENT PROGRAM (ACIP)

Airports must undertake a continual and ongoing planning process and capital improvement program in order to maintain safe, efficient, and modern transportation facilities. To this end, the FAA requests that airports provide a prioritized airport capital improvement plan (ACIP) on an annual basis for the following five-year period. **Table 1B** presents a recently developed ACIP for the Airport, covering the years 2015-2019.

One product of this master planning effort will be to create a revised and updated ACIP.

TABLE 1B
Airport Capital Improvement Program, 2015-2019
Redding Municipal Airport

Year	Project Descriptions	Project Costs	Total Cost
2015	1. ADA Passenger Loading Ramp, 2. Wildlife Hazard Management Program 3. Airport Pavement Management System 4. Air Shasta West Apron Reconstruction (design) 5. T-Hangar Taxilane Reconstruction (design)	$40,000 $56,000 $30,000 $160,000 $85,000	$365,000
2016	1. Environmental Assessment (runway) 2. Air Shasta West Apron Reconstruction 3. T-Hangar Taxilane Reconstruction	$350,000 $1,600,000 $850,000	$2,800,000
2017	1. Parallel Runway/Taxiway (design)	$500,000	$500,000
2018	1. Parallel Runway Environmental (CEQA) 2. Construct Parallel Runway/Taxiway	$300,000 $4,000,000	$4,300,000
2019	1. Eastside Cargo Apron (design) 2. New Aircraft Parking Apron (design) 3. All Weather Perimeter Road (design) 4. Upgrade Airfield Electrical System (design) 5. Security Fencing (design)	$120,000 $120,000 $90,000 $150,000 $55,000	$535,000

Note: Primary entitlement is a minimum of $1,000,000 for airports >10,000 annual boardings. Additional AIP funding must be allocated from discretionary funds.
Source: FAA

THE AIRPORT'S SYSTEM ROLE

Airport planning takes place at the local, regional, state, and national levels. Each level has a different emphasis and purpose. On the national level, Redding Municipal Airport is included in the *2013-2017 National Plan of Integrated Airport Systems* (NPIAS). On the state and regional levels, the Airport is included in the *California Aviation System Plan* (CASP). The local planning document--the *Redding Municipal Airport Master Plan*--was finalized in 2005. The *Airport Layout Plan* (*ALP*), showing existing and planned development, has since been updated to reflect as-built projects and recent land acquisitions.

FEDERAL AIRPORT PLANNING

The role of the federal government in the development of airports cannot be overstated. Many of the nation's existing airports were either initially constructed by the federal government or their development and maintenance was partially funded through various federal grant-in-aid programs to local communities. In large measure, the system of airports existing today is due to the existence of federal policy that promotes the development of civil aviation. As part of a continuing effort to develop a national airport system to meet the needs of civil aviation and promote air commerce, the U.S. Congress has continually maintained a national plan for the development and maintenance of airports.

The current national airport system plan is the 2013-2017 NPIAS. A primary purpose of the NPIAS is to identify the airports that are important to national transportation, which includes all commercial service airports, all reliever airports (high utility metropolitan general aviation airports), and selected general aviation airports. The NPIAS identifies 3,355 public use airports (3,330 existing and 25 proposed) which are eligible to receive development grants under AIP. The AIP program is funded exclusively by user fees and user taxes, such as those on fuel and airline tickets. The 2013-2017 NPIAS estimates that $42.5 billion worth of needed airport improvements are eligible for AIP funding across the country over the next five years. An airport must be included in the NPIAS to be eligible for federal funding assistance through the AIP.

Redding Municipal Airport is classified as a primary commercial service non-hub airport (greater than 10,000 annual enplanements). The term "hub" is used by the FAA to group commercial service airports as measured by passenger enplanements. Primary commercial service airports are grouped into four categories. Large hubs (e.g., San Francisco International) are those airports that each account for at least one percent of total U.S. passenger enplanements; medium hubs (e.g., Sacramento International) account for between 0.25 percent and one percent; small hubs (e.g. Reno/Tahoe International) account for between 0.05 percent and 0.25 percent; and non-hubs account for less than 0.05 percent of all enplanements, but more than 10,000 annual enplanements. There are 239 non-hub primary commercial service airports that together account for three percent of all enplanements. These airports are heavily used by general aviation aircraft, with an average of 95 based aircraft. **Table 1C** presents the types of airports included in the 2013-2017 NPIAS.

TABLE 1C
NPIAS Distribution of Activity

Number of Airports	Airport Type	% of Enplanements	% of Based Aircraft	% NPIAS Costs
29	Large Hub Primary Commercial	68.00	0.07	35.00
36	Medium Hub Primary Commercial	20.00	2.10	12.00
74	Small Hub Primary Commercial	8.00	4.00	8.00
239	Non-hub Primary Commercial	3.00	10.10	12.00
121	Non-primary Commercial	0.01	1.60	2.00
499	**Total Commercial Service Airports**	**99.01**	**17.87**	**69.00**
268	Relievers	0.00	21.90	7.00
2,563	General Aviation	0.00	34.40	23.00
25	Planned New/Replacement Airports	0.00	0.00	1.00
3,355	**Existing NPIAS Airports**	**99.10**	**74.17**	**100.00**
16,456	**Non-NPIAS Airports**	**0.90**	**25.83**	**NA**

Source: 2013-2017 National Plan of Integrated Airport Systems (NPIAS)

The NPIAS supports the goals identified in the FAA's Strategic Plan entitled, *Destination 2025*, for safety, efficiency, access, and environmental sustainability by identifying airport improvements that will help achieve those goals. The 2013-2017 NPIAS identified $4.423 million in development needs for Redding Municipal Airport when it was published. This figure is not a guarantee of federal funding; instead, this figure represents development needs as presented to the FAA in the annual airport capital improvement program.

Airports that apply for and accept AIP grants must adhere to various grant assurances. These assurances include maintaining the airport facility safely and efficiently in accordance with specific conditions. The duration of the assurances depends on the type of airport, the useful life of the facility being developed, and other factors. Typically, the useful life for an airport development project is a minimum of 20 years. Thus, when an airport accepts AIP grants, they are obligated to maintain that facility in accordance with FAA standards for at least that long.

14 CFR Part 139 Certification

An airport must have an Airport Operating Certificate (AOC) if it is serving air carrier aircraft with more than nine seats or serving unscheduled air carrier aircraft with more than 30 passenger seats. 14 CFR Part 139 (Part 139) describes the requirements for obtaining and maintaining an AOC. This includes meeting various Federal Aviation Regulations (FARs).

Airports are classified in the following categories based on the type of air carrier operations served:

- **Class I Airport** – an airport certificated to serve scheduled operations of large air carrier aircraft that can also serve unscheduled passenger operations of large air carrier aircraft and/or scheduled operations of small air carrier aircraft. Redding Municipal Airport is a Class I airport.

- **Class II Airport** – an airport certificated to serve scheduled operations of small air carrier aircraft and the unscheduled passenger operations of large air carrier aircraft. A Class II airport cannot serve scheduled large air carrier aircraft.

- **Class III Airport** – an airport certificated to serve scheduled operations of small air carrier aircraft. A Class III airport cannot serve scheduled or unscheduled large air carrier aircraft.

- **Class IV Airport** – an airport certificated to serve unscheduled passenger operations of large air carrier aircraft. A Class IV airport cannot serve scheduled large or small air carrier aircraft.

Part 139 (which implemented provisions of the *Airport and Airway Development Act of 1970*, as amended on Nov. 27, 1971) set standards for: the marking and lighting of areas used for operations; firefighting and rescue equipment and services; the handling and storing of hazardous materials; the identification of obstructions; and safety inspection and reporting procedures. It also required airport operators to have an FAA-approved Airport Certification Manual (ACM).

The ACM defines the procedures to be followed in the routine operation of the airport and for response to emergency situations. The ACM is a working document that is updated annually. It reflects the current condition and operation of the airport and establishes responsibility, authority, and procedures. There are required sections for the ACM, covering administrative detail and procedural detail. Each section independently addresses the: who (primary/secondary), what, how, and when as it relates to each element.

The administrative sections of the ACM cover such elements as the organizational chart, operational responsibilities, maps, descriptions, weather sensors, access, and cargo. The procedural elements cover such items as paved and unpaved areas, safety areas, lighting and marking, communications and navigational aids, airport rescue and firefighting, handling of hazardous material, utility protection, public protection, self-inspection program, ground vehicle control, obstruction removal, wildlife management, and construction supervision. Redding Municipal Airport has a current, approved ACM.

STATE AIRPORT PLANNING

The California Department of Transportation – Division of Aeronautics (Caltrans) actively participates in aviation planning and capital improvement projects in the state. The Division maintains and updates the *California Aviation System Plan* (CASP) which is composed of five elements: 1) Capital Improvement Plan (CIP); 2) Policy Element; 3) General Aviation System Needs Assessment (GASNA); 4) System Requirements, and; 5) Finance. Each of the elements is updated periodically.

The CASP establishes minimum standards for several airport elements based upon the airport classification. For a non-hub commercial service airport, the CASP recommends a minimum runway length of 7,000 feet. Other minimum requirements are good pavement strength and condition, installed visual approach slope aids, fuel availability, weather observation systems, and a precision instrument approach. Redding Municipal Airport meets the minimum standards as set forth in the CASP.

LOCAL AIRPORT PLANNING

The Airport Master Plan and ALP are the primary local planning documents. Guidelines for the development of airport master plans and the ALP are provided in FAA AC 150/5070-6B, *Airport Master Plans*. The AC identifies the following functions of a master planning study:

a. The airport master plan is the sponsor's conceptual design for the long-term development of the airport. Master plans are prepared to support the modernization or expansion of existing airports or the creation of new airports.

b. The goal of a master plan is to provide the framework needed to guide future airport development that will cost-effectively satisfy aviation demand, while also addressing relevant environmental and socioeconomic issues.

c. Each master plan should meet the following objectives:

    1) Justify the plan through technical, economic and environmental investigation of concepts and alternatives.
    2) Provide an effective graphic presentation of the future development of the airport and anticipated land use in the vicinity of the airport.
    3) Establish a realistic schedule for the implementation of the development proposed in the plan, particularly the short-term capital improvement program.
    4) Propose an achievable financial plan to support the implementation schedule.
    5) Provide sufficient project definition and detail for subsequent environmental evaluations that may be required before the project is approved.
    6) Present a plan that adequately addresses the issues and satisfies local, state, and federal regulations.

7) Document policies and future aeronautical demand to support municipal or local deliberations on spending, debt, land use controls, and other policies necessary to preserve the integrity of the airport and its surroundings.
8) Set the stage and establish the framework for a continuing planning process. Such a process should monitor key conditions and permit changes in plan recommendations as required.

The products of the master planning process vary with the complexity of the study and may include a variety of supporting studies and add-ons. However, all products will fall within one of two basic types: Airport Master Plans or ALP Updates.

Master Plan Reviews by the FAA

The recommendations contained in an airport master plan represent the views, policies, and development plans of the airport sponsor and do not necessarily represent the views of the FAA. Acceptance of the master plan by the FAA does not constitute a commitment on the part of the United States to participate in any development depicted in the plan, nor does it indicate that the proposed development is environmentally acceptable in accordance with appropriate public law. The FAA reviews all elements of the master plan to ensure that sound planning techniques have been applied. However, the FAA only approves the following elements of airport master plans:

1) ***Forecasts of Demand*** – The master plan forecast should be reviewed to ensure that the underlying assumptions and forecast methodologies are appropriate. Paragraph 704.h of this guidance (AC 150/5070-6B, *Airport Master Plans*) should be used to determine consistency of the master plan forecast levels and the *Terminal Area Forecast* (TAF). Inconsistencies between the master plan forecast and TAF must be resolved, and the forecast approved, before proceeding with subsequent planning work.

2) ***Airport Layout Plan*** – All airport development at federally obligated airports must be done in accordance with an FAA-approved ALP. Furthermore, proposed development must be shown on an approved ALP to be eligible for AIP funding. FAA approval of the ALP indicates that the existing facilities and proposed development depicted on the ALP conforms to the FAA airport design standards in effect at the time of the approval or that an approved modification to standard has been issued. Such approval also indicates that the FAA finds the proposed development to be safe and efficient.

In many regards, an airport master plan can be considered a feasibility study of what may be possible or desired as part of the long term vision for an airport. Included in a master plan are multiple alternative development scenarios, each of which may be feasible; however, implementation of which will require FAA approval. While a single long term vision is included in a master plan, it can be revised in the future by updating the ALP or by updating the master plan.

EXISTING FACILITIES

The existing runway configuration at Redding Municipal Airport includes two intersecting runways (Runway 16-34 and Runway 12-30). Runway 16-34 is the primary instrument runway and is 7,003 feet long, 150 feet wide, and oriented in a north-south manner. Runway 12-30 is 5,067 feet long, 150 feet wide, and oriented in a northwest-southeast manner. Both runways are constructed of asphalt, while Runway 16-34 is also grooved. Both runways are equipped with runway end identification lighting.

Runway strengths presented in **Table 1D** are the values that have been reported in the latest *Airport Facility Directory*. These strengths represent a realistic estimate of capability at an average level of activity. They are not intended to represent a maximum allowable weight or an operating limitation. Permissible operating weights are a matter of agreement between the airport owner and user.

The precision instrument approach on Runway 34 provides properly equipped aircraft with landing capabilities down to 200-foot cloud ceiling and one-half mile visibility (in any aircraft size category). A medium intensity approach lighting system with runway alignment indicator lights (MALSR) is available on this approach. An area navigation (RNAV) approach is also available to properly equipped aircraft on Runway 34. This instrument approach provides landing capabilities down to 300-foot cloud ceiling and one-half mile visibility. Other instrument approaches are available to both Runways 16 and 34, but with higher ceilings and/or visibility minimums—some using the terminal VOR antenna, which is located 1,000 feet north and 750 feet east of the Runway 34 threshold. Runway 16-34 is equipped with high intensity edge lighting, while Runway 12-30 is equipped with medium intensity edge lighting. The runway lighting systems may be operated through a pilot-controlled lighting system (PCL) which allows the pilot to turn on or change the intensity of the airfield lighting.

Visual approach lighting aids are available on Runways 16, 34, and 30. Runway 16 has a four-box visual approach slope indicator (VASI-4L), Runway 34 has a four-box precision approach path indicator (PAPI-4L), while Runway 30 has a two-box PAPI-2L.

The Airport is equipped with an automated surface observation system (ASOS). The ASOS reports cloud ceiling, visibility, temperature, dew point, wind direction, wind speed, altimeter setting (barometric pressure), and density altitude (airport elevation corrected for temperature). The ASOS equipment is located north of the Runway 12 threshold and west of Taxiway D. Lighted wind cones and a segmented circle are also available on the airfield.

Runway 16-34 is served by a full-length parallel taxiway (D) which is 50 feet wide and separated from Runway 16-34 at 400 feet (consistent with FAA guidelines). Runway 12-30 is not served by a parallel taxiway. There are several taxiways of various lengths and widths which serve as an entrance or exit along the runways, with connecting taxiways to the commercial and general aviation operational areas. Lighted identification signs are available at all taxiway and runway intersections.

Airside facilities are identified on **Exhibit 1B**. A summary of the existing airside facility data is summarized in **Table 1D**.

TABLE 1D
Airside Facilities Data
Redding Municipal Airport

	Runway 16-34	Runway 12-30
Runway Length (feet)	7,003	5,067
Runway Width (feet)	150	150
Runway Surface Material	Asphalt (Grooved)	Asphalt
Condition	Good	Good
Pavement Markings	Precision Instrument	Non-precision
Runway Load-Bearing Strength (lbs)		
Single Wheel Type Landing Gear (S)	98,000	60,000
Dual Wheel Type Landing Gear (D)	128,000	72,000
Two Single Wheels/Tandem Type Gear (2S)	135,000	91,000
Two Dual Wheels/Tandem Type Gear (2D)	195,000	110,000
Runway Lighting	High Intensity	Medium Intensity
Taxiway Lighting	Medium Intensity	
Approach Aids	VASI-4L (16) PAPI-4L (34) MALSR (34)	PAPI-2L (30)
Instrument Approach Procedures	ILS or LOC/DME (Runway 34) RNAV (GPS) (Runway 34) VOR (Runway 34) LOC/DME BC (Runway 16)	
Weather or Navigational Aids	Automated Surface Observation System (ASOS) Segmented Circle Lighted Wind Cone	

Source: *Airport Facility Directory, Airport Master Record (Form 5010-1) and AirNav.*

Abbreviations:
ILS-Instrument Landing System
LOC/DME-Localizer/Distance Measuring Equipment
RNAV-Area Navigation
GPS-Global Positioning System
VOR-Very High Frequency/Omnidirectional Range

There are three aircraft parking aprons available to commercial and general aviation aircraft at Redding Municipal Airport: an air carrier apron, an itinerant general aviation apron, and a local general aviation apron. The air carrier apron is located east of the terminal building and occupies approximately 17,800 square yards. This apron serves scheduled passenger and air cargo (FedEx) operations. The itinerant general aviation apron, which provides tie-downs for transient aircraft, is located east of Redding Jet

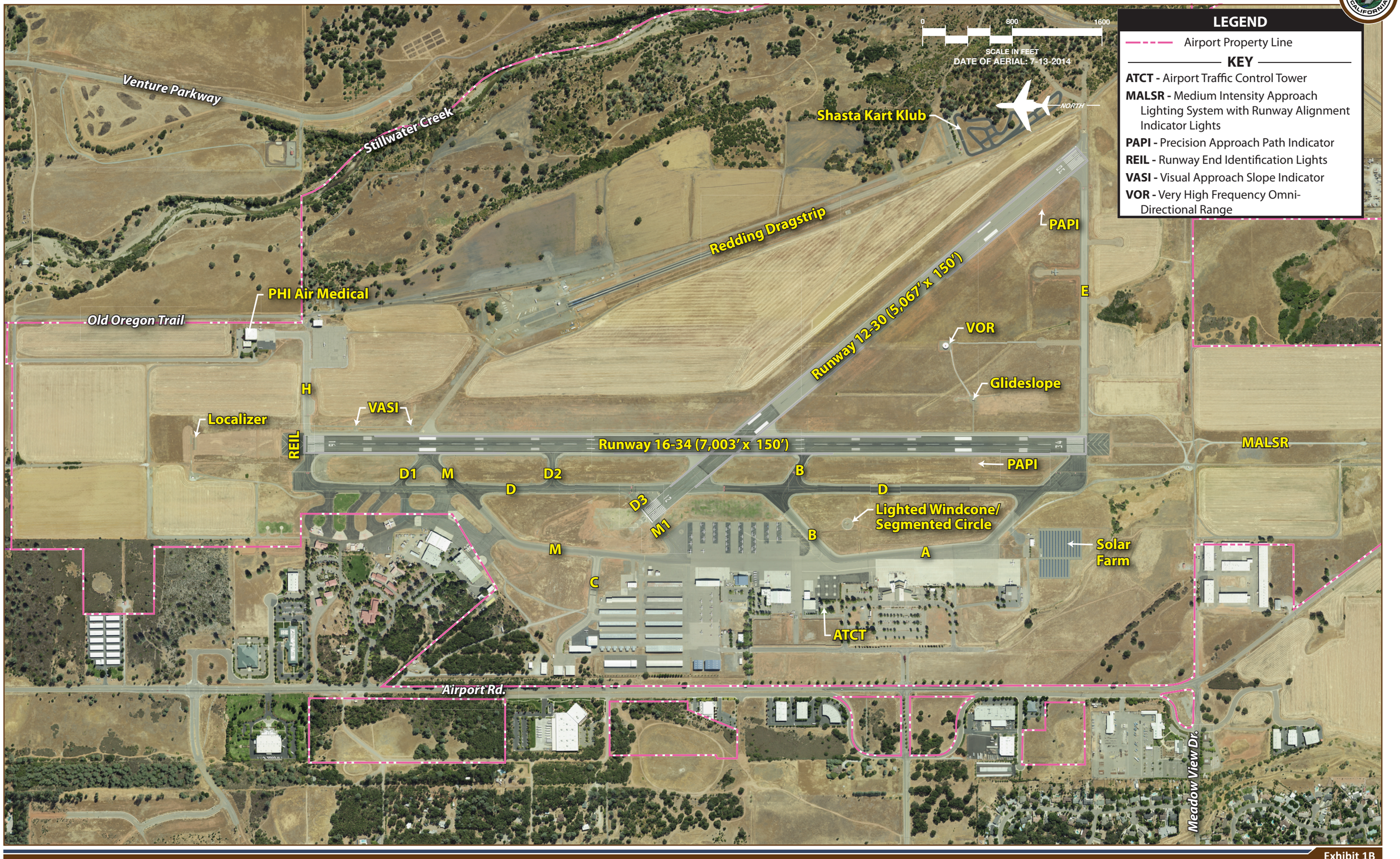

Exhibit 1B
EXISTING AIRSIDE FACILITIES

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Center and occupies approximately 29,300 square yards. This apron also serves as a tie-down ramp for aircraft operated by IASCO international flight training and the air cargo sortation for UPS. Additional tie-downs for locally based aircraft are located south of the T-hangars. A helicopter ramp with eight parking positions is located south of Redding Air Service.

Landside facilities include the terminal building, airport rescue and firefighting (ARFF) station, airport traffic control tower (ATCT), fixed base operator facilities, aircraft storage hangars, and airport support facilities. The City of Redding has recently expanded the passenger terminal building, providing an additional 10,000 square feet of space. The expanded hold room area has increased capacity from 70 to 200 passengers, and provides restrooms inside the secure area. Landside facilities are identified on **Exhibit 1C**. A summary of existing landside facilities (including approximate square footages) is presented in **Table 1E**.

The existing passenger terminal building at Redding Municipal Airport is a two-story building, totaling approximately 32,000 square feet. The terminal building is located near the south end of the field, west of the air carrier apron. The ground floor provides passenger ticketing, bag make-up/screening, airline offices, passenger screening, baggage claim, and rental car facilities. The current airline in the terminal is SkyWest Airlines. The current rental car companies include Avis/Budget and Hertz. Several taxi companies also provide ground transportation to deplaning passengers, including ABC Cab, Day & Nite Cab, and Yellow Cab. Facilities on the second floor include Peter Chu's Skyroom restaurant and City of Redding – Airports Division administrative offices.

Part 139 airports are required to provide airport rescue and firefighting (ARFF) services during scheduled air carrier operations. Each certificated airport maintains equipment and personnel based on an ARFF index established according to the length of aircraft and scheduled daily flight frequency. There are five indices, A through E, with A applicable to the smallest aircraft and E the largest (based on length). The Airport's ARFF station, located on the flight line at midfield, meets Index B requirements. A new station was constructed within the past decade to house equipment and personnel meeting the Index B standards. New ARFF safety equipment has also been acquired over the past few years and a new Index B ARFF vehicle was purchased in the current fiscal year to replace a 15-year old vehicle. The City of Redding maintains

a mutual/automatic aid agreement with the Shasta County Fire Department and CAL FIRE. This agreement allows the departments to maximize resource utilization on wildfires within City/County areas, in addition to other rural areas in northern California.

TABLE 1E
Landside Facilities Data
Redding Municipal Airport

Facility/Use Description	Approximate Area (square feet)
Terminal Building	32,000
ARFF (Fire Station)	12,000
Airport Maintenance Building	5,000
Air Shasta (FBO-Helicopter Services)	10,500
Baker-Barr Hangar (Corporate Hangar)	11,200
FedEx (Cargo Operator)	13,200
Eastside Hangar	4,000
REACH Air Ambulance Service	1,200
Redding Aerotronics (Aircraft Maintenance)	3,200
Redding Air Service (FBO-Helicopter Services)	3,800
Redding Jet Center (FBO)	20,000
Sierra Pacific (Corporate Hangar)	17,400
Stringer Hangar (Corporate Hangar)	6,400
Tullis Hangar (Corporate Hangar)	8,000
Wong Hangar (Corporate Hangar)	6,400
Aircraft Storage Hangars:	
T-Hangars (98 units)	119,250
Box Hangars (6 units)	15,000
Twin Hangars (8 units)	11,600
Port-A-Ports (6 units)	12,000

Source: Airport Records and/or aerial photography

The Airport also maintains an inventory of maintenance and support equipment, including airstairs, passenger lifts, utility trucks and tractors, snow plows, and sweepers. Most of this equipment is considered by the Airport to be in good condition. The current ACIP has programmed the purchase of an ADA passenger loading ramp in the 2015 fiscal year.

Fuel facilities at Redding Municipal Airport include four 20,000-gallon underground storage tanks, two 12,000-gallon above-ground storage tanks, and one 1,000-gallon above-ground storage tank, which is self-serve.

A 3.5-acre solar farm, located south of the terminal and air cargo aprons, provides power to the terminal and airfield facilities.

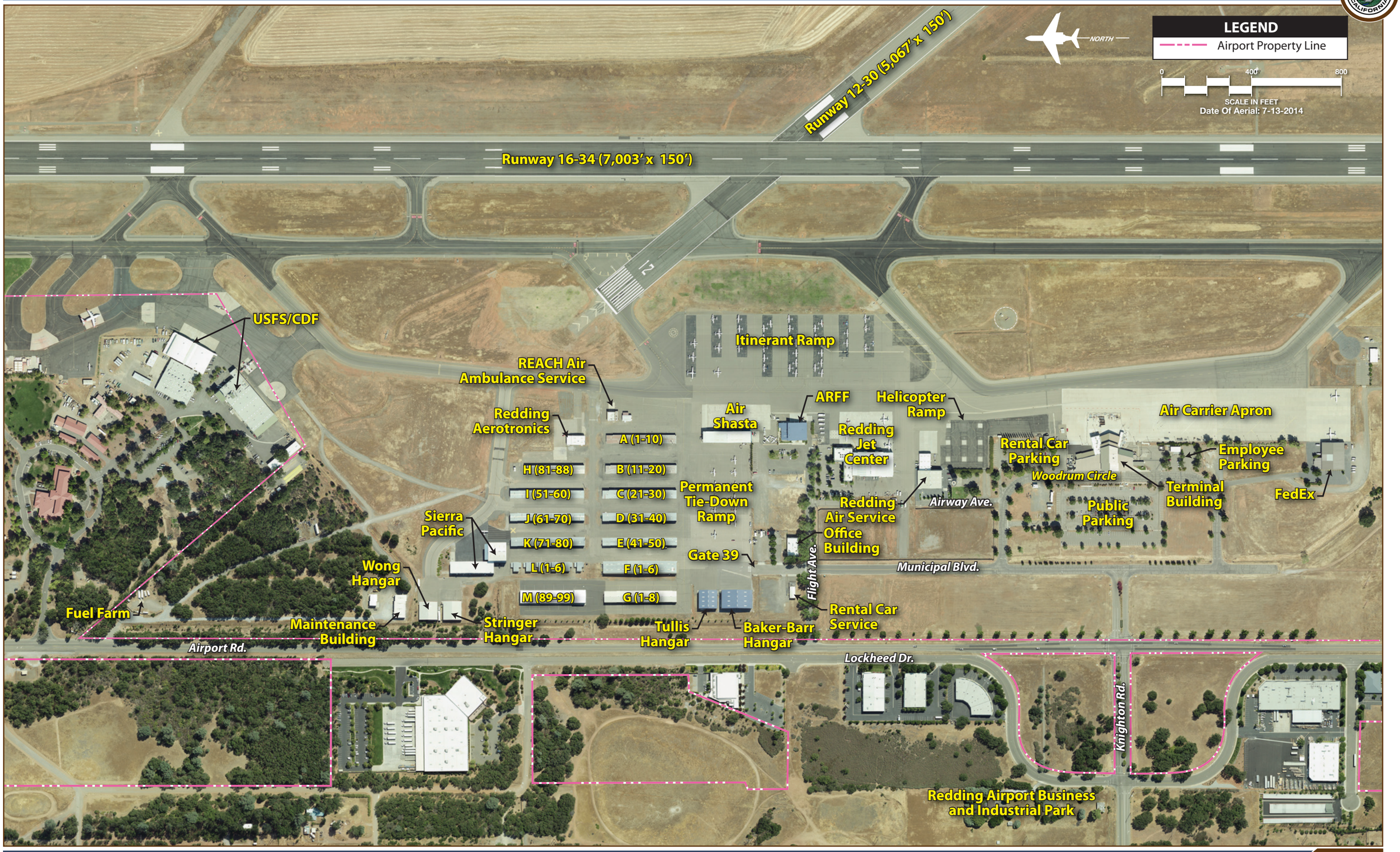

Exhibit 1C
EXISTING LANDSIDE FACILITIES

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Short and long term parking is available across from the main entrance to the terminal building. The 329-space lot (261 long-term/68 short-term) is operated by Republic Parking System using a cashier-less system. A rental car parking lot with 75 spaces is located directly north of the terminal building. An employee parking lot with 30 spaces is located south of the terminal. Limited parking for general aviation is located south of the T-hangars.

AIRSPACE STRUCTURE

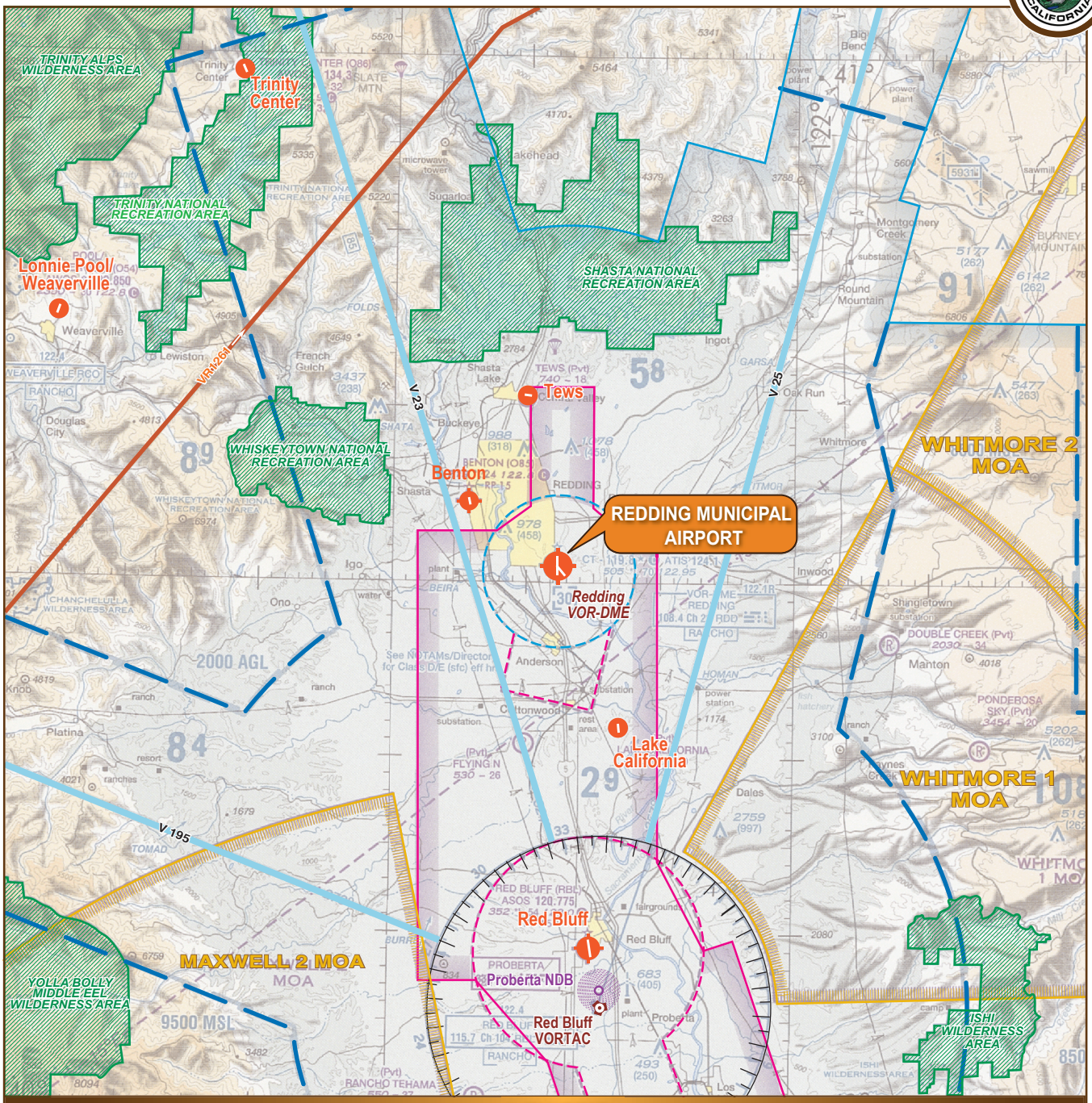
Airspace within the United States is broadly classified as either controlled or uncontrolled. The difference between controlled and uncontrolled airspace relates primarily to requirements for pilot qualifications, ground-to-air communications, navigation and air traffic services, and weather conditions. Six classes of airspace have been designated in the United States. Airspace designated as Class A, B, C, D, or E is considered controlled airspace. Aircraft operating within controlled airspace are subject to varying requirements for positive air traffic control. Airspace in the vicinity of the Airport is depicted on **Exhibit 1D.**

Class A Airspace: Class A airspace includes all airspace from 18,000 feet mean sea level (MSL) to flight level (FL) 600 (60,000 feet MSL). This airspace is designated in Federal Aviation Regulation (F.A.R.) Part 71.193 for positive control of aircraft. The Positive Control Area (PCA) allows flights governed only under IFR operations. The aircraft must have special radio and navigation equipment, and the pilot must obtain clearance from an air traffic control (ATC) facility to enter Class A airspace. In addition, the pilot must possess an instrument rating.

Class B Airspace: Class B airspace has been designated around some of the country's busiest commercial service airports, such as San Francisco International Airport. Class B airspace is designed to regulate the flow of uncontrolled traffic, above, around, and below the arrival and departure airspace required for high-performance, passenger-carrying aircraft at busy commercial service airports. This airspace is the most restrictive controlled airspace encountered by pilots operating under visual flight rules (VFR). There is no Class B airspace in the immediate vicinity of the Airport.

In order to fly within Class B airspace, an aircraft must be equipped with special radio and navigation equipment and must obtain clearance from air traffic control. Moreover, a pilot must have at least a private pilot's certificate or be a student pilot who has met the requirements of F.A.R. Part 61.95, which requires special ground and flight training for Class B airspace. Helicopters do not need special navigation equipment or a transponder if they operate at or below 1,000 feet and have made prior arrangements in the form of a Letter of Agreement with the FAA controlling agency. Aircraft are also required to have and utilize a Mode C transponder within a 30-nautical-mile (nm) range of the center of Class B airspace. A Mode C transponder allows the ATCT to track the altitude of the aircraft.

Class C Airspace: The FAA has established Class C airspace at 120 airports around the country as a means of regulating air traffic in these areas. Class C airspace is designed to regulate the flow of uncontrolled traffic above, around, and below the arrival and departure airspace required for high-performance, passenger-carrying aircraft at some commercial service airports. In order to fly inside



LEGEND

- Airport with other than hard-surfaced runways
- Airport with hard-surfaced runways 1,500' to 8,069' in length
- Airports with hard-surfaced runways greater than 8,069' or some multiple runways less than 8,069'
- VORTAC
- Non-Directional Radiobeacon (NDB)
- VOR-DME
- Compass Rose
- Class D Airspace
- Class E Airspace
- Class E Airspace with floor 700 ft. above surface
- Class E Airspace with floor 1200 ft. or greater above surface
- Class E Airspace with Floor other than 700 ft. above surface
- Military Training Routes
- Victor Airways
- MOA - Military Operations Area
- Wilderness Areas

Source: Klamath Falls Sectional Chart, US Department of Commerce, National Oceanic and Atmospheric Administration

Exhibit 1D
VICINITY AIRSPACE

Class C airspace, the aircraft must have a two-way radio, an encoding transponder, and have established communication with ATC. Aircraft may fly below the floor of Class C airspace or above the Class C airspace ceiling without establishing communication with ATC.

Class D Airspace: Class D airspace is controlled airspace surrounding airports with an ATCT--this is the controlled airspace that is highlighted on **Exhibit 1D** for Redding Municipal Airport and is in effect when the ATCT is open (6:30 a.m. to 9:30 p.m.). The Class D airspace constitutes a cylinder with a horizontal radius of four or five nautical miles from the airport, extending from the surface up to a designated vertical limit, typically set at approximately 2,500 feet above the airport elevation. If an airport has an instrument approach or departure, Class D airspace sometimes extends along the approach or departure path.

Class E Airspace: Class E airspace consists of controlled airspace designed to contain IFR operations near an airport, and while aircraft are transitioning between the airport and enroute environments. Unless otherwise specified, Class E airspace terminates at the base of the overlying airspace. Only aircraft operating under IFR are required to be in contact with air traffic control when operating in Class E airspace. While aircraft conducting visual flights in Class E airspace are not required to be in radio communications with air traffic control facilities, visual flight can only be conducted if minimum visibility and cloud ceilings exist. The Red Bluff Airport is supported by Class E airspace.

Class G Airspace: Airspace not designated as Class A, B, C, D, or E is considered uncontrolled, or Class G, airspace. Air traffic control does not have the authority or responsibility to exercise control over air traffic within this airspace. Class G airspace lies between the surface and the overlaying Class E airspace (700 to 1,200 feet above ground level [AGL]). The airspace surrounding Redding Municipal Airport reverts to Class G when the tower is closed (9:30 p.m. to 6:30 a.m.).

SPECIAL USE AIRSPACE

Special use airspace is defined as airspace where activities must be confined because of their nature or where limitations are imposed on aircraft not taking part in those activities.

Military Operating Areas: This special use airspace is established outside positive control areas to separate/segregate certain nonhazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted. MOAs are established to contain certain military activities, such as air combat maneuvers, air intercepts, acrobatics, etc. There are several MOAs noted on **Exhibit 1D** near the Airport. Official NOTAMs are typically issued prior to use.

Military Training Routes: Military training routes (MTRs) are designated airspace that has been generally established for use by high performance military aircraft to train below 10,000 feet AGL and in excess of 250 knots. There are VR (visual) and IR (instrument) designated MTRs. MTRs with no segment above 1,500 feet AGL will be designated with the VR or IR, followed by a four-digit number (e.g., VR1261—noted on **Exhibit 1D**). The arrows on the route show the direction of travel.

Victor Airways: For aircraft arriving or departing the regional area using very high frequency omni-directional range (VOR) facilities, a system of Federal Airways, referred to as Victor Airways, has been established. Victor Airways are corridors of airspace eight miles wide that extend upward from 1,200 feet AGL to 18,000 feet MSL and extend between VOR navigational facilities. There are several Victor Airways in the vicinity of the Airport, including V-23, V-25, and V-195.

While the Recreation Areas and Wilderness Areas identified on **Exhibit 1D** are not considered special use airspace by the FAA, the agency has published voluntary practices for visual flight rules over these noise-sensitive areas. Pilots operating noise-producing aircraft (fixed or rotary wing) are asked to make every effort to fly not less than 2,000 feet above ground level (AGL), weather permitting. The intent of the 2,000 AGL recommendations is to reduce potential interference with wildlife and complaints of noise disturbances caused by low flying aircraft over noise-sensitive areas.

AIRSPACE CONTROL

The FAA has established 21 Air Route Traffic Control Centers (ARTCCs) throughout the continental United States to control aircraft operating under IFR within controlled airspace and while enroute. An ARTCC assigns specific routes and altitudes along Federal Airways to maintain separation and orderly traffic flow. The Oakland Center controls enroute airspace in the Redding region. The Rancho Marietta Flight Service Station provides additional information to pilots operating in the Redding vicinity.

VICINITY AIRPORTS

Other airports identified on **Exhibit 1D** include: Benton Airpark, Red Bluff Municipal, Lake California, Tews, Weaverville, and Trinity Center. Benton Airpark, a public facility operated by the City of Redding, has a single 2,420-foot runway, no published approaches, and 97 based aircraft. Red Bluff Municipal Airport is a public facility that is operated by the City of Red Bluff, has a single 5,431-foot runway with RNAV (GPS) approaches to each runway, and 122 based aircraft. Lake California Air Park is a private-use facility with a single 3,000-foot runway and 19 aircraft. Tews Field is also a private-use facility with a single 1,800-foot runway and three based aircraft. Weaverville Airport (2,980-foot runway/eight based aircraft) and Trinity Center Airport (3,215-foot runway/18 based aircraft) are owned and operated by Trinity County.

EXISTING LAND USE AND ZONING

The Airport is located six miles southeast of Redding's central business district. The airport property lies within the jurisdiction of the City of Redding. The City of Anderson lies directly south of the airport property.

GENERAL PLAN

Based on a review of the *City of Redding 2000-2020 General Plan* (General Plan) map, land adjacent to the Redding Municipal Airport is assigned the following land use designations: General Industry, Heavy Industry, Park, Greenway, General Commercial and Acquisition Overlay.

Much of the land to the north, west, and south of the airport is designated for Industrial development. As discussed in the General Plan, the industrial land use classifications include development of warehousing, manufacturing, and processing businesses. The General Plan also notes that ancillary uses and restaurants may be appropriate. From a compatibility perspective, industrial development would generally be considered compatible with the exception of uses that may generate excessive dust, smoke, or water vapor that may affect a pilot's view of the airport when approaching. As planned, the lands designated for industrial development would provide a buffer between the airport and other potential non-compatible development, such as residences or public facilities.

Immediately to the east of the airport, the land is designated for Park and Greenway land uses. Within the General Plan, the Park designation includes land uses for neighborhood and regional parks, golf courses, athletic fields, and open space areas adjacent to improved parks or trails. The land immediately east of the airport designated as Park in the General Plan is located within the Stillwater Creek corridor and land to the east of that, designated as Greenway, includes areas within the 100-year floodplain. Associated with the presence of Stillwater Creek, the elevation profile of land to the east of the airport includes a change of approximately 50 feet from the airfield elevation to the lower terrace of the Stillwater Creek floodplain. With the exception of land uses that may result in high intensity land uses, those which may result in high concentrations of people, such as an amphitheater or stadium, development of Park or Greenway land uses would be compatible with airport operations.

Immediately to the west and southwest of the airport are two areas designated as General Commercial. This land use category includes smaller scale development of retail stores, offices, and personal-service establishments. The General Plan also notes that financial institutions, private schools, day-care facilities, convalescent hospitals, automobile sales and service, and similar uses also may be permitted subject to appropriate standards. With the exception of private schools, day-care facilities, and hospitals, General Commercial development would likely be compatible with airport development.

The Acquisition Overlay area appears to correspond with the land identified on the Airport Layout Plan (ALP) for acquisition for the Runway Protection Zone (RPZ).

ZONING

The zoning designations for the land surrounding the airport are similar to the *General Plan* designations discussed above.

To the north, west and south, lands are zoned for industrial development. Based on the zoning ordinance, the purpose of these zones is to accommodate traditional industries ranging from small,

employee-intensive uses to large capital-intensive businesses and to promote and preserve the city's industrial areas as significant employment generators. As discussed in the *General Plan* section above, industrial development would generally be considered compatible with the exception of uses that may generate excessive dust, smoke, or water vapor that may affect a pilot's view of the airport when approaching.

To the east of the airport, land use is zoned for open space development. Within the City of Redding zoning ordinance, this zone is generally applied to lands having slopes in excess of 20 percent and being located within the 100-year flood elevation of the Sacramento River or one of its local tributaries, which includes Stillwater Creek. As previously discussed, the land exhibits steep slopes associated with the Stillwater Creek corridor. The zoning ordinance notes that the Open Space district is a preservation tool and uses are limited to those consistent with undeveloped land, but may also include corridors for trails, public utilities, streets, and other necessary public improvements.

To the west and southwest there are areas zoned for general retail commercial development. Similar to the General Plan, this includes smaller scale retail stores, offices, and personal-service establishments. A review of the zoning ordinance indicates that multi-family residential development may occur within this zone with a site development permit from the City of Redding's Board of Administrative Review.

ADDITIONAL CONSIDERATIONS

Based on previous coordination with the California Department of Fish and Game and the City of Redding Development Services Department, an area south of Taxiway E and north of Meadow View Drive may provide habitat for vernal pool species. According to the U.S. Fish and Wildlife Service's Information Planning and Conservation System (IPaC), the airport property includes critical habitat for the slender orcutt grass. The habitat area is generally located south of Taxiway E.

SOCIOECONOMIC CHARACTERISTICS

Socioeconomic characteristics are collected and examined to derive an understanding of the dynamics of growth within the study area. This information assists in determining aviation service level requirements, as well as forecasting the number of based aircraft and aircraft activity at the airport. Aviation forecasts are typically related to the population base, economic strength of the region, and the ability of the region to sustain a strong economic base over an extended period of time.

POPULATION

Historical population totals, which were obtained from the U.S. Census Bureau, are presented in **Table 1F**. According to the U.S. Census Bureau, the State of California had over 37.3 million residents in 2010. This is an increase of more than 7.5 million residents since 1990, which represents an average annual growth rate of 0.8 percent. The population of Shasta County, which includes the cities of Redding, Anderson, and Shasta Lake, experienced a 0.6 percent average annual growth rate, adding

more than 30,000 residents. The City of Redding experienced an average annual growth rate of 1.0 percent, adding more than 23,000 residents.

TABLE 1F
Historical Population--State of California, Shasta County, and City of Redding

Area	1990	2000	2010	Average Annual Growth Rate (1990-2010)
City of Redding	66,500	80,900	89,861	1.0%
Shasta County	147,000	163,300	177,223	0.6%
State of California	29,760,000	33,873,000	37,309,382	0.8%

Source: U.S. Census Bureau

Forecast population projections are presented in **Table 1G**. These projections were prepared by the Demographic Research Unit, California Department of Finance in January 2013. The department projects the state's population to reach more than 47.7 million by 2040, which is an average annual growth rate of 0.8 percent. Population in Shasta County is expected to grow at a slightly faster rate (1.0 percent) during the same time, totaling approximately 242,016 residents by 2040.

TABLE 1G
Forecast Population—State of California and Shasta County

Area	2010	2020	2030	2040	Average Annual Growth Rate (2010-2040)
Shasta Co.	177,223	199,814	220,019	242,016	1.0%
California	37,309,382	40,643,643	44,279,354	47,690,186	0.8%

Source: Demographic Research Unit, California Department of Finance (January 2013)

EMPLOYMENT

Analysis of a community's employment base can provide valuable insight to the overall well-being of the community. In most cases, the community make-up and health is significantly impacted by the availability of jobs, variety of employment opportunities, and types of wages provided by local employers. Civilian labor force data, which was obtained from the California Labor Market Information (LMI), is presented in **Table 1H**.

As shown in the table, as of June 2014, the United States had a current unemployment rate of 6.1 percent, while the State of California had a slightly higher unemployment rate of 7.4 percent. Since 1990, Shasta County's unemployment rate has been historically high compared to the State and U.S. figures. Shasta County has a year-round labor force of nearly 80,000. The county's current unemployment rate is at 8.6 percent, which has declined considerably from the all-time high of 15.1 percent that was reached in 2009. It still exceeds the current rate in the State of California and the U.S.

TABLE 1H
Civilian Labor Force Data

	1990	2000	June 2014
Shasta County			
Civilian Labor Force	67,700	74,800	79,500
Employment	61,900	70,300	72,700
Unemployment	5,900	4,500	6,800
Unemployment Rate	8.6%	6.1%	8.6%
State of California			
Civilian Labor Force	15,168,500	16,857,500	18,618,600
Employment	14,294,100	16,024,300	17,240,700
Unemployment	874,400	833,200	1,378,000
Unemployment Rate	5.8%	4.9%	7.4%
United States			
Civilian Labor Force	125,840,000	142,583,000	155,694,000
Employment	118,793,000	136,891,000	146,221,000
Unemployment	7,047,000	5,692,000	9,474,000
Unemployment Rate	5.6%	4.0%	6.1%

Source: California Labor Market Information (Data is seasonally adjusted for June 2014)

Table 1J presents the major employers in Shasta County. As is evident in the table, the medical services sector is a significant source of employment for the county. Shasta County also has significant income based on agriculture, retail business, and tourism.

TABLE 1J
Major Employers
Shasta County

Employer Name	Employer Size Class	Location	Industry
Ave's Audio Visual Equipment	250-499	Redding	Audio Visual Equipment Rental
Bethel Church	250-499	Redding	Churches
Blue Shield-CA	500-999	Redding	Insurance
Forest Service	100-249	Redding	Foresters-Consulting
Lassen Canyon Nursery, Inc.	500-999	Redding	Nurseries
Mayers Memorial Hospital	250-499	Burney	Hospitals
Mayers Memorial Hospital	250-499	Fall River Mills	Hospitals
Medtronic Inc.	100-249	Redding	Physicians & Surgeons Equipment
Mercy Medical Center	1,000-4,999	Redding	Hospitals
Oakdale Heights Management	500-999	Redding	Business Consultants
Record Searchlight	100-249	Redding	Newspapers
Shascade Community Services	250-499	Redding	Business Services NEC
Shasta College	500-999	Redding	Schools – Universities
Shasta Community Health Centers	250-499	Redding	Clinics
Shasta Regional Medical Center	500-999	Redding	Hospitals
Transportation Department	250-499	Redding	State Government
U.S. Post Office	250-499	Redding	Post Offices
Vibra Hospital of Northern California	250-499	Redding	Rehabilitation Centers
Victor Treatment Center	100-249	Redding	Residential Care Homes
Wal-Mart Supercenter	500-999	Redding	Department Stores – Retail
Win-River Casino	250-499	Redding	Casinos

Source: California Labor Market Information (2014)

REDDING
Municipal Airport

Chapter Two

FORECASTS OF AVIATION DEMAND

FORECASTS OF AVIATION DEMAND

An important factor in facility planning involves a definition of demand that may reasonably be expected to occur during the useful life of the facility's key components. For Redding Municipal Airport, this involves projecting potential aviation demand for a 20-year timeframe. In this report, forecasts of passenger enplanements, enplaned air cargo, annual operations, peak operational activity, based aircraft, and based aircraft fleet mix will serve as the basis for facility planning.

The resulting forecast may be used for several purposes, including facility needs assessments, airfield capacity evaluation, and environmental evaluations. The forecasts will be reviewed and approved by the FAA to ensure that they are reasonable projections of aviation activity. The intent is to permit the City of Redding to make the necessary planning adjustments to ensure the facility meets projected demands in an efficient and cost-effective manner.

Because aviation activity can be affected by many influences at the local, regional, and national levels, it is important to remember that forecasts are to serve only as guidelines, and planning must remain flexible enough to respond to unforeseen facility needs.

FORECASTING APPROACH

The development of aviation forecasts proceeds through both analytical and judgmental processes. A series of mathematical relationships is tested to establish statistical logic and rationale for projected growth. However, the judgment of the forecast analyst, based upon professional experience

knowledge of the aviation industry, and assessment of the local situation, is important in the final determination of the preferred forecast. The most reliable approach to estimating aviation demand is through the utilization of more than one analytical technique. Methodologies frequently considered include trend line/time-series projections, correlation/regression analysis, and market share analysis.

Trend line/time-series projections are probably the simplest and most familiar of the forecasting techniques. By fitting growth curves to historical data, then extending them into the future, a basic trend line projection is produced. A basic assumption of this technique is that outside factors will continue to affect aviation demand in much the same manner as in the past. As broad as this assumption may be, the trend line projection does serve as a reliable benchmark for comparing other projections.

Correlation analysis provides a measure of direct relationship between two separate sets of historic data. Should there be a reasonable correlation between the data sets, further evaluation using regression analysis may be employed.

Regression analysis measures statistical relationships between dependent and independent variables, yielding a "correlation coefficient." The correlation coefficient (Pearson's "r") measures association between the changes in the dependent variable and the independent variable(s). If the "r^2" value (coefficient determination) is greater than 0.95, it indicates good predictive reliability. A value less than 0.95 may be used, but with the understanding that the predictive reliability is lower.

Market share analysis involves a historical review of the airport activity as a percentage, or share, of a larger regional, state, or national aviation market. A historical market share trend is determined, providing an expected market share for the future. These shares are then multiplied by the forecasts of the larger geographical area to produce a market share projection. This method has the same limitations as trend line projections, but can provide a useful check on the validity of other forecasting techniques.

It is important to note that one should not assume a high level of confidence in forecasts that extend beyond five years. Facility and financial planning usually require at least a 10-year purview since it often takes more than five years to complete a major facility development program. However, it is important to use forecasts which do not overestimate revenue-generating capabilities or understate demand for facilities needed to meet public (user) needs.

NATIONAL AVIATION TRENDS

Each year, the FAA updates and publishes a national aviation forecast. Included in this publication are forecasts for the large air carriers, regional/commuter air carriers, general aviation, and FAA workload measures. The forecasts are prepared to meet budget and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the general public. The current edition when this chapter was prepared was FAA *Aerospace Forecasts – Fiscal Years 2014-2034*, published in March 2014. The FAA primarily uses the

economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets. The following discussion is summarized from the FAA Aerospace Forecasts.

U.S. ECONOMIC OUTLOOK

Since the beginning of the century, the commercial air carrier industry has suffered several major shocks that have led to reduced demand for air travel. These shocks include the terror attacks of September 11, 2001, periods of rising fuel prices, and the most significant global economic recession since the Great Depression. To manage this period of extreme volatility, air carriers have fine-tuned their business models with the aim of minimizing financial losses by lowering operating costs, eliminating unprofitable routes, and grounding older, less fuel efficient aircraft. To increase operating revenues, carriers have initiated new services that customers are willing to purchase, and unbundled other services that were typically included in the price of a ticket, such as checked bags and on-board meals. The capacity discipline exhibited by carriers and their focus on additional revenue streams bolstered the industry to profitability in 2013 for the fourth consecutive year. Going into the next decade, there is cautious optimism that the industry has been transformed from that of a boom-to-bust cycle to one of sustainable profits.

According to the FAA Forecast report, as the economy recovers from the most serious economic downturn and slowest recovery in recent history, aviation will continue to grow over the long run. Fundamentally, demand for aviation is driven by economic activity. As economic growth picks up, so will growth in aviation activity. The FAA Forecast calls for passenger growth over the next 20 years to average 2.2 percent annually. In the next five years, growth is anticipated to be somewhat muted, primarily due to uncertainty that surrounds the U.S. and global economies, with most growth in passengers taking place in years six through 20.

U.S. economic performance in 2013 continued to be mixed with modest growth in real GDP and real incomes, a slowly falling unemployment rate, and oil prices and consumer inflation remaining in check. The economy grew at an average annual rate of 1.6 percent in fiscal year (FY) 2013 after expanding 2.8 percent in FY 2012. Given the uncertainty that characterized 2013, it was not surprising that growth in 2013 was lower than the previous year. GDP growth accelerated throughout the year with the negative effects of Hurricane Sandy and the expiration of the temporary payroll tax cut impacting the first and second quarters. Despite the slow growth, there were some favorable signs as the housing market continued to improve, the stock market entered record territory, and the labor market saw steady but slow improvement.

One of the unique features about the economic recovery (now in its 5th year) has been the slow improvement in the nation's unemployment rate. Since 1960, there have been five economic expansions in the U.S. that have lasted longer than 48 months, including this latest expansion. On average, for the prior four expansions, the unemployment rate four years after the peak rate in the recession prior to the expansion, has declined by about one-third. If the current recovery had been similar to the prior four recoveries, the unemployment rate would be 0.6 to 0.7 points lower than the

7.5 percent in the fourth quarter of FY 2013, and 7.6 percent for all of FY 2013. The persistently high unemployment rate is thought to be a contributing factor to the slow recovery in consumer spending and aviation demand that has been experienced since 2009.

In the medium term, (the four-year period between 2015 and 2019), U.S. economic growth is projected to average 3.0 percent per year with rates ranging between 2.9 and 3.2 percent. Income growth picks up during the same period averaging 3.2 percent per year. For the balance of the forecast period, both U.S. real GDP and real income growth slow to around 2.4 percent annually. The long-term stability of U.S. economic growth depends on sustained growth in the workforce and capital stock, along with improved productivity and competitiveness.

U.S. TRAVEL DEMAND

By year end of FY 2013, the U.S. commercial aviation industry consisted of 15 scheduled mainline air carriers that used large passenger jets (over 90 seats) and 63 regional carriers that used smaller piston, turboprop, and regional jet aircraft (up to 90 seats) to provide connecting passengers to the larger carriers. Mainline and regional carriers offer domestic and international passenger service between the U.S. and foreign destinations, although regional carrier international service is confined to the border markets in Canada, Mexico, and the Caribbean. Thirty all-cargo carriers were providing domestic and/or international air cargo service at the end of 2013.

Shaping today's commercial air carrier industry are three distinct trends: (1) continuing industry consolidation and restructuring; (2) continued capacity discipline in response to external shocks; and (3) the proliferation of ancillary revenues.

The restructuring and consolidation of the U.S. airline industry that began in the aftermath of the terror attacks of September 11, 2001 continued in 2013. During the year, Southwest continued to integrate the former AirTran network into its operations as did United with the former Continental Airlines network. In 2013, American and US Airways (the third and fifth largest U.S. airlines, respectively) announced a merger agreement that, if approved, would create the world's largest airline. Consequently, when compared to 2007, 7.0 percent fewer domestic available seat miles (ASMs) were flown and 5.2 percent fewer passengers were carried domestically in 2013.

One of the most striking outcomes of industry restructuring has been the unprecedented period of capacity discipline (achieving higher passenger loads through scheduled flight and fleet mix consolidation, primarily), especially in domestic markets. Between 1978 and 2000, ASMs in domestic markets increased at an average annual rate of four percent per year, recording only two years of decline. Even though domestic ASMs shrank by 6.9 percent in FY 2002, following the events of September 11, 2001, growth resumed and by 2007, domestic ASMs were 3.6 percent above the FY 2000 level. However, since 2007, ASMs in the U.S. domestic market have decreased by 7.0 percent, as the industry responded first to the sharp rise in oil prices (up 155 percent between 2004 and 2008) and then the Global Recession that followed (2009 to the present).

The 7.0 percent reduction in domestic capacity since 2007 has not been shared equally between the mainline carriers and their regional counterparts. To better match demand to capacity, the mainline carriers contracted out "thin" routes to their regional counterparts because they could provide lift at a lower cost, or simply removed the capacity altogether. In 2013, the mainline carrier group provided 8.0 percent less capacity than it did in 2007 (and carried 6.6 percent fewer passengers). Capacity flown by the regional group has shrunk by 0.4 percent over the same five-year period (with passengers carried decreasing by 0.5 percent).

The most recent trend to take hold is that of ancillary revenues. Carriers generate ancillary revenues by selling products and services beyond that of an airplane ticket to customers. This includes the un-bundling of services previously included in the ticket price, such as checked bags and on-board meals, and by adding new services, such as boarding priority. As a result of capacity reduction and the introduction of ancillary revenue sources, U.S. passenger carriers posted net profits for the fourth consecutive year in 2013.

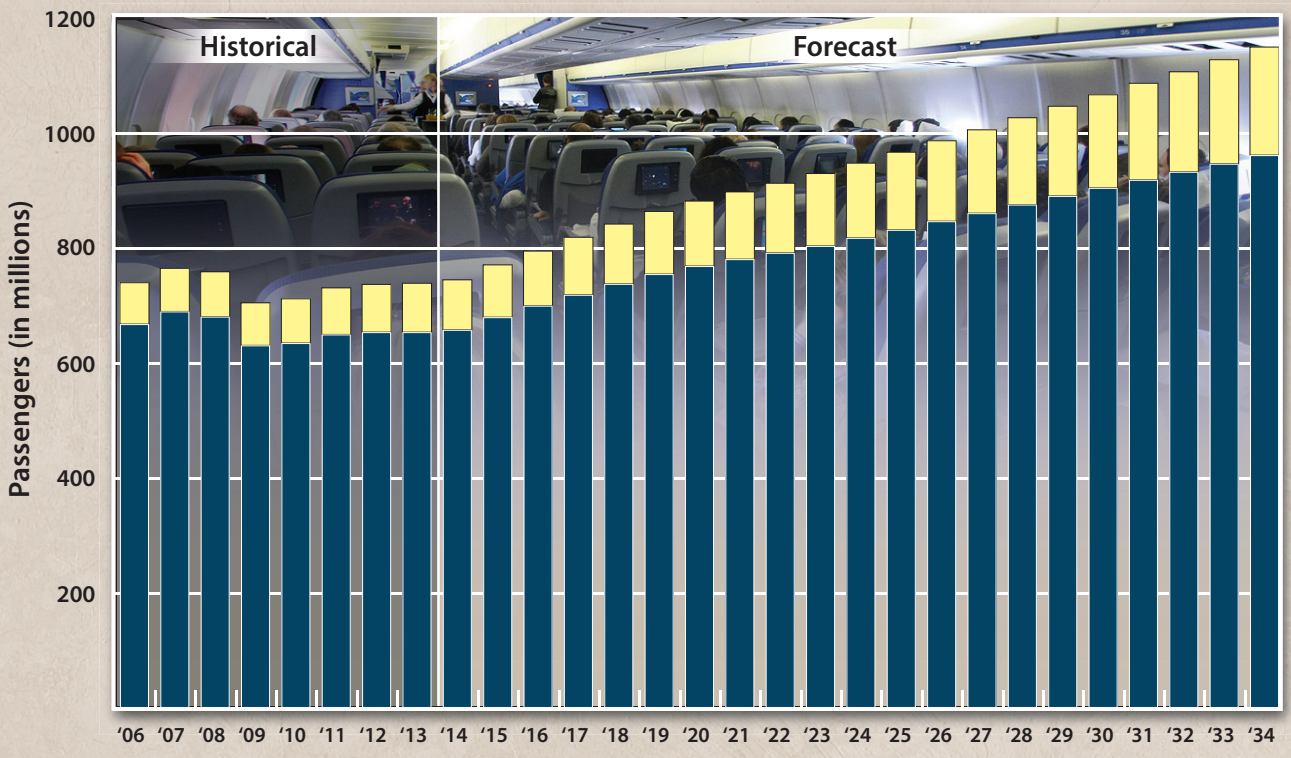
FAA COMMERCIAL AIR CARRIER FORECASTS

Although the recession has been officially over for several years, in 2013 carriers continued to deal with economic uncertainties as business travel budgets remained strained, unemployment persisted, and uncertainty surrounding federal fiscal policy (expiration of the payroll tax break in January, sequestration, and a partial shutdown of the federal government) remained. In such an uncertain economic environment, industry capacity growth was restrained (up 0.8 percent in 2013), after only a 0.1 percent increase in 2012. Given the minimal increase in seats available to the traveling public, carriers were still able to raise airfares despite the slow growth in demand. Higher airfares and ancillary revenue, coupled with flat to falling fuel prices, resulted in U.S. carriers being profitable in 2013.

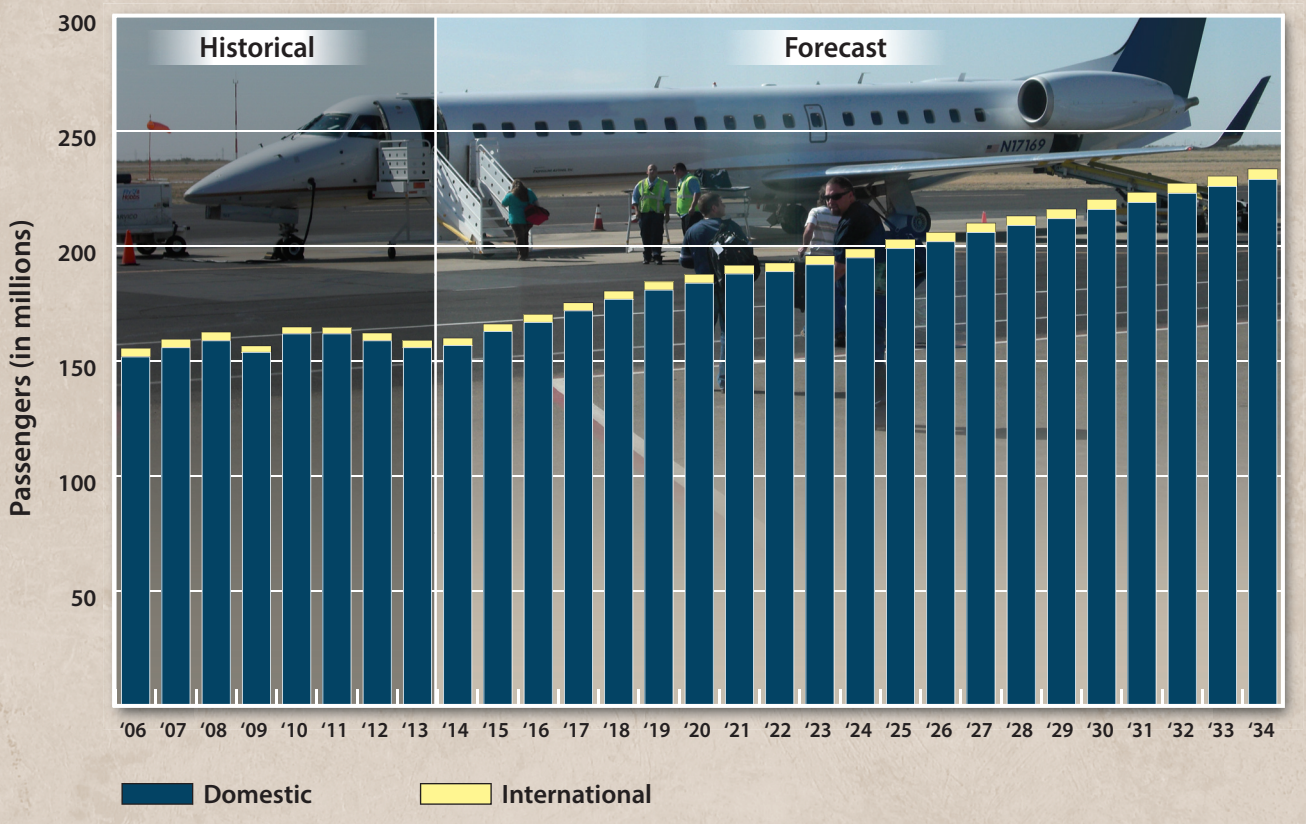
The FAA provides several measures for commercial airline activity in its *Aerospace Forecasts – Fiscal Years 2014-2034*. After experiencing slight growth in 2013 (up 0.8 percent), domestic system capacity (as measured in available seat miles – ASMs) was projected to increase 1.0 percent in 2014. From 2013 through 2034, domestic ASMs are projected to grow 2.0 percent annually. Mainline carrier capacity is forecast to grow 0.8 percent in 2014 and 2.0 percent through 2034. Regional carrier capacity grew by 2.2 percent and is forecast to grow 2.3 percent annually through 2034. Overall domestic capacity is projected to increase at an average annual rate of 2.1 percent through 2034, which is slightly slower than economic growth.

The FAA forecasts indicate that enplanements are forecast to grow slightly (up 0.6 percent) in 2014, following a 0.1 percent increase in 2013. Over the forecast period, domestic enplanements are projected to grow at an average annual rate of 1.9 percent, with mainline carriers growing at the same rate (1.9 percent). **Exhibit 2A** presents the annual historical and forecast enplanement totals for both large air carriers and commuter airlines in the U.S. as forecast by the FAA.

U.S. Scheduled Commercial Air Carrier Passenger Enplanements



U.S. Regional / Commuter Scheduled Passenger Enplanements



Source: FAA Aerospace Forecasts, Fiscal Years 2014-2034

Exhibit 2A
U.S. COMMERCIAL AIR CARRIER AND REGIONAL/COMMUTER FORECASTS

FAA COMMERCIAL AIRCRAFT FLEET FORECAST

The commercial passenger carrier fleet is undergoing transformation. The mainline carriers are retiring older, less fuel efficient aircraft (e.g., 737-300/400/500, 757/767, and MD-80) and replacing them with more technologically advanced A319/320 and 737-700/800/900 aircraft. The regional carriers are growing their fleet of 70-90 seat regional jet aircraft and reducing their fleet of 50-seat jet aircraft. The total number of aircraft in the U.S. commercial fleet (including regional carriers) is estimated at 6,727 for 2013, a decrease of 184 aircraft from 2012. This includes 3,774 mainline air carrier passenger aircraft (over 90 seats), 740 mainline air cargo aircraft, and 2,213 regional carrier aircraft (jets, turboprops, and pistons).

The number of passenger jets in the mainline fleet is estimated to have increased by 41 in 2013. After 2013, the mainline aircraft fleet was projected to add approximately 65 aircraft annually, totaling 5,112 aircraft in 2034. The mainline narrow-body fleet (including the Embraer 190s) was projected to grow by 42 aircraft annually from 2013-2034. The wide-body fleet (including the Boeing 787 and Airbus A-350) was projected to grow by 23 aircraft annually over the same period. Mainline passenger jet aircraft are forecast to increase 1.5 percent annually through 2034.

The regional passenger aircraft fleet is estimated to have decreased by 127 aircraft in 2013, as decreases in 50-seat and smaller regional jets and turboprops outpace production of new larger regional jets. After 2013, the regional carrier fleet (turboprops and jets) is expected to decrease by 0.1 percent per year over the remaining years of the forecast period, totaling 2,141 aircraft in 2034. The number of regional jets (90 seats or fewer) is projected to grow from 1,642 in 2013 to 1,953 in 2034, an average annual increase of 0.8 percent. All of the growth in regional jets over the forecast period occurs in the larger, 70- to 90-seat aircraft category. During the forecast period, all regional jets of 50 or less seats are projected to be retired from the fleet.

The commercial turboprop/piston fleet was expected to shrink from 571 units in 2013 to 188 in 2034. Turboprop/piston aircraft are expected to account for just 8.8 percent of the regional carrier passenger fleet in 2033, down from a 25.8 percent share in 2013.

COMMERCIAL SERVICE

In 2014/2015, scheduled air service at Redding Municipal Airport was being provided by SkyWest Airlines (as United Express on behalf of United Airlines). SkyWest/United Express provided service to San Francisco with three daily flights on 30-seat turboprops until March 2015, when service transitioned to two daily 50-seat regional jets. Since 2010, departures have declined by 63 percent, and the seats available on departing flights have declined by 79 percent. The Airport is actively pursuing new air service since the current passenger catchment area is clearly being underserved.

To determine the types and sizes of facilities necessary to properly accommodate present and future airline activity, two elements of air service must be forecast: annual enplaned passengers and annual aircraft operations. Of these, the number of annual enplaned passengers is the most basic indicator of

demand for commercial service activity. From a forecast of annual enplanements, operations and peak period activity can be projected based on the specific characteristics of passenger demand at Redding Municipal Airport.

Passenger Enplanements

Historical passenger enplanements and the annual percentage change are presented in **Table 2A**. As shown in the table, passenger enplanements at Redding Municipal Airport have fluctuated from 66,405 in 2000 to 24,875 in 2013. (Note: Following initial preparation of the forecasts chapter, the mid-year enplanements in 2015 had increased to a 12-month moving total of 28,890 and were on track to finish calendar year 2015 at 32,000, requiring an adjustment to passenger enplanement forecast.)

TABLE 2A
Historical Passenger Enplanements
Redding Municipal Airport

Year	Total Enplanements	Annual % Change
2000	66,405	--
2001	65,666	-1.1%
2002	53,987	-17.8%
2003	54,921	1.7%
2004	61,113	11.3%
2005	62,085	1.6%
2006	66,390	6.9%
2007	64,478	-2.9%
2008	66,239	2.7%
2009	57,094	-13.8%
2010	54,420	-4.7%
2011	38,290	-29.6%
2012	29,175	-23.8%
2013	24,875	-14.7%

Source: Airport Records/2013 FAA/ACAIS.

Previous forecasts of passenger enplanements were first examined for this study. Forecasts included in the *2004 Airport Master Plan Update* used 2001 as the base year (65,666 enplanements) and projected 130,000 annual enplanements by the year 2022. Forecasts prepared for the *2010 ALP Narrative Report* (using a base year of 2009 when 57,094 annual enplanements were recorded) projected 86,900 enplanements by the year 2030.

The most recent iteration of the FAA *Terminal Area Forecast* (TAF) was also examined. The FAA TAF is prepared annually and presents enplanement projections for all commercial service airports in the United States. The most recent FAA TAF was published in February 2014 and used FY 2012 (31,244 annual enplanements) as the base year. The FAA TAF projects 41,415 annual enplanements by the year 2034. This document will be updated again in early 2015, and with the lower base year for FY 2013, the enplanement forecast is expected to be lowered.

Due to the fluctuation and subsequent decline in the number of enplanements between 2000 and 2014, time-series and regression analyses were not performed as they would not provide reliable results. Rather, other forecasting techniques were used to develop new enplanement projections: market share (based upon projected U.S. passenger growth) and travel propensity factors (based upon Shasta County population-passenger relationships).

National forecasts of U.S. domestic regional enplanements are compiled each year by the FAA. The most recent publication, FAA *Aerospace Forecasts, Fiscal Years 2014-2034*, was released in March 2014.

As shown in **Table 2B**, the airport's market share of U.S. domestic regional passenger enplanements declined from 0.083 percent in 2000 to 0.016 percent in 2013. Over the past five years, the average market share is 0.0258. Based upon this, a constant market share projection was developed. This projection applies the 0.0258 percent market share to the forecast of U.S. domestic regional enplanements. This constant ratio projection yields 59,200 annual enplanements by the year 2034.

TABLE 2B
Market Share Enplanements Forecasts
Redding Municipal Airport (RDD)

Year	RDD Enplanements	U.S. Domestic Regional Enplanements	RDD Market Share of U.S.
2000	66,405	79,700,000	0.083%
2001	65,666	88,800,000	0.074%
2002	53,987	98,900,000	0.054%
2003	54,921	110,100,000	0.050%
2004	61,113	122,700,000	0.050%
2005	62,085	136,600,000	0.045%
2006	66,390	152,200,000	0.044%
2007	64,478	156,200,000	0.041%
2008	66,239	159,100,000	0.042%
2009	57,094	154,000,000	0.037%
2010	54,420	161,600,000	0.034%
2011	38,290	161,700,000	0.024%
2012	29,175	159,000,000	0.018%
2013	24,875	155,500,000	0.016%
Constant Market Share Projection			
2019	46,500	180,500,000	0.0258%
2024	50,400	195,300,000	0.0258%
2034	59,200	229,400,000	0.0258%

Source: Historical Enplanements at RDD – Airport Records; Historical and Forecast U.S. Domestic Regional Enplanements – FAA Aerospace Forecasts, Fiscal Years 2014-2034 (March 2014).

A second method used to forecast enplanements examined the ratio between the number of enplanements and the population of Shasta County. This ratio of enplanements to county-wide population is referred to as the travel propensity factor (TPF) and is presented in **Table 2C**.

As shown in the table, the TPF has declined from a high of 0.41 in 2000 to a low of 0.14 in 2013. The five-year average for the TPF is 0.23. The forecast that was developed assumes that the TPF will remain static at 0.23 as Shasta County population grows, resulting in 53,000 annual enplanements by the year 2034.

TABLE 2C
Enplanements Per Capita (TPF) Forecast
Redding Municipal Airport (RDD)

Year	RDD Enplanements	Shasta County Population	Travel Propensity Factor
2000	66,405	163,300	0.41
2001	65,666	165,500	0.40
2002	53,987	167,800	0.32
2003	54,921	170,100	0.32
2004	61,113	172,500	0.35
2005	62,085	174,900	0.36
2006	66,390	177,300	0.37
2007	64,478	179,700	0.36
2008	66,239	182,200	0.36
2009	57,094	181,100	0.32
2010	54,420	177,223	0.31
2011	38,290	177,675	0.22
2012	29,175	178,332	0.16
2013	24,875	178,980	0.14
Constant TPF Projection			
2019	45,100	196,210	0.23
2024	47,900	208,200	0.23
2034	53,000	230,300	0.23

Source: Historical Enplanements - Airport Records; Historical Population - U.S. Census Bureau (Actual-2000 and 2010, other years-estimates); Forecast Population – California Department of Finance.

For planning purposes, a mid-range forecast is generally chosen if it provides a reasonable growth rate. The selected planning forecast is an average of the market share and population-based travel propensity factor forecasts: 45,800 enplanements by 2019; 49,200 enplanements by 2024; and 56,100 enplanements by 2034. Of course, efforts by the City of Redding to enhance air service through added airline hub destinations may provide higher growth rates through the planning period. Therefore, the chart presented in **Exhibit 2B** reflects a 50 percent market recapture at approximately 47,000 enplanements and 100 percent market recapture at approximately 67,000 enplanements. The selected planning forecast for the Master Plan represents a 75 percent market recapture. **Table 2D** and **Exhibit 2B** summarize the passenger enplanement forecasts for Redding Municipal Airport. It should be recognized that further adjustments in airline service (frequency, destinations, or aircraft type) may result in significantly different estimates of future enplanement growth.

TABLE 2D
Summary of Passenger Enplanement Forecasts
Redding Municipal Airport

	2013	2019	2024	2034
2010 ALP Narrative Report (extrapolated to 2034)		70,470	77,810	92,960
FAA *Terminal Area Forecast* (published February 2014)		28,737	32,454	41,415
Market Share--U.S. Domestic Regional Enplanements		46,500	50,400	59,200
Travel Propensity Factor--Shasta County Population		45,100	47,900	53,000
Selected Planning Forecast (Avg.)	**24,875**	**45,800**	**49,200**	**56,100**

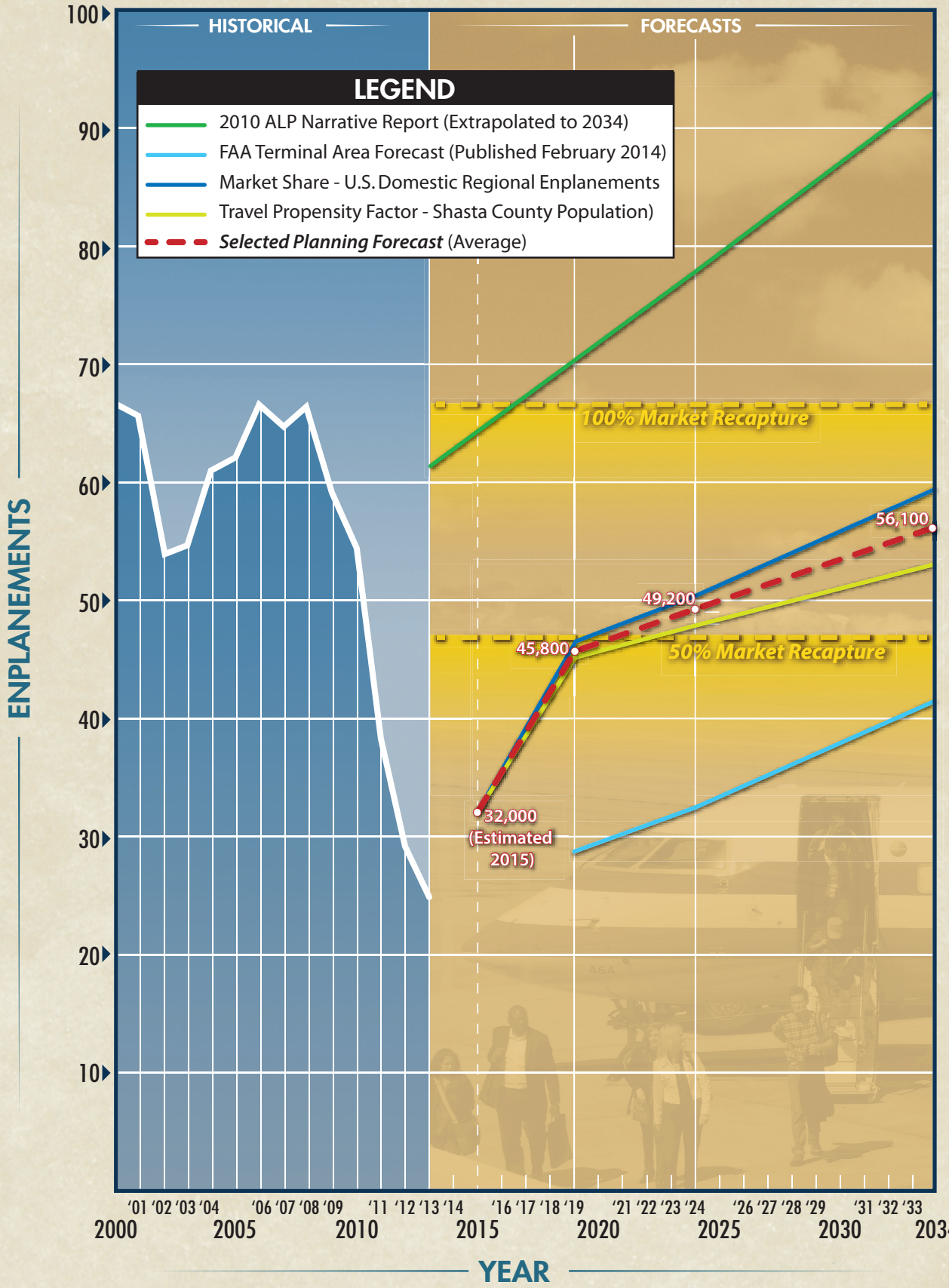


Exhibit 2B
PASSENGER ENPLANEMENTS FORECAST

Fleet Mix and Operations Forecast

The fleet mix defines a number of key parameters in airfield and terminal planning, including runway length and width, taxiway width, terminal space and apron requirements, and peak demands on parking requirements. Changes in equipment, airframes, and engines have always had a significant impact on airlines and airport planning. There are many ongoing programs by the manufacturers to improve performance characteristics. These programs are focusing on improvements in fuel efficiency, noise suppression, and the reduction of air emissions. A fleet mix projection for Redding Municipal Airport has been developed by reviewing the aircraft historically used by airlines serving the airport and orders the airlines have placed with manufacturers for new aircraft.

Redding Municipal Airport is currently receiving scheduled commercial service from SkyWest Airlines as United Express on behalf of United Airlines. SkyWest/United Express was operating the 30-seat Embraer EMB 120ER Brasilia turboprop in the local market until March 2015, when they transitioned to the 50-seat regional jet. The airline is also operating the 70-seat CRJ700 on behalf of United Airlines, and the parent company (SkyWest, Inc.) has placed orders for the 76-seat Embraer E175/E175-E2 and Mitsubishi MRJ90 regional jets (with deliveries to begin in 2014 for the E175 and 2017 for the MRJ90). Regional airlines are continuing to transition to regional jets with higher seating capacities, although current airline scope clauses are limiting many regional carriers to aircraft with a maximum of 76 seats. Past airline service at Redding has included the 74-seat Bombardier Q400 turboprop. The local fleet mix is expected to continue to reflect this transition to larger aircraft over the next two decades.

The fleet mix assumptions have been used to calculate the average seats per departure and the projected enplanements per departure were derived based upon a static boarding load factor of 0.65 through the planning period. While the load factor in 2013 was quite high at 0.71, airlines continue to demand high load factors in the current operating environment. If the carrier is unable to achieve a high load factor on a consistent basis, the equipment will be relocated. **Table 2E** summarizes the fleet mix operations forecast for the scheduled airlines. The decline in airline operations is attributable to the higher level of enplanements per departure (i.e. larger aircraft in the fleet). However, if the Airport is successful in recapturing market share, then the commercial operations would be expected to increase above these figures.

TABLE 2E
Airline Fleet Mix and Operations Forecast
Redding Municipal Airport

		FORECAST		
Fleet Mix Seating Capacity	**2013**	**2019**	**2024**	**2034**
< 51 seats (30 average) - (PC-12, EMB 120, CRJ100/200)	100%	75%	60%	50%
51-100 seats (75 average) - (Q-400, CRJ 700/900, EMB 170/190)	0%	25%	40%	50%
Totals	100%	100%	100%	100%
Average Seats per Departure	30	41	48	53
Boarding Load Factor	0.71	0.65	0.65	0.65
Enplanements per Departure	21.3	26.7	31.2	34.5
Annual Enplanements	24,875	45,800	49,200	56,100
Annual Departures	1,168	1,720	1,580	1,630
Annual Operations	2,334	3,440	3,160	3,260

AIR CARGO TONNAGE

Air cargo traffic is comprised of domestic and international revenue freight, express freight, and mail. Air cargo services at Redding Municipal Airport are handled by the integrated all-cargo companies in addition to scheduled and non-scheduled carriers. All freight is handled on single or twin-engine propeller aircraft, and the operations are recorded by the airport traffic control tower under the air taxi category. Airport records indicate that the number of landings recorded by the air cargo feeder carriers has declined from 2,166 in 2010 to 1,430 in 2013. The total tonnage of freight handled through the Airport during this period has remained relatively unchanged (according to Airport records), although data reported to the Bureau of Transportation Statistics indicates there may have been a modest increase in tonnage handled over the four-year period.

A market share analysis examined the air cargo volumes at Redding Municipal Airport in relation to the revenue ton-miles (RTMs) of domestic all-cargo carriers in the U.S. (this is the only category projected annually by the FAA). This information is presented in **Table 2F**. As shown in the table, the airport's market share has fluctuated between a high of 0.022 percent in 2000 and a low of 0.011 percent in 2010.

TABLE 2F
Market Share of U.S. Domestic All-Cargo – Revenue Ton-Miles (RTMs)
Redding Municipal Airport (RDD)

Year	RDD Freight and Mail Total (lbs.)	U.S. Domestic All-Cargo Carrier RTMs	RDD Market Share
2000	2,276,400	10,423,700	0.022%
2001	1,950,000	9,992,300	0.020%
2002	2,017,900	9,629,900	0.021%
2003	1,939,500	11,153,400	0.017%
2004	2,040,000	13,040,800	0.016%
2005	2,010,700	13,007,900	0.015%
2006	2,084,000	12,481,200	0.017%
2007	1,933,000	12,792,700	0.015%
2008	1,674,700	12,160,400	0.014%
2009	1,281,000	10,275,300	0.012%
2010	1,261,000	11,243,200	0.011%
2011	1,221,000	10,601,200	0.012%
2012	1,367,000	10,880,300	0.013%
2013	1,480,000	10,991,500	0.014%
Constant Market Share Projection			
2019	1,728,000	12,343,400	0.014%
2024	1,839,000	13,133,000	0.014%
2034	2,077,000	14,833,300	0.014%

Source: Historical Freight and Mail - Airport Records and/or Bureau of Transportation Statistics; Historical & Forecast Domestic All-Cargo Carrier RTMs - FAA Aerospace Forecasts, Fiscal Years 2014-2034 (March 2014).

A market share projection examined what the airport could expect if it simply maintained its current share (0.014 percent) of the U.S. domestic cargo market. Demand for air cargo services frequently correlates with strong manufacturing and/or service sectors of the local economy. The service sector in Shasta County (including professional services, education and healthcare, retail trade, and public sectors) is projected in *California County-Level Economic Forecast, 2012-2040* to be the greatest job

creator for Shasta County in future years. Maintaining a level market share may result in 2.1 million pounds of air cargo at the airport by 2034, which is an annual average growth rate of 1.6 percent. Since local and national air cargo volumes declined after 2005, before beginning to rebound the past two years, this appears to be a reasonable long-range planning projection.

TABLE 2G
Air Taxi Operations Forecasts
Redding Municipal Airport

Year	Air Taxi Operations
2000	15,020
2001	15,075
2002	12,736
2003	12,370
2004	11,910
2005	11,377
2006	12,107
2007	10,388
2008	9,839
2009	16,181
2010	26,848
2011	34,061
2012	33,506
2013	35,424
2014 Est.	*37,000*
Forecasts	
2019	38,900
2024	40,900
2034	45,100

Source: FAA Tower Reports

AIR TAXI OPERATIONS

Historical air taxi operations were obtained from FAA tower reports and are presented in **Table 2G**. The air taxi category is defined by the FAA to include operations by carriers with authority to provide "on demand" public transportation of persons and property in aircraft. Therefore, this category represents a broad mix of passenger, air cargo, firefighting, and/or business aircraft operations. As shown in the table, air taxi operations at the airport are at the highest recorded levels since 2000, and based on year-to-date statistics in mid-2014, the air taxi operations category has continued to grow, even as the scheduled passenger operations which are included in this category have declined. The FAA *Terminal Area Forecast* has projected an annual growth rate of 0.8 percent for RDD in this category, although actual growth rates appear to justify a slightly higher growth rate of 1.0 percent through the planning period, as reflected in **Table 2G**.

TABLE 2H
Military Operations Forecast
Redding Municipal Airport

Year	Total Operations
2000	1,148
2001	1,132
2002	1,184
2003	838
2004	815
2005	854
2006	1,085
2007	1,200
2008	1,130
2009	1,008
2010	496
2011	637
2012	653
2013	599
Avg. 2010-2013	*600*
Forecasts	
2019	600
2024	600
2034	600

Source: FAA Tower Reports

MILITARY OPERATIONS

Historical military operations were obtained from tower reports and are presented in **Table 2H**. As shown in the table, military operations at the airport have declined since the 2006-2009 time period, and remained generally within the range of 500-700 operations annually, with two-thirds of the recorded operations in the itinerant category. Therefore, operations were forecast at a static level of 600 annual operations for the planning period. The military traffic includes a mix of helicopter, fixed wing, and trainer activity.

FAA GENERAL AVIATION FORECASTS

The FAA forecasts the fleet and hours flown for single-engine piston aircraft, multi-engine piston aircraft, turboprops, business jets, piston and turbine helicopters, light sport, experimental, and others (gliders and balloons). The FAA forecasts "active aircraft," not total aircraft. An active aircraft is one that is flown at least one hour during the year. **Exhibit 2C** presents the historical and forecast U.S. active general aviation aircraft.

After growing rapidly for most of the past decade, the demand for business jet aircraft has slowed over the past few years as the industry has been hard hit by the economic recession. Nonetheless, the FAA forecast calls for robust growth in the long-term, driven by higher corporate profits and the growth of worldwide GDP. Additionally, continued concerns about safety, security, and flight delays keep business aviation attractive relative to commercial air travel. Overall, business aviation is projected to outpace personal/recreational use. The active general aviation fleet is projected to increase at an average annual rate of 0.5 percent through 2034, growing from a 2013 estimate of 202,865 to 225,700 in 2034.

The turbine fleet, including helicopters, is forecast to grow annually at 2.6 percent, growing from 29,110 in 2013 to 49,565 in 2034. The fixed wing jet aircraft portion is forecast to grow 3.0 percent annually from a 2013 estimate of 11,890 to 14,370 in 2034. The turbine helicopter portion is forecast to grow 3.0 percent annually reaching 13,145 by 2034.

Piston-powered aircraft, including helicopters, are projected to decrease from the 2013 total of 141,325 to 131,615 through 2034, with declines in both single and multi-engine fixed wing aircraft but growth in piston helicopters. Over the forecast period, piston-powered fixed-wing aircraft are projected to decrease by an average annual rate of 0.4 percent. Although piston helicopters are forecast to increase by one percent a year, they are a relatively small portion of this segment of general aviation aircraft and, therefore, have little effect on the overall trend. Single-engine fixed-wing piston aircraft, which are much more numerous, are projected to decline at an annual rate of 0.4 percent, while multi-engine fixed wing piston aircraft are projected to decline by 0.5 percent a year.

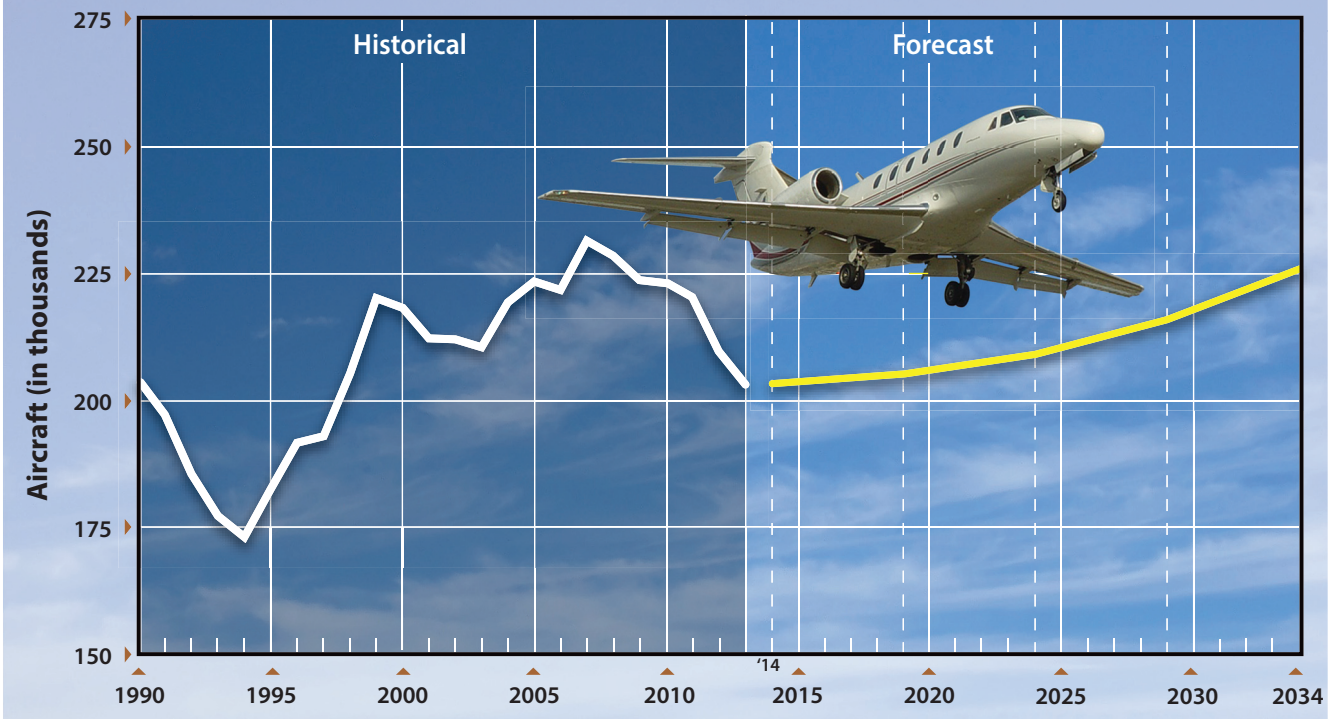
The FAA began tracking the light sport aircraft segment of the general aviation fleet in 2005. At the end of 2013, a total of 2,110 of these aircraft was estimated. By 2034, a total of 4,880 light sport aircraft are forecast to be in the fleet for an annual growth rate of 4.1 percent.

BASED AIRCRAFT

The number of based aircraft is the most basic indicator of general aviation demand. By first developing a forecast of based aircraft, the growth of aviation activities at the airport can be projected. Aircraft basing at the airport are somewhat dependent upon the nature and degree of aircraft ownership in the local service area. As a result, aircraft registrations in the area were reviewed and forecast first.

U.S. Active General Aviation Aircraft

	2014	2019	2024	2029	2034
FIXED WING					
Piston					
Single Engine	122,755	118,700	115,660	113,895	113,975
Multi-Engine	14,180	13,890	13,500	13,155	12,890
Turbine					
Turboprop	10,160	10,355	11,000	12,375	14,370
Turbojet	12,055	13,600	15,800	18,665	22,050
ROTORCRAFT					
Piston	3,430	3,775	4,090	4,405	4,750
Turbine	7,280	8,690	10,150	11,600	13,145
EXPERIMENTAL					
	25,895	28,100	30,130	32,275	34,440
SPORT AIRCRAFT					
	2,240	2,955	3,595	4,315	4,880
OTHER					
	5,025	5,075	5,115	5,155	5,200
TOTAL	**203,020**	**205,140**	**209,040**	**215,840**	**225,700**



Source: FAA Aerospace Forecasts, Fiscal Years 2014-2034.

Notes: An active aircraft is one that has a current registration and was flown at least one hour during the calendar year.

Registered Aircraft Forecasts

Table 2J outlines the historic registered aircraft in Shasta County since 2000. This information was obtained from records of the FAA Aircraft Registry. There were 325 aircraft registered in Shasta County in 2000. This number has since increased, with 353 registered aircraft reported in Shasta County in 2013. This represents an annual average growth rate of 0.6 percent. Using the historical information reported to the FAA, several techniques were utilized to project registered aircraft in the County through 2034. Due to the fluctuations in historical aircraft registrations through the period, time-series and regression analyses were not considered reliable forecasting tools for this analysis. Average growth, market share, and population factors were applied to the analysis.

TABLE 2J
Historical Registered Aircraft
Shasta County

Year	Registered Aircraft	Annual % Change
2000	325	-
2001	331	1.8%
2002	333	0.6%
2003	352	5.7%
2004	348	-1.1%
2005	365	4.9%
2006	367	0.5%
2007	384	4.6%
2008	386	0.5%
2009	380	-1.6%
2010	368	-3.2%
2011	373	1.4%
2012	382	2.4%
2013	353	-7.6%

Source: FAA Aircraft Registry

Applying the average annual growth rate of 0.6 percent provides a net increase of 47 aircraft through the planning period: 366 by 2019, 377 by 2024, and 400 by 2034.

Another useful tool in projecting registered aircraft considers the county's market share of U.S. active general aviation aircraft. This market share analysis compares the county's aircraft ownership trends versus national aircraft ownership trends. As evidenced in **Table 2K**, the county's share of U.S. active general aviation aircraft has remained very steady over the past decade. Using a market share of 0.174 percent, a constant market share forecast was applied to the forecast years and yields 393 registered aircraft in Shasta County by 2034.

The population of Shasta County has also been used as a comparison with registered aircraft in the county. This forecast method examines historical registered aircraft as a ratio of 1,000 residents in Shasta County. As shown in **Table 2K**, the 2013 population for the county was estimated at 178,980, which equates to 1.97 registered aircraft per 1,000 residents. A constant ratio projection of 2.0 aircraft per 1,000 residents provides a forecast of 460 registered aircraft in the county by 2034.

The selected planning forecast, which is presented in **Table 2L**, is an average of the projections forecasting 418 registered aircraft in Shasta County by 2034. This is an additional 65 aircraft in the county over the planning period, growing at an average annual rate of 0.8 percent.

TABLE 2K
Registered Aircraft Forecasts
Shasta County

Year	Shasta County Registered Aircraft	U.S. Active GA Aircraft	% of U.S. Active GA Aircraft	Shasta County Population	Aircraft Per 1,000 County Residents
2000	325	217,533	0.149%	163,256	1.99
2001	331	211,446	0.157%	165,515	2.00
2002	333	211,244	0.158%	167,807	1.98
2003	352	209,606	0.168%	170,130	2.07
2004	348	219,319	0.159%	172,485	2.02
2005	365	224,262	0.163%	174,872	2.09
2006	367	221,942	0.165%	177,293	2.07
2007	384	231,606	0.165%	179,747	2.14
2008	386	228,664	0.169%	182,236	2.12
2009	380	223,876	0.170%	181,100	2.10
2010	368	223,370	0.165%	177,223	2.08
2011	373	220,453	0.169%	177,675	2.10
2012	382	209,034	0.183%	178,332	2.15
2013	353	202,865	0.174%	178,980	1.97
Constant Market Share Projection of U.S. Active GA Aircraft					
2019	357	205,140	0.174%		
2024	364	209,040	0.174%		
2034	393	225,700	0.174%		
Constant Ratio Projection Per 1,000 County Residents					
2019	392			196,210	2.00
2024	416			208,200	2.00
2034	460			230,300	2.00

Source: Historical Registered Aircraft – FAA; Historical and Forecast U.S. Active GA Aircraft - FAA Aerospace Forecasts, Fiscal Years 2014-2034 (March 2014); Historical Population – U.S. Census Bureau; Forecast Population – California Department of Finance (January 2013).

TABLE 2L
Summary of Registered Aircraft Forecasts
Shasta County

	2013	2019	2024	2034
0.6% Growth Rate (Actual Growth Rate 2000-2013)		366	377	400
Market Share of U.S. Active GA Aircraft--Constant Market Share Projection (0.174%)		357	364	393
Registered Aircraft Ratio Per 1,000 Shasta County Residents--Constant Ratio Projection (2.0)		392	416	460
Planning Forecast	**353**	**372**	**386**	**418**

Based Aircraft Forecasts

According to the latest FAA *Airport Master Record* (Form 5010), there are currently 218 based fixed wing aircraft and helicopters at Redding Municipal Airport: 169 single engine, 23 multi-engine, six jets, and 20 helicopters. The addition of the IASCO international flight training operation has added 33 new

fixed wing based aircraft (25 single engine and eight multi-engine) beginning in 2009. Several techniques have been utilized to examine future based aircraft forecasts for Redding Municipal Airport.

The first method examined the airport's market share of Shasta County registered aircraft (forecast in a previous section). The 218 based aircraft at Redding Municipal Airport currently represent 62 percent of the total aircraft registered in Shasta County, which is an increase over the 48 percent captured as recently as 2008. A constant market share forecast was developed and assumes the airport's market share will remain at 62 percent, resulting in a projection of 259 based aircraft by the year 2034. This market share forecast is presented in **Table 2M**.

TABLE 2M
Based Aircraft Forecasts
Redding Municipal Airport

Year	RDD Based Aircraft	Shasta County Registered Aircraft	Market Share of Reg. AC	Shasta County Population	Aircraft Per 1,000 County Residents
2000	160	325	49%	163,300	0.98
2008	184	386	48%	182,200	1.01
2009	208	380	55%	183,000	1.14
2013	218	353	62%	178,980	1.22
Constant Market Share Projection of Registered Aircraft (Shasta County)					
2019	231	372	62%		
2024	239	386	62%		
2034	259	418	62%		
Constant Ratio Projection Per 1,000 County Residents					
2019	239			196,210	1.22
2024	254			208,200	1.22
2034	281			230,300	1.22

Source: Based Aircraft – FAA Master Record (5010 Form); County Registered Aircraft – FAA; Population - U.S. Census Bureau; Forecast Population – California Department of Finance (January 2013).

A second forecast examined the ratio of based aircraft at Redding Municipal Airport per 1,000 residents in Shasta County. As shown in **Table 2M**, this ratio increased from 0.98 in 2000 to 1.22 in 2013. The forecast assumes that the ratio will remain constant at 1.22 through the planning period, resulting in a projection of 281 based aircraft by 2034. This population-based ratio projection is also presented in **Table 2M**.

Another forecast method examined the historical growth rate. Based aircraft totals for Redding Municipal Airport were examined between the years 2000 and 2013, during which the airport experienced a 2.4 percent annualized growth rate. While a significant amount of the growth in based aircraft can be attributable to the addition of IASCO international flight training aircraft, the net growth rate (without IASCO) is still 1.1 percent on an annualized basis. Therefore, the 1.1 percent growth rate was applied to the base number, resulting in 275 based aircraft by the year 2034.

The FAA's *Terminal Area Forecast* (TAF) released in February 2014 was also examined for comparative purposes. This forecast used a base year of 2012, with an estimated 222 based aircraft. The FAA TAF projects total based aircraft at 258 by 2019, 283 by 2024, and 343 by 2034.

For planning purposes, an average forecast is generally chosen if it provides a reasonable growth rate. The preferred planning forecast reflects an average of the market share, population-based and net growth rate (1.1 percent) projections, which results in a preferred planning forecast of 272 based aircraft by 2034. This represents an average annual growth rate of 1.1 percent. **Table 2N** and **Exhibit 2D** summarize the based aircraft forecasts for Redding Municipal Airport.

TABLE 2N
Summary of Based Aircraft Forecasts
Redding Municipal Airport

	2013	2019	2024	2034
Market Share of Registered Aircraft (Shasta Co.) Constant Market Share Projection (62%)		231	239	259
Based Aircraft Per 1,000 Residents (Shasta Co.) Constant Ratio Projection (1.22%)		239	254	281
1.1% Growth Rate (2000-2013 w/o IASCO)		231	243	275
FAA *Terminal Area Forecast* (February 2014)		258	283	343
Preferred Planning Forecast	218	**233**	**245**	**272**

Based aircraft growth is highly possible at the airport. As a training facility for foreign carriers, additional based aircraft through the planning period can be expected. Furthermore, the projected socioeconomic growth of the region will support new aircraft growth in the service area.

Based Aircraft Fleet Mix

The current mix of aircraft based at the airport consists of 169 single engine aircraft, 23 multi-engine aircraft, six jets, and 20 helicopters. While the total number of general aviation aircraft based at Redding Municipal Airport is projected to increase, it is also important to know the type of aircraft expected to base at the airport. This will ensure the planning of proper facilities in the future.

The forecast mix of based aircraft was determined by comparing existing and forecast U.S. general aviation fleet trends to the fleet mix at Redding Municipal Airport. While an increase in single engine aircraft can be expected, their percentages of the total fleet mix will likely decline as percentages in the other categories increase. The fleet mix projections for Redding Municipal Airport are shown in **Table 2P**.

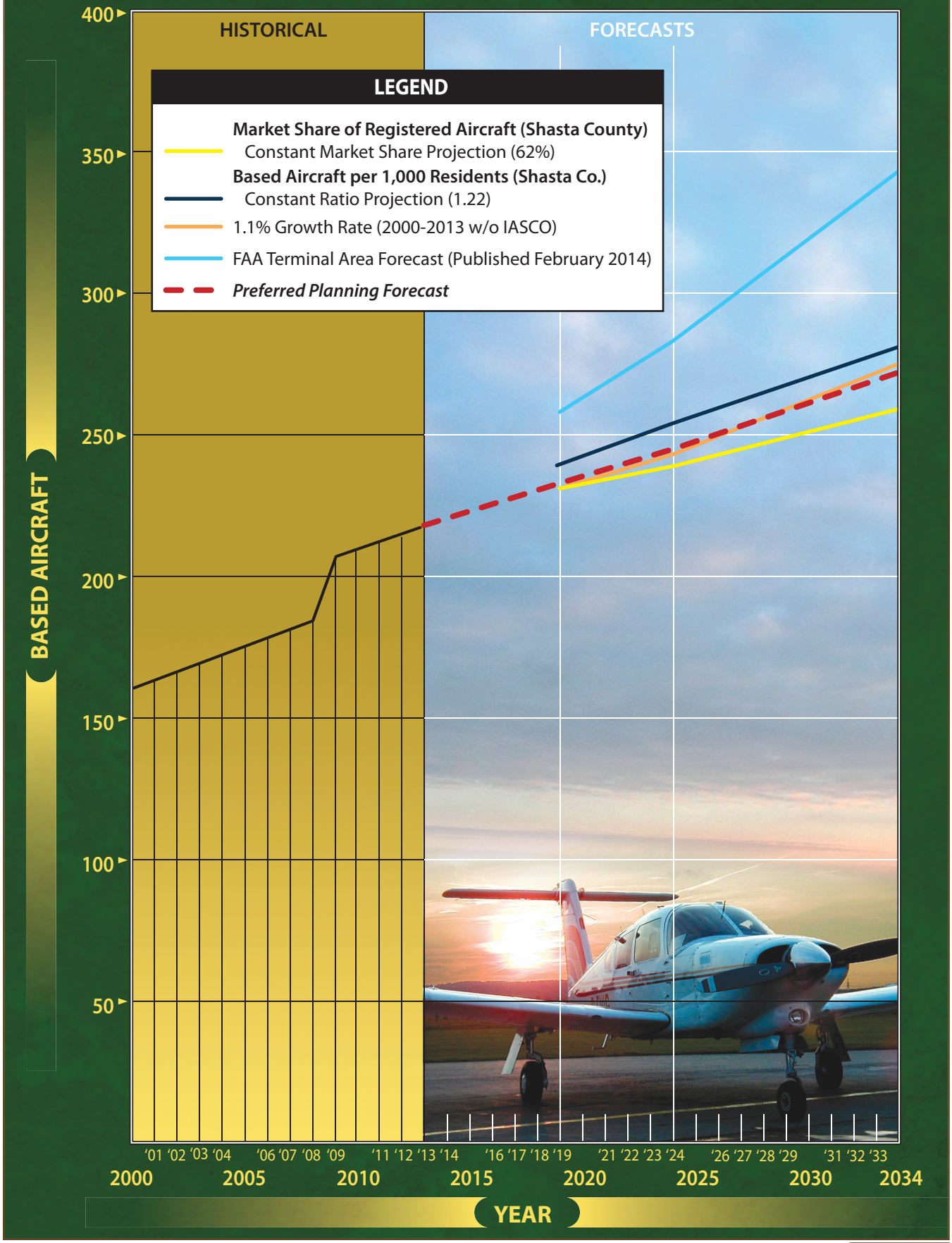


Exhibit 2D
BASED AIRCRAFT FORECAST

TABLE 2P
Based Aircraft Fleet Mix
Redding Municipal Airport

Year	Total	Single Engine	Multi-Engine	Jets	Helicopters
2009	208	158	32	6	12
2013	218	169	23	6	20
Percentage Share					
2009	100.0%	76.0%	15.4%	2.9%	5.8%
2013	100.0%	77.5%	10.6%	2.8%	9.2%
FORECAST					
2019	233	175	28	7	23
2024	245	179	32	9	25
2034	272	190	41	11	30
Change	+54	+21	+18	+5	+10
Percentage Share					
2019	100.0%	75.0%	12.0%	3.0%	10.0%
2024	100.0%	73.0%	13.0%	3.5%	10.5%
2034	100.0%	70.0%	15.0%	4.0%	11.0%

Source: Existing Fleet Mix – FAA Airport Master Record (Form 5010).

GENERAL AVIATION OPERATIONS

General aviation operations are classified as either local or itinerant. A local operation is a take-off or landing performed by an aircraft that operates within sight of the airport, or which executes simulated approaches or touch-and-go operations at the airport. Itinerant operations are those performed by aircraft with a specific origin or destination away from the airport. Generally, local operations are characterized by training operations. Typically, itinerant operations increase with business and commercial use, since business aircraft operate on a high frequency.

Table 2Q summarizes historical general aviation operations at Redding Municipal Airport since 2000. This data was obtained from airport tower records. As shown in the table, annual operations at the airport reached a record high level for the period in 2013. Training operations began to increase in April 2009, and have continued to push operational levels to record levels. Year-to-date data for 2014 reflects an increasing number of local training operations, with 12-month moving totals exceeding 48,000 annual operations.

Forecasts of annual operations were developed by examining the number of operations per based aircraft. The 64,041 annual general aviation operations reported in 2013 equate to 294 operations per based aircraft.

TABLE 2Q
Historical General Aviation Operations
Redding Municipal Airport

Year	Itinerant	Local	Total	% Change
2000	34,024	21,368	55,572	N/A
2001	34,436	20,822	55,258	-0.6%
2002	34,742	24,119	58,861	6.5%
2003	33,602	26,366	59,968	1.9%
2004	36,412	25,586	61,998	3.4%
2005	34,860	21,026	55,886	-9.9%
2006	37,820	24,219	62,039	11.0%
2007	35,419	24,726	60,145	-3.1%
2008	29,863	20,008	49,871	-17.1%
2009	24,245	30,697	54,942	10.2%
2010	19,574	37,324	56,898	3.6%
2011	18,468	47,939	66,407	16.7%
2012	20,370	43,481	63,851	-3.8%
2013	19,346	44,695	64,041	0.3%

Source: FAA Tower Reports/ATADS

The recent announcement by IASCO international flight training that an additional foreign carrier has contracted for training (initially with a group of 30 students) will continue to drive an increase in the local operations category. IASCO, initially in partnership with multiple Chinese airlines, offers a 58-week course to train students as entry-level airline pilots for foreign carriers. IASCO began operating at Redding Municipal Airport early in 2009 with a group of 30 students. Two additional groups began later in the same year, contributing to the ongoing increase in local operations at the airport.

Annual general aviation operations have been projected at a ratio of 300 operations per based aircraft. Holding this ratio constant through the planning period will result in 82,000 annual operations by 2034. This equates to an average annual growth rate of 1.2 percent.

Local operations are estimated to account for 70 percent of total annual general aviation operations, based upon the percentage recorded in 2013. This percentage is expected to remain static through the planning period. This level of local activity will continue to be dependent upon the amount of training undertaken through the international flight school, as well as the number of aircraft basing at the airport. Without the international flight training, local operations could decline by 40-50 percent. A summary of the general aviation operations forecasts are presented in **Table 2R**.

TABLE 2R
General Aviation Operations Forecasts
Redding Municipal Airport

Year	Based Aircraft	Itinerant Operations	Local Operations	Total Operations	Operations/ Based Aircraft
2013	218	19,346	44,695	64,041	294
Constant Ratio Projection					
2019	233	21,000	49,000	70,000	300
2024	245	22,000	52,000	74,000	300
2034	272	25,000	57,000	82,000	300

PEAKING CHARACTERISTICS

Many airport facility needs are related to the level of activity during peak periods. The periods used in developing facility requirements for this study are as follows:

- **Peak Month –** The calendar month when peak activity occurs.
- **Design Day –** The average day in the peak month.
- **Busy Day –** The busy day of a typical week in the peak month.
- **Design Hour –** The peak hour within the design day.

It is important to realize that only the peak month is an absolute peak within the year. Each of the other periods will be exceeded at various times during the year. However, each provides reasonable planning standards that can be applied without overbuilding or being too restrictive.

Airline Peaks

Historical airport records were examined to determine the peak month for passenger enplanements at Redding Municipal Airport. The peak month of the year has historically been July, when 10 percent of the annual enplanements are recorded. The design hour enplanements were estimated at 33 percent of the design day (average day of the peak month) based upon the current airline schedule and load factors.

The peak month for airline operations is nine percent of annual operations. Based upon the current airline schedule, the peak hourly period represents 33 percent of design day activity. This percentage has been applied to the forecasts of design hour operations at Redding Municipal Airport. A summary of forecasts for airline enplanements and operations is presented in **Table 2S**.

TABLE 2S
Peak Period Forecasts
Redding Municipal Airport

		FORECASTS		
	2013	2019	2024	2034
Airline Enplanements				
Annual	24,875	45,800	49,200	56,100
Peak Month (10.0%)	2,488	4,580	4,920	5,610
Design Day	83	153	164	187
Design Hour (33.0%)	27	50	54	62
Airline Operations				
Annual	2,330	3,440	3,160	3,260
Peak Month (9.0%)	210	310	284	293
Design Day	6	10	10	10
Design Hour (33.0%)	2	3	3	3
General Aviation Operations				
Annual	64,041	70,000	74,000	82,000
Peak Month (10.3%)	6,628	7,210	7,620	8,450
Design Day	221	240	254	282
Busy Day	276	300	318	352
Design Hour (12.0%)	29	36	38	42

General Aviation Peaks

A review of tower reports reveals the peak month for general aviation operations in 2013 was August, which accounted for 10.3 percent of general aviation operations. Forecasts of peak month activity have been developed by applying this same percentage to the forecasts of general aviation operations.

The design hour is projected at 12 percent of the design day (average day of the peak month) operations. Busy day operations were calculated at 25 percent busier than the design day activity. **Table 2S** summarizes the general aviation peak activity forecasts.

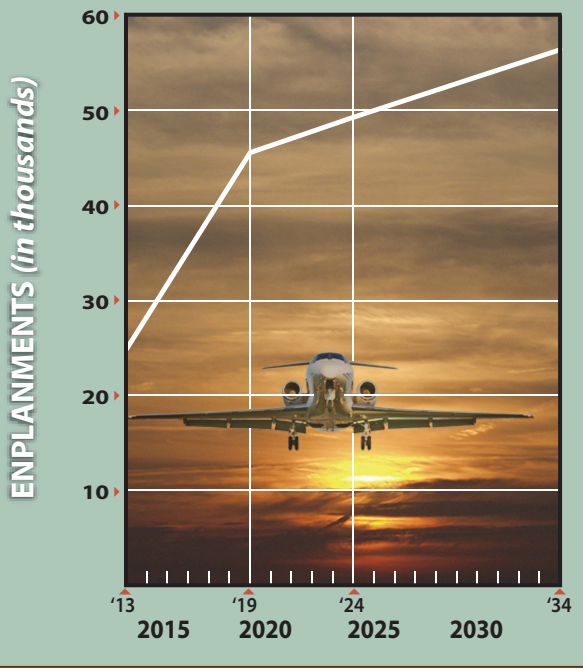
This section has provided forecasts for each sector of aviation demand anticipated over the planning period. A summary of the aviation forecasts developed for Redding Municipal Airport is presented in **Exhibit 2E**.

AIRCRAFT/AIRPORT/RUNWAY CLASSIFICATION

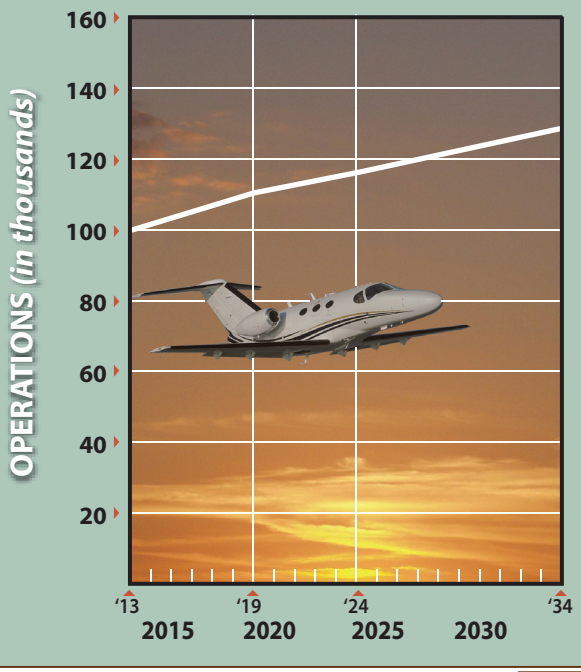
The FAA has established several aircraft classification systems that group aircraft types based on their performance (approach speed in landing configuration) and on design characteristics (wingspan and landing gear configuration). These classification systems are used to determine the appropriate airport design standards for specific airport elements, such as runways, taxiways, taxilanes, and aprons.

CATEGORY	BASE YEAR 2013	FORECASTS 2019	2024	2034
ANNUAL ENPLANEMENTS				
Airport Total	**24,875**	**45,800**	**49,200**	**56,100**
AIR CARGO				
Airport Total (million pounds)	**1.480**	**1.728**	**1.839**	**2.077**
ANNUAL OPERATIONS				
Itinerant				
Air Carrier/Air Taxi	34,497	38,900	40,900	45,100
Military	393	400	400	400
General Aviation	19,346	21,000	22,000	25,000
Total Itinerant	***54,236***	***60,300***	***63,300***	***70,500***
Local				
General Aviation	44,695	49,000	52,000	57,000
Military	206	200	200	200
Total Local	***44,901***	***49,200***	***52,200***	***57,200***
Total Operations	**99,137**	**109,500**	**115,500**	**127,700**
BASED AIRCRAFT				
Single Engine	169	175	179	190
Multi-Engine	23	28	32	41
Jets	6	7	9	11
Helicopters	20	23	25	30
Total Based Aircraft	**218**	**233**	**245**	**272**

ENPLANEMENTS FORECAST



OPERATIONS FORECAST



AIRCRAFT CLASSIFICATION

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using or are expected to use an airport. The critical design aircraft is used to define the design parameters for an airport. The design aircraft may be a single aircraft type or, more commonly, is a composite aircraft representing a collection of aircraft classified by three parameters: Aircraft Approach Category (AAC), Airplane Design Group (ADG), and Taxiway Design Group (TDG). FAA AC 150/5300-13A, *Airport Design*, describes the following airplane classification systems, the parameters of which are presented on **Exhibit 2F**.

Aircraft Approach Category (AAC): A grouping of aircraft based on a reference landing speed (V_{REF}), if specified, or if V_{REF} is not specified, 1.3 times stall speed (V_{SO}) at the maximum certificated landing weight. V_{REF}, V_{SO}, and the maximum certificated landing weight are those values as established for the aircraft by the certification authority of the country of registry.

The AAC generally refers to the approach speed of an aircraft in landing configuration. The higher the approach speed, the more restrictive the applicable design standards. The AAC, depicted by a letter A through E, is the aircraft approach category and relates to aircraft approach speed (operational characteristic). The AAC generally applies to runways and runway-related facilities, such as runway width, runway safety area (RSA), runway object free area (ROFA), runway protection zone (RPZ), and separation standards.

Airplane Design Group (ADG): The ADG, depicted by a Roman numeral I through VI, is a classification of aircraft which relates to aircraft wingspan or tail height (physical characteristic). When the aircraft wingspan and tail height fall in different groups, the higher group is used. The ADG influences design standards for taxiway safety area (TSA), taxiway object free (TOFA), taxilane object free area, apron wingtip clearance, and various separation distances.

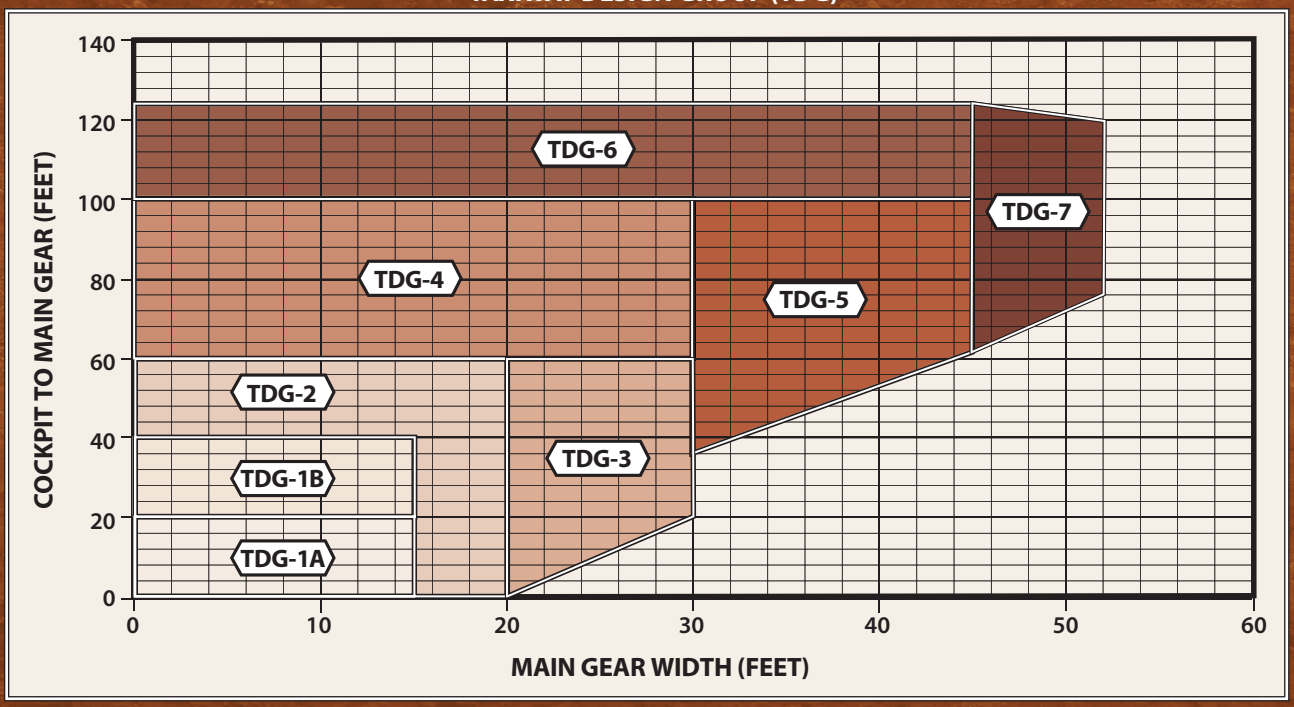
Taxiway Design Group (TDG): A classification of airplanes based on outer-to-outer Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance. The TDG relates to the undercarriage dimensions of the design aircraft. The taxiway design elements determined by the application of the TDG include the taxiway width, taxiway edge safety margin, taxiway shoulder width, taxiway fillet dimensions, and, in some cases, the separation distance between parallel taxiways/taxilanes. Other taxiway elements, such as the taxiway safety area (TSA), taxiway/taxilane object free area (TOFA), taxiway/taxilane separation to parallel taxiway/taxilanes or fixed or movable objects, and taxiway/taxilane wingtip clearances, are determined solely based on the wingspan (ADG) of the design aircraft utilizing those

AIRCRAFT APPROACH CATEGORY (AAC)	
Category	**Approach Speed**
A	less than 91 knots
B	91 knots or more but less than 121 knots
C	121 knots or more but less than 141 knots
D	141 knots or more but less than 166 knots
E	166 knots or more

AIRPLANE DESIGN GROUP (ADG)		
Group #	**Tail Height (ft)**	**Wingspan (ft)**
I	<20	<49
II	20-<30	49-<79
III	30-<45	70-<118
IV	45-<60	118-<171
V	60-<66	171-<214
VI	66-<80	214-<262

VISIBILITY MINIMUMS	
RVR (ft)	**Flight Visibility Category (statute miles)**
VIS	3-mile or greater visibility minimums
5,000	Lower than 3 miles but not lower than 1-mile
4,000	Lower than 1-mile but not lower than ¾-mile (APV ≥ ¾ but < 1-mile)
2,400	Lower than ¾-mile but not lower than ½-mile (CAT-I PA)
1,600	Lower than ½-mile but not lower than ¼-mile (CAT-II PA)
1,200	Lower than ¼-mile (CAT-III PA)

TAXIWAY DESIGN GROUP (TDG)



KEY

APV: Approach Procedure with Vertical Guidance
PA: Precision Approach
RVR: Runway Visual Range
TDG: Taxiway Design Group

surfaces. It is appropriate for taxiways to be planned and built to different TDG standards based on expected use.

AIRPORT AND RUNWAY CLASSIFICATION

These classifications, along with the aircraft classifications defined previously, are used to determine the appropriate FAA design standards to which the airfield facilities are to be designed and built.

***Airport Reference Code (ARC)*:** An airport designation that signifies the airport's highest Runway Design Code (RDC), minus the third (visibility) component of the RDC. The ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely on the airport. The current Airport Layout Plan (ALP) for the airport, which will be updated as part of this master planning effort, identifies an ARC of D-IV for the Airport (existing/ultimate), based upon the faster approach speeds of business jet aircraft and the wingspans of larger transport aircraft which use the Airport.

Runway Design Code (RDC): A code signifying the design standards to which the runway is to be built. The RDC is based upon planned development and has no operational component.

The AAC, ADG, and runway visual range (RVR) are combined to form the RDC of a particular runway. The RDC provides the information needed to determine certain design standards that apply. The first component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the ADG and relates to either the aircraft wingspan or tail height (physical characteristics), whichever is most restrictive. The third component relates to the visibility minimums expressed by RVR values in feet of 1,200 (⅛-mile), 1,600 (¼-mile), 2,400 (½-mile), 4,000 (¾-mile), and 5,000 (1-mile). The RVR values approximate standard visibility minimums for instrument approaches to the runways. The third component should read "VIS" for runways designed for visual approach use only.

Approach Reference Code (APRC): A code signifying the current operational capabilities of a runway and associated parallel taxiway with regard to landing operations. Like the RDC, the APRC is composed of the same three components: the AAC, ADG, and RVR. The APRC describes the current operational capabilities of a runway under particular meteorological conditions where no special operating procedures are necessary, as opposed to the RDC, which is based upon planned development with no operational component. The APRC for a runway is established based upon the minimum runway to taxiway centerline separation.

Departure Reference Code (DPRC): A code signifying the current operational capabilities of a runway and associated parallel taxiway with regard to takeoff operations. The DPRC represents those aircraft that can takeoff from a runway while any aircraft are present on adjacent taxiways, under particular meteorological conditions with no special operating conditions. The DPRC is similar to the APRC, but is composed of two components, ACC and ADG. A runway may have more than one DPRC depending on the parallel taxiway separation distance.

CRITICAL DESIGN AIRCRAFT

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using or are expected to use an airport. The critical design aircraft is used to define the design parameters for an airport. The design aircraft may be a single aircraft or a composite aircraft representing a collection of aircraft classified by the three parameters: AAC, ADG, and TDG. In the case of an airport with multiple runways, a design aircraft is selected for each runway.

The first consideration is the safe operation of aircraft likely to use an airport. Any operation of an aircraft that exceeds design criteria of an airport may result in either an unsafe operation or a lesser safety margin; however, it is not the usual practice to base the airport design on an aircraft that uses the airport infrequently.

The design aircraft is defined as the most demanding category of aircraft, or family of aircraft, which conducts at least 500 itinerant operations per year at an airport or the most demanding aircraft in regularly scheduled commercial service. Planning for future aircraft use is of particular importance since the design standards are used to plan separation distances between facilities. These future standards must be considered now to ensure that short term development does not preclude the reasonable long range potential needs of the airport.

According to FAA AC 150/5300-13A, *Airport Design*, "airport designs based only on existing aircraft can severely limit the ability to expand the airport to meet future requirements for larger, more demanding aircraft. Airport designs that are based on large aircraft never likely to be served by the airport are not economical." Selection of the current and future critical design aircraft must be realistic in nature and supported by current data and realistic projections.

AIRPORT DESIGN AIRCRAFT

The Airport experiences frequent activity by commercial, firefighting, and business aircraft. The largest commercial service jet currently used in charter service at the Airport is the Boeing 737/MD-80 series. The USFS and CALFIRE operate a variety of fixed wing aircraft and helicopters from their facilities, including the BAe-146 Airtanker, Lockheed P-2 Neptune Airtanker, Grumman S-2T Airtanker, OV-10A "Bronco" air tactical aircraft, and AH-1 Firewatch "Cobra" helicopter. The USFS has recently acquired a second DC-10 aircraft and is completing recertification and training for eight Lockheed C-130 "Hercules" to complement their firefighting fleet. The Airport also experiences activity by small, medium, and large business jets, the most common types, including the Cessna Citation series, Bombardier Challenger series, Dassault Falcon series, the Gulfstream III/IV/V series, and the Hawker 800/1000/4000 series.

The FAA maintains the Traffic Flow Management System Count (TFMSC) database which documents certain aircraft operations at certain airports. Information is added to the TFMSC database when pilots file flight plans and/or when flights are detected by the National Airspace System, usually via radar. It

includes documentation of commercial traffic (air carrier and air taxi), general aviation, and military aircraft. Due to factors such as incomplete flight plans and limited radar coverage, TFMSC data does not account for all aircraft activity at an airport by a given aircraft type. Therefore, it is likely that there are more operations (touch and go's, for example) at the airport than are captured by this methodology. TFMSC data is available for activity at Redding Municipal Airport and was utilized in this analysis.

Exhibit 2G presents the TFMSC operational mix at the Airport, with aircraft operations occurring in each category with the exception of D-V. Aircraft classified in C-IV or D-IV occasionally operate at the Airport (e.g., Lockheed C-130 and Boeing 757-200) but total operations by these aircraft have not reached the FAA's critical aircraft threshold. The current design aircraft for the Airport are those falling in AAC/ADG C-III. A representative aircraft would be the Boeing 737, BAe-146, Embraer 170, or Bombardier Q400. The TDG of each of these aircraft is a 3 (with the exception of the Q400, which is a 5). **Therefore, the current design aircraft for the airport is best described as C-III-3.** Where practicable, planning should not preclude the future capability of the Airport to accommodate ARC D-IV.

As the airline fleet mix transitions away from the 30-seat turboprops and 50-seat regional jets towards 70-plus seat regional jets, the Airport's share of ARC C-III (e.g., Embraer 170 & 190) and D-II (e.g., CRJ 900) classified aircraft are projected to grow. Additionally, with continued operational growth of larger business jets, operations in the ARC D-III category are expected to increase through the planning period as well.

RUNWAY DESIGN AIRCRAFT

Each runway is assigned an RDC. The RDC relates to specific FAA design standards that should be met in relation to each runway.

Runway 16-34 Design Aircraft

Runway 16-34 is the primary runway and should be designed to accommodate the critical design aircraft. This runway is currently 7,003 feet and has an instrument landing system providing ½-mile visibility minimums for instrument approaches to Runway 34. **Therefore, the applicable RDC is C-III-2400**. This RDC determination is supported by current activity levels as determined previously.

A-I

- Beech Baron 55
- **Beech Bonanza**
- Cessna 150
- Cessna 172
- Cessna Citation Mustang
- Eclipse 500
- Piper Archer
- Piper Seneca

B-I *less than 12,500 lbs.*

- Beech Baron 58
- Beech King Air 100
- Cessna 402
- **Cessna 421**
- Piper Navajo
- Piper Cheyenne
- Swearingen Metroliner
- Cessna Citation I

B-II *less than 12,500 lbs.*

- **Super King Air 200**
- Cessna 441
- DHC Twin Otter

B-I, B-II *over 12,500 lbs.*

- Super King Air 350
- Beech 1900
- Jetstream 31
- Falcon 10, 20, 50
- Falcon 200, 900
- **Citation II**, III, IV, V
- Saab 340
- Embraer 120

A-III, B-III

- DHC Dash 7
- **DHC Dash 8**
- DC-3
- Convair 580
- Fairchild F-27
- ATR 72
- ATP

C-I, D-I

- Beech 400
- **Lear 25, 31, 35, 45, 55, 60**
- Israeli Westwind
- HS 125-400, 700

C-II, D-II

- Cessna Citation III, VI, VIII, X
- **Gulfstream II, III, IV**
- Canadair 600
- ERJ-135, 140, 145
- CRJ-200/ 700

C-III, D-III

- ERJ-170, 190
- CRJ 700/900
- Boeing Business Jet
- B 737-300 Series
- MD-80, DC-9
- **BAe 146-200**
- A319, A320
- Gulfstream V
- Global Express

C-IV, D-IV

- B-757
- B-767
- C-130
- DC-8-70
- **MD-11**

D-V

- **B-747** Series
- B-777

Note: Aircraft pictured is identified in bold type.

Runway 12-30 Design Aircraft

Runway 12-30 is the secondary runway and should be designed to accommodate the critical design aircraft that is expected to need this runway. This runway is currently 5,067 feet but has no instrument landing system. **Therefore, the applicable RDC is C-III-5000.**

FUTURE DESIGN AIRCRAFT

As documented previously, operations are forecast to grow over the 20-year planning horizon; however, the mix of aircraft types is anticipated to remain largely unchanged. The airport will continue to be utilized by all sectors of aviation, including air carrier, air taxi, general aviation, and military. The frequency of these operations may increase somewhat, but the category of the design aircraft for the Airport and each runway is not anticipated to change. **Therefore, the overall design aircraft for the airport will remain C-III-3.**

The AAC and ADG design components for each Runway RDC are anticipated to remain unchanged. The RVR (visibility component) may change based on analysis and recommendations regarding potential instrument approach capability.

SUMMARY

This chapter has presented aviation demand forecasts as projected over the next 20 years for the Airport. Following input from the Planning Advisory Committee, the forecasts will be provided to FAA for their review. The next step in the master plan is to reassess the capacity of the existing facilities and determine what facilities will be necessary to meet both existing and future demands. The Facility Requirements chapter will be developed utilizing the forecasts of aviation demand.

Chapter Three

FACILITY REQUIREMENTS

FACILITY REQUIREMENTS

The objective of this chapter is to identify, in general terms, the adequacy of the existing airport facilities and outline what facilities may be needed to accommodate future demands. Having established these facility needs, alternatives for providing these facilities will be evaluated in the following chapter.

Recognizing that facility needs are based upon demand (rather than a point in time), the requirements may be expressed in short, intermediate, and long range planning horizons which correlate generally to 2019, 2024, and 2034 projections as developed in the previous chapter. This chapter will examine several components of the airport and their respective capacities to determine future facility needs over the planning period. The identified deficiencies will then be examined in the alternatives evaluation.

AIRFIELD CAPACITY

An airport's airfield capacity is expressed in terms of its annual service volume (ASV) and is a reasonable estimate of the maximum number of operations that can be accommodated in a year. ASV accounts for annual differences in runway use, aircraft mix, and weather conditions. The airport's annual service volume was examined utilizing FAA Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*.

FACTORS AFFECTING ANNUAL SERVICE VOLUME

A number of factors are included in the calculation of an airport's annual service volume. These include airfield characteristics, meteorological conditions, aircraft mix, and demand characteristics (aircraft operations). These factors are described in the following paragraphs.

Airfield Characteristics

The layout of the runways and taxiways directly affects an airfield's capacity. This not only includes the location and orientation of the runways, but the percentage of time that a particular runway or combination of runways is in use. Additional airfield characteristics include the length, width, load bearing strength, and instrument approach capability of each runway at the airport, all of which determine the type of aircraft that may operate on the runway and if operations can occur during poor weather conditions.

- **Runway Configuration**

The existing runway configuration at Redding Municipal Airport consists of primary Runway 16-34 and intersecting Runway 12-30. A precision instrument approach is available to Runway 34. Airfield capacity is reduced during low visibility (instrument) conditions.

- **Runway Use**

Runway use is normally dictated by wind conditions. The direction of takeoffs and landings is generally determined by the speed and direction of wind. It is generally safest for aircraft to depart and land into the wind, avoiding a crosswind or tailwind components during these operations. Prevailing winds favor the use of Runway 16-34.

- **Exit Taxiways**

Exit taxiways have a significant impact on airfield capacity since the number and location of exits directly determines the occupancy time of an aircraft on the runway. The airfield capacity analysis gives credit to exits located within a prescribed range from a runway's threshold. This range is based upon the mix index of the aircraft that use the runway. The exits must be at least 750 feet apart to count as separate exits. Under these criteria, Runway 16-34 receives the best exit rating, while Runway 12-30 receives a lower rating.

- **Meteorological Conditions**

Weather conditions have a significant effect on airfield capacity. Airfield capacity is usually highest in clear weather, when flight visibility is at its best. Airfield capacity is diminished as weather conditions deteriorate and cloud ceilings and visibility are reduced. As weather conditions deteriorate, the spacing of aircraft must increase to provide allowable margins of safety. The increased distance between aircraft reduces the number of aircraft which can operate at the airport during any given period. Consequently, this reduces overall airfield capacity.

There are three categories of meteorological conditions, each defined by the reported cloud ceiling and flight visibility. Visual Flight Rule (VFR) conditions exist whenever the cloud ceiling is greater than 1,000 feet above ground level and visibility is greater than three statute miles. VFR flight conditions permit pilots to approach, land, or take-off by visual reference, and to see and avoid other aircraft.

Instrument Flight Rule (IFR) conditions exist when the reported cloud ceiling is less than 1,000 feet above ground level and/or visibility is less than three statute miles. Under IFR conditions, pilots must rely on instruments for navigation and guidance to the runway. Safe separations between aircraft must be assured by following air traffic control rules and procedures. This leads to increased distances between aircraft, which diminishes airfield capacity.

Poor Visibility Conditions (PVC) exists when cloud ceilings are less than 500 feet above ground level and visibility is less than one mile.

According to weather data collected for the 10-year period beginning in January 2004 and extending through December 2013, VFR conditions at Redding Municipal Airport exist 89.05 percent of the time, IFR conditions 7.15 percent of the time, and PVC conditions 3.8 percent of the time. The 16-34 runway orientation provides 99.5 percent coverage in all-weather and IFR conditions.

- **Aircraft Mix**

Aircraft mix refers to the speed, size, and flight characteristics of aircraft operating at the airport. As the mix of aircraft operating at an airport increases to include larger aircraft, airfield capacity begins to diminish. This is due to larger separation distances that must be maintained between aircraft of different speeds and sizes.

Aircraft mix for the capacity analysis is defined in terms of four aircraft classes. Classes A and B consist of single and multi-engine aircraft weighing less than 12,500 pounds. Aircraft within these classifications are primarily associated with general aviation operations, but this classification also includes some air taxi and regional airline aircraft. Class C consists of multi-engine aircraft weighing between 12,500 pounds and 300,000 pounds. This is a broad classification that includes business jets, turboprops, military aircraft, and large commercial airline aircraft. Class D includes all aircraft over 300,000 pounds and includes all wide-bodied jumbo jets. A review of the Redding TFMSC data for 2013 did not reveal any aircraft operations within Class D.

For the capacity analysis, the percentage of Class C aircraft operating at the airport is critical in determining the annual service volume, as these classes include the larger and faster aircraft in the operational mix. The existing and projected operational fleet mix for Redding Municipal Airport is summarized in **Table 3A**. Consistent with projections prepared in the previous chapter, the operational fleet mix at the airport is expected to increase its percentage of Class C aircraft as regional airline operations transition to jets and the business and corporate use of general aviation aircraft increases at the airport. The percentage of Class C aircraft is higher during IFR conditions, as some general aviation operations are suspended during poor weather conditions.

TABLE 3A
Aircraft Operational Mix
Redding Municipal Airport

Weather	Year	A & B	C	D
VFR (Visual)	Existing	95%	5%	0.0%
	Short Term	95%	5%	0.0%
	Intermediate Term	94%	6%	0.0%
	Long Term	93%	7%	0.0%
IFR (Instrument)	Existing	12%	88%	0.0%
	Short Term	11%	89%	0.0%
	Intermediate Term	10%	90%	0.0%
	Long Term	10%	90%	0.0%

Demand Characteristics

Operations, not only the total number of annual operations, but the manner in which they are conducted, have an important effect on airfield capacity. Peak operational periods, touch-and-go operations, and the percent of arrivals impact the number of annual operations that can be conducted at the airport.

- **Peak Period Operations**

For the airfield capacity analysis, average daily operations during the peak month is calculated based upon data recorded by the airport traffic control tower. These peak operational levels were previously calculated for existing and forecast levels of operations. Typical operational activity is important in the calculation of an airport's annual service level, as "peak demand" levels occur sporadically. The peak periods used in the capacity analysis are representative of normal operational activity and can be exceeded at various times through the year.

- **Touch-and-Go Operations**

A touch-and-go operation involves an aircraft making a landing and an immediate takeoff without coming to a full stop or exiting the runway. These operations are normally associated with general aviation training operations and are included in local operations data recorded by the airport traffic control tower.

Touch-and-go activity is counted as two operations, as there is an arrival and a departure involved. A high percentage of touch-and-go traffic normally results in a higher operational capacity because one landing and one take-off occurs within a shorter time than individual operations. Due to the number of training operations at the airport, touch-and-go operations were assumed to account for 45 percent of annual operations based upon the forecast period.

- **Percent Arrivals**

Under most circumstances, the lower the percentage of arrivals, the higher the hourly capacity. Except in unique circumstances, the aircraft arrival-departure split is typically 50-50. Traffic information at Redding Municipal Airport indicated no major deviations from this pattern.

CALCULATION OF ANNUAL SERVICE VOLUME

The preceding information was used in conjunction with the airfield capacity methodology developed by the FAA to determine airfield capacity for Redding Municipal Airport.

Hourly Runway Capacity

The first step in determining ASV involves the computation of the hourly capacity of each runway configuration in use. The percentage of use of each runway configuration in VFR and IFR weather, the amount of touch-and-go training activity, and the number and locations of runway exits become important factors in determining the hourly capacity of each runway configuration.

As the mix of aircraft operating at an airport changes to include an increasing percentage of Classes C and D aircraft, the hourly capacity of the runway system is also reduced. This is because larger aircraft require longer utilization of the runway for takeoffs and landings, and because the greater approach speeds of the aircraft require increased separation. There was no significant variation in this analysis, and the weighted hourly capacity remains constant.

Annual Service Volume

Once the weighted hourly capacity is known, the annual service volume can be determined. Annual service volume (ASV) is calculated by the following equation:

Annual Service Volume = C x D x H
C = Weighted hourly capacity D = Ratio of annual demand to average daily demand during the peak month H = Ratio of average daily demand to peak hour demand during the peak month

Annual service volume has been calculated for two situations. First, ASV has been calculated assuming the existing runway configuration can be used by all of the aircraft using (and expected to use) the airport. The previous master plan included a recommendation to add a parallel runway for small aircraft (under 12,500 pounds). A second calculation was prepared to examine airfield capacity in this situation.

Following this formula, the current annual service volume for Redding Municipal Airport has been estimated at 214,000 operations. Following the same formula, a calculation of annual service volume was prepared to compare airfield capacity with a parallel runway configuration. The annual service volume with a parallel runway configuration increases to 267,000 operations. It has been assumed that the parallel runway would be limited to small aircraft operations and would be available 90 percent of the time under VFR conditions. It is also assumed that Runway 12-30 would close upon construction of a parallel runway.

Delay

As the number of aircraft operations approaches the airfield's capacity, increasing amounts of delay to aircraft operations begin to occur to arriving and departing aircraft in all-weather conditions. Arriving aircraft delays result in aircraft holding outside of the airport traffic area, while departing aircraft delays result in aircraft holding at the runway end until they can safely depart.

Currently, total annual delay at the airport is estimated at 500 hours (0.3 minutes per aircraft). If no capacity improvements are made, annual delay can be expected to reach 1,070 hours (0.5 minutes per aircraft) by the long term planning horizon. Delays five to ten times the average could be experienced by individual aircraft.

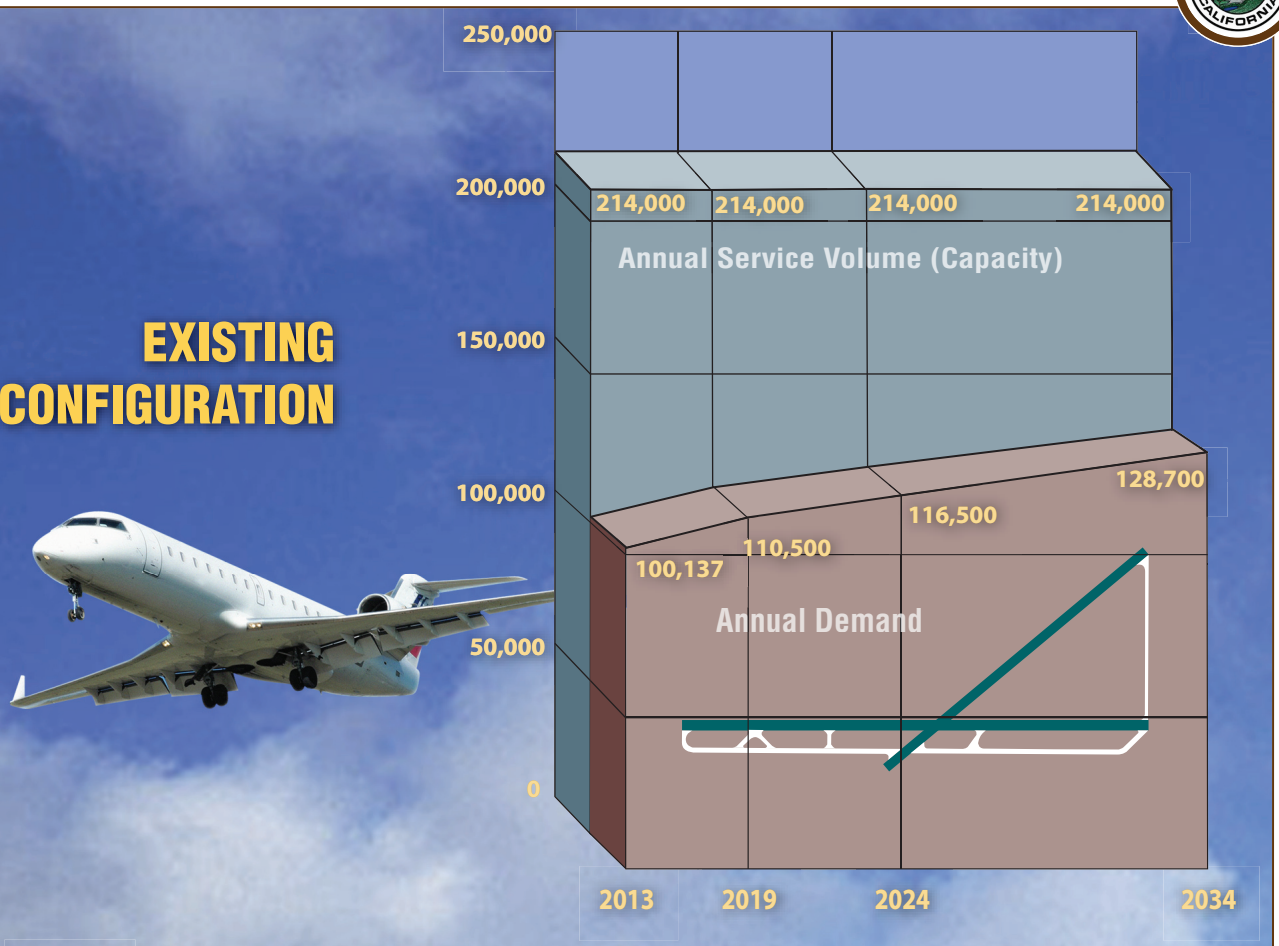
Conclusion

Table 3B and **Exhibit 3A** compare annual service volume at existing and forecast operational levels for each runway configuration. The 2013 level of 100,137 operations uses 47 percent of the annual service volume. In five years, the percentage is projected to reach 51 percent of ASV. By the end of the planning period, total annual operations are projected to represent 60 percent of annual service volume, creating additional delays to aircraft.

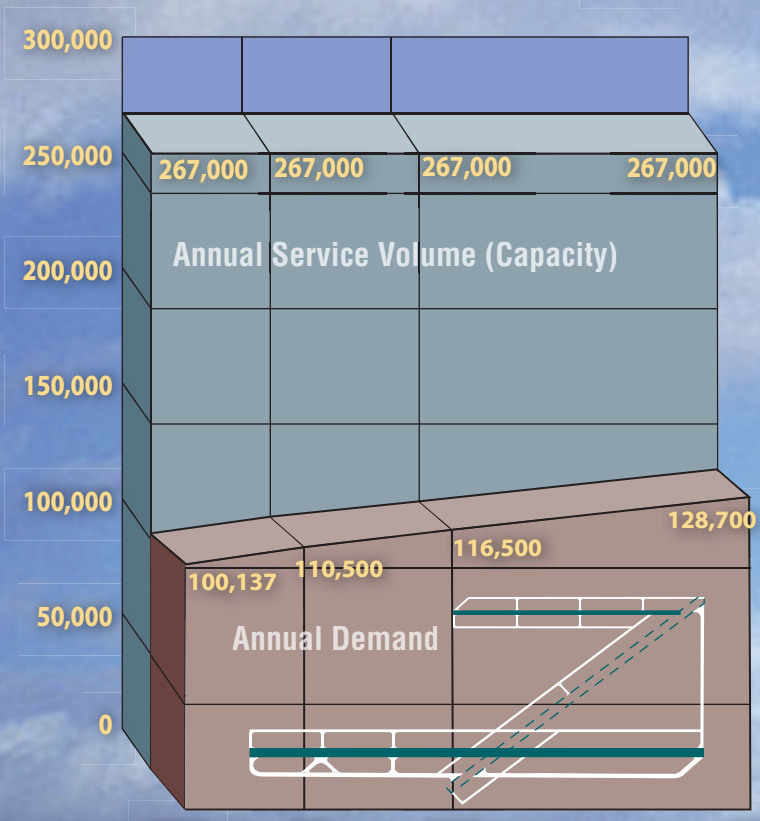
TABLE 3B
Annual Service Volume Summary
Redding Municipal Airport

	Annual Operations	Weighted Hourly Capacity	Annual Service Volume	Percent Capacity
EXISTING CONFIGURATION				
Existing (2013)	100,137	102	214,000	47%
Short Term (2019)	110,500	102	214,000	51%
Intermediate Term (2024)	116,500	102	214,000	54%
Long Term (2034)	128,700	102	214,000	60%
WITH PARALLEL RUNWAY				
Existing (2013)	100,137	127	267,000	37%
Short Term (2019)	110,500	127	267,000	41%
Intermediate Term (2024)	116,500	127	267,000	43%
Long Term (2034)	128,700	127	267,000	48%

EXISTING CONFIGURATION



WITH PARALLEL RUNWAY CONFIGURATION*



*Limited to small aircraft.

Exhibit 3A
DEMAND VS. CAPACITY SCENARIOS

FAA Order 5090.3B, *Field Formulation of the National Plan of Integrated Airport Systems* (NPIAS), indicates that improvements for airfield capacity should be considered when operations reach 60 to 75 percent of the annual service volume. This is an approximate level to begin the detailed planning of capacity improvements. Actual implementation may be deferred until such a time that the improvement is considered timely and cost-beneficial. When 80 percent of the annual service volume is reached, capacity improvement projects should become high priority capital improvements and should be addressed as soon as possible. A parallel runway configuration at Redding Municipal Airport would improve ASV, reduce future aircraft delays, and (with closure of Runway 12-30) create opportunities for a more sustainable airport operation. This would result in a net reduction of airfield pavements and provide the opportunity for more efficient expansion of aircraft hangars on the west side of the airfield.

RUNWAY LENGTH REQUIREMENTS

Runway length requirements have been developed using the FAA's computer program for determining runway length. This program groups general aviation aircraft by category and by anticipated stage length needs.

Local site-specific data for elevation, temperature, and runway gradient are used in the calculations. **Table 3C** summarizes the FAA's generalized recommended runway lengths for Redding Municipal Airport.

TABLE 3C
Runway Length Requirements
Redding Municipal Airport

AIRPORT AND RUNWAY DATA	
Airport elevation	505 feet
Mean daily maximum temperature of the hottest month	98.4° F
Maximum difference in runway centerline elevation	14 feet
Length of haul for airplanes of more than 60,000 pounds	500 miles
RUNWAY LENGTHS RECOMMENDED FOR AIRPORT DESIGN	
Small airplanes with less than 10 passenger seats	
95 percent of these small airplanes	3,300 feet
100 percent of these small airplanes	4,000 feet
Large airplanes of 60,000 pounds or less	
75 percent of large airplanes at 60 percent useful load	5,000 feet
75 percent of large airplanes at 90 percent useful load	7,500 feet
100 percent of large airplanes at 60 percent useful load	6,100 feet
100 percent of large airplanes at 90 percent useful load	9,600 feet
Airplanes of more than 60,000 pounds	5,200 feet

Reference: FAA AC 150/5325-4B, Runway Length Requirements for Airport Design.

As shown in the table, local conditions call for a runway length of 3,300-4,000 feet to accommodate small airplanes. The FAA recommends a minimum runway length of 5,000 feet for large airplanes, with

lengths as great as 9,600 feet when covering 100 percent of the fleet at 90 percent useful load. The previous master plan had considered as much as a 2,000-foot extension (to 9,000 feet) on Runway 16-34. Any runway extension will require adequate justification based upon aircraft type and frequency.

Runway length requirements for various commercial aircraft and business jets operating at Redding Municipal Airport were also examined. Based upon data available from the FAA, there were an estimated 3,629 operations (takeoffs and landings) by commercial and business aircraft at Redding Municipal Airport in 2013. The required take-off and landing lengths for maximum load and range (adjusted for temperature and elevation) for several of the business aircraft currently utilizing the airport are presented in **Table 3D**. The takeoff distance requirements reflect maximum gross weight for the aircraft. For situations when the runway length requirement exceeds the available runway length at the given design temperature, aircraft operators may be required to reduce payload.

TABLE 3D
Runway Length Requirements – Individual Aircraft Performance

Aircraft Type	Required Take-off Length (feet)	Required Landing Length (feet)
Avro RJ85	5,000	5,400
BAE Systems BAe 146-200	5,000	5,400
Bombardier Q400	5,500	6,000
Canadair Regional Jet 200	7,000	7,000
Canadair Regional Jet 700	6,700	7,300
Canadair Regional Jet 900	7,400	7,500
Cessna 525 Citation	4,200	3,700
Cessna 550 Citation Bravo	4,300	4,300
Cessna 560 Citation Excel	4,600	4,500
Dassault Falcon 2000	6,700	3,800
Embraer Brasilia 120	6,500	6,500
Embraer 170/175	6,200	6,000
Embraer 190/195	6,700	6,200
Gulfstream G-IV	6,400	3,400
Hawker 400XP	5,000	5,000
Hawker 800XP	6,900	4,700
Israel IAI-1124	5,000	2,600
Learjet 31A	4,500	4,100
Learjet 35A	6,300	3,700
Learjet 45	5,600	3,800
Learjet 60	6,900	4,900

Source: Aircraft Manufacturers. Elevation: 505 ft. MSL, 98.4 ºF, Dry Runway, Maximum Load and Range.

Based upon the FAA's design software and the individual aircraft performance data, Runway 16-34 meets the requirements for the majority of the aircraft currently operating at the airport. It is also important to note that some commercial and business aircraft may experience payload and/or fuel limitations when attempting longer stage lengths during the warmest summer days.

RUNWAY WIDTH

The width of each of the existing runways was also examined to determine the need for facility improvements. Currently, both of the runways at Redding Municipal Airport are 150 feet wide. This width is adequate for the current and projected future aircraft mix. Therefore, no additional runway width is required to serve aircraft expected to operate at the airport through the planning period.

RUNWAY PAVEMENT STRENGTH

The most important feature of airfield pavement is its ability to withstand repeated use by aircraft of significant weight. The current strength ratings are sufficient for the fleet of aircraft currently serving and expected to serve the airport in the future.

It should be noted that the pavement strength rating is not the maximum weight limit. Aircraft weighing more than the certified strength can operate on the runway on an infrequent basis. However, heavy aircraft operations can shorten the life span of airport pavements.

RUNWAY LINE-OF-SIGHT AND GRADIENT

FAA has instituted various line-of-sight requirements to facilitate coordination among aircraft and between aircraft and vehicles that are operating on active runways. This allows departing and arriving aircraft to verify the location and actions of other aircraft and vehicles on the ground that could create a conflict.

Line-of-sight standards for an individual runway are based on whether there is a parallel taxiway available. If a parallel taxiway is available (as it is on Runway 16-34), thus facilitating faster runway exit times, then any point five feet above the runway centerline must be mutually visible, with any other point five feet above the runway centerline that is located at a distance of less than half the length of the runway. If a parallel taxiway is not available (as it is not on Runway 12-30), then these points must be mutually visible over the length of the entire runway.

Both runways meet the line-of-sight standard.

The runway gradient is the maximum allowable slope for a runway. For Runway 16-34, the standard is no more than 1.5 percent. The runway slopes upward from the south end to the north end at a grade of 0.2 percent.

The maximum allowable gradient for Runway 12-30 is also 1.5 percent. The gradient is also 0.2 percent.

Both runways meet gradient standard, which should be maintained.

TAXIWAY DESIGN STANDARDS

The design standards associated with taxiways are determined by the taxiway design group (TDG) and the airplane design group (ADG) of the critical design aircraft that would potentially use that taxiway. **Table 3E** presents the taxiway design standards to be applied at the Airport.

TABLE 3E
Taxiway Design Standards

Standards Based on Wingspan (ADG)	ADG III
Taxiway Protection	
Taxiway Safety Area (TSA) width	118'
Taxiway Object Free Area (TOFA) width	186'
Taxilane Object Free Area width	162'
Taxiway Separation	
Taxiway Centerline to:	
Parallel Taxiway/Taxilane	152'
Fixed or Movable Object	93'
Taxilane Centerline to:	
Parallel Taxilane	140'
Fixed or Movable Object	81'
Wingtip Clearance	
Taxiway Wingtip Clearance	34'
Taxilane Wingtip Clearance	27'
Standards Based on TDG	**TDG 3**
Taxiway Width Standard	50'
Taxiway Edge Safety Margin	10'
Taxiway Shoulder Width	20'

ADG: Airplane Design Group
TDG: Taxiway Design Group
Source: FAA AC 150/5300-13A, Airport Design

Taxiway Width Standards

The design aircraft for the Airport and for primary Runway 16-34 falls in classification C-III-3; therefore, the taxiways that may potentially support aircraft within TDG-3 should be at least 50 feet wide.

Any potential changes to the width of existing taxiways will be considered in the Alternatives chapter. Any new taxiways should be planned at standard widths.

Other Taxiway Design Considerations

FAA AC 150/5300-13A, *Airport Design*, provides guidance on taxiway design that has a goal of enhancing safety by providing a taxiway geometry that reduces the potential for runway incursions. A runway incursion is defined as, "any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft."

The following is a list of the taxiway design guidelines and the basic rationale behind each recommendation:

1. **Taxi Method**: Taxiways are designed for "cockpit over centerline" taxiing, with pavement being sufficiently wide to allow a certain amount of wander. On turns, sufficient pavement should be provided to maintain the edge safety margin from the landing gear. When constructing new taxiways, upgrading existing intersections should be undertaken to eliminate judgmental oversteering, which is when the pilot must intentionally steer the cockpit outside the marked centerline in order to assure the aircraft remains on the taxiway pavement.

2. **Steering Angle**: Taxiways should be designed such that the nose gear steering angle is no more than 50 degrees, the generally accepted value to prevent excessive tire scrubbing.

3. **Three-Node Concept**: To maintain pilot situational awareness, taxiway intersections should provide a pilot a maximum of three choices of travel. Ideally, these are right and left angle turns and a continuation straight ahead.

4. **Intersection Angles**: Design turns to be 90 degrees wherever possible. For acute angle intersections, standard angles of 30, 45, 60, 120, 135, and 150 degrees are preferred.

5. **Runway Incursions**: Design taxiways to reduce the probability of runway incursions.
   - *Increase Pilot Situational Awareness*: A pilot who knows where he/she is on the airport is less likely to enter a runway improperly. Complexity leads to confusion. Keep taxiway systems simple using the "three node" concept.
   - *Avoid Wide Expanses of Pavement*: Wide pavements require placement of signs far from a pilot's eye. This is especially critical at runway entrance points. Where a wide expanse of pavement is necessary, avoid direct access to a runway.
   - *Limit Runway Crossings*: The taxiway layout can reduce the opportunity for human error. The benefits are twofold – through simple reduction in the number of occurrences, and through a reduction in air traffic controller workload.
   - *Avoid "High Energy" Intersections*: These are intersections in the middle third of runways. By limiting runway crossings to the first and last thirds of the runway, the portion of the runway where a pilot can least maneuver to avoid a collision is kept clear.
   - *Increase Visibility*: Right angle intersections, both between taxiways and runways, provide the best visibility. Acute angle runway exits provide for greater efficiency in runway usage, but should not be used as runway entrance or crossing points. A right angle turn at the end of a parallel taxiway is a clear indication of approaching a runway.
   - *Avoid "Dual Purpose" Pavements*: Runways used as taxiways and taxiways used as runways can lead to confusion. A runway should always be clearly identified as a runway and only a runway.
   - *Indirect Access*: Do not design taxiways to lead directly from an apron to a runway. Such configurations can lead to confusion when a pilot typically expects to encounter a parallel taxiway.
   - *Hot Spots*: Confusing intersections near runways are more likely to contribute to runway incursions. These intersections must be redesigned when the associated runway is subject to reconstruction or rehabilitation. Other hot spots should be corrected as soon as practicable.

6. **Runway/Taxiway Intersections**:
   - *Right Angle*: Right angle intersections are the standard for all runway/taxiway intersections, except where there is a need for a high-speed exit. Right angle taxiways provide the best visual perspective to a pilot approaching an intersection with the runway to observe aircraft in both the left and right directions. They also provide optimal orientation of the runway holding position signs so they are visible to pilots.
   - *Acute Angle*: Acute angles should not be larger than 45 degrees from the runway centerline. A 30-degree taxiway layout should be reserved for high-speed exits. The use of multiple intersecting taxiways with acute angles creates pilot confusion and improper positioning of taxiway signage.
   - *Large Expanses of Pavement*: Taxiways must never coincide with the intersection of two runways. Taxiway configurations with multiple taxiway and runway intersections in a single area

create large expanses of pavement, making it difficult to provide proper signage, marking, and lighting.

7. **Taxiway/Runway/Apron Incursion Prevention**: Apron locations that allow direct access into a runway should be avoided. Increase pilot situational awareness by designing taxiways in such a manner that forces pilots to consciously make turns. Taxiways originating from aprons and forming a straight line across runways at mid-span should be avoided.
   - *Wide Throat Taxiways*: Wide throat taxiway entrances should be avoided. Such large expanses of pavement may cause pilot confusion and makes lighting and marking more difficult.
   - *Direct Access from Apron to a Runway*: Avoid taxiway connectors that cross over a parallel taxiway and directly onto a runway. Consider a staggered taxiway layout that forces pilots to make a conscious decision to turn.
   - *Apron to Parallel Taxiway End*: Avoid direct connection from an apron to a parallel taxiway at the end of a runway.

FAA AC 150/5300-13A, *Airport Design,* states that, "existing taxiway geometry should be improved whenever feasible, with emphasis on designated hot spots. To the extent practicable, the removal of existing pavement may be necessary to correct confusing layouts."

The Alternatives chapter will examine possible taxiway geometry changes that would improve pilot situational awareness and reduce potential pilot confusion. Any changes will consider the reasonableness of each alternative in terms of cost and benefit.

Taxilane Design Considerations

Taxilanes are distinguished from taxiways in that they do not provide access to or from the runway system directly. Taxilanes typically provide access to hangar areas. As a result, taxilanes can be constructed to varying design standards depending on the type of aircraft utilizing the taxilane. For example, a taxilane leading to a T-hangar area only needs to be designed to accommodate those aircraft typically accessing a T-hangar.

The taxilanes at the Airport are those pavements between hangars. Any future taxilanes will be considered in the Alternatives chapter and will be planned to the appropriate design standard.

INSTRUMENT NAVIGATIONAL AIDS AND APPROACH LIGHTING

Instrumentation for runways is important when weather conditions are less than visual (greater than three-mile visibility and 1,000-foot cloud ceilings). Instrumentation can be classified as precision, non-precision, and visual.

The Airport has a sophisticated precision ILS (CAT-I) instrument approach to Runway 34. This approach provides for visibility minimums as low as ½-mile and cloud ceilings down to 200 feet. The combina-

tion of a glide slope antenna, localizer antenna, and approach lighting system form the ILS. The ILS provides near all-weather capability for the Airport and should be maintained.

The instrument approach to Runway 16 with the lowest visibility minimum is the localizer back course (LOC/DME BC) approach which provides one mile visibility with 500-foot cloud ceilings. Advancements in GPS technology could lead to better minimums for approaches to Runway 16. Localizer Performance with Vertical Guidance (LPV) and Required Navigation Performance (RNP) approaches are reaching ¾-mile visibility minimums.

Approach lighting systems provide the basic means to transition from instrument flight to visual flight for landing. Runway 34 is equipped with a medium intensity approach lighting system with runway alignment indicator lights (MALSR).

To provide pilots with visual guidance information during landings to the runway, electronic visual approach aids are commonly provided at airports. Currently, Runway 16 has a four-light visual approach slope indicator (VASI-4), while Runway 34 is equipped with a four-light precision approach path indicator (PAPI-4). Runway 30 is equipped with a two-light PAPI-2. As most airports are replacing older VASIs with the PAPI system, consideration should continue to be given to replacing the existing VASI-4 on Runway 16 with a PAPI-4, which is less costly to maintain and operate. A shorter runway for small aircraft should be planned with two-light PAPI-2 systems.

AIRFIELD MARKING, LIGHTING AND SIGNAGE

Runway markings are designed according to the type of instrument approach available on the runway. Runway 16-34 has the necessary markings for the instrument landing system (ILS) and global positioning systems (GPS) which serve the runway, while non-precision markings exist on Runway 12-30. A shorter runway used exclusively by small aircraft should have basic markings for visual operations.

TERMINAL BUILDING AND AUTO PARKING REQUIREMENTS

The existing terminal building at Redding Municipal Airport is a two-story building, originally constructed in 1981 and recently expanded. While the gross building area is approximately 32,000 square feet, the functional areas on the first floor, which are used for passenger processing functions, are only two-thirds of the total area (with additional area on the second floor used for restaurant and administration offices). Gross estimates of future terminal building needs in the functional areas can be useful in providing a general overview of the existing facility's adequacy in meeting demand.

The requirements for the various terminal complex functional areas were examined with the guidance of FAA Advisory Circular 150/5360-13, *Planning and Design Guidelines for Airport Terminal Facilities*. **Table 3F** summarizes the terminal area space needs for the projected enplanement levels. Only functional areas on the first floor are reflected in this analysis. As reflected in the table, future terminal area needs do not increase through the planning period based upon the selected enplanements planning forecast. However, if the Airport is successful in recapturing market share, the sizing of functional areas may need to be reexamined at a future date.

Aircraft gate positions are considered to be adequate through the planning period—in addition to the parking positions in front of the terminal, five additional hard stand positions are available to overnighting (RON) aircraft on the south ramp.

Future auto parking requirements have been estimated based upon growth in passenger enplanements, and are not expected to create demands in excess of available capacity. However, land area is available adjacent to existing parking lot for expansion if required. The available curb frontage will also meet the requirements of peak passenger traffic.

TABLE 3F
Terminal Building and Parking Requirements
Redding Municipal Airport

Functional Area (s.f.)	Existing Facility	Projected Enplanement Thresholds		
		Short Term	Intermediate Term	Long Term
Ticket Lobby/Counter Area	1,700	1,300	1,400	1,500
Airline Operations/Bag Make-up	2,100	2,500	2,500	2,500
Holdroom Area	3,500	1,800	2,000	2,300
Bag Claim Lobby	1,700	2,000	2,300	2,900
Vending/Concessions (1st Floor)	500	2,000	2,000	2,000
Restrooms (1st Floor)	1,000	1,000	1,100	1,200
Rental Car Office/Queue Area	500	1,400	1,500	1,600
Security Stations/Queuing Area	2,200	1,500	1,700	2,000
General Public Circulation Area	7,300	2,000	3,000	4,000
Total Terminal Functional Areas	**20,500**	**15,500**	**17,500**	**20,000**
Total Parking Spaces	**430**	**400**	**420**	**450**

Source: Terminal Building Plan and Aerial Photography.

AIR CARGO REQUIREMENTS

The primary cargo-related facilities requiring analysis include the cargo apron, sort building space, and staging area (delivery truck and vehicle parking). Currently, West Air/FedEx operates from a dedicated facility south of the terminal building. Ameriflight/UPS operate their aircraft/sort on the itinerant aircraft ramp, with no dedicated cargo sort facility. Both operators utilize smaller commuter-type turboprop aircraft.

The cargo apron area requirements are based on the current and projected aircraft type to be utilized in air cargo service at the Airport. As presented in the previous chapter, no significant change from the current mix of aircraft is anticipated; in fact, the total landings by air cargo aircraft have declined over the past few years. Apron space requirements are estimated at 800 square yards per aircraft. Based upon current frequency of daily operations, the current apron at FedEx meets the aggregate apron size requirement. However, the other cargo operations operate on the itinerant ramp and the air cargo sorts for these operators are not being segregated from other users.

Estimates of the appropriate size of air cargo sort facilities are based upon national industry standards and vary based upon local conditions. For planning purposes, eight square feet per ton is utilized, which results in a current need for 11,840 square feet of sort facilities. The current FedEx facility provides approximately 13,200 square feet.

To accommodate the loading and unloading of aircraft, additional space is necessary for the movement of delivery trucks and equipment. This space is called the staging area and is measured in acres and is estimated at three times the forecast building size. **Table 3G** presents the requirements needed to fully accommodate air cargo activity at the Airport.

TABLE 3G
Air Cargo Facility Requirements
Redding Municipal Airport

	Available	Short Term	Intermediate Term	Long Term
Enplaned Cargo (lbs.)	1,480,000	1,728,000	1,839,000	2,077,000
Cargo Apron (s.y.)	5,000	4,000	4,800	5,600
Cargo Building (s.f.)	13,200	13,800	14,700	16,600
Staging Area (acres)	0.9	1.0	1.0	1.1

Assumptions:
Apron: 800 s.y. per daily aircraft flight
Building: 8 s.f. per 1,000 enplaned pounds
Staging Area: 3 times building size
Source: Coffman Associates analysis

AIRCRAFT STORAGE, MAINTENANCE, FUELING AND APRON REQUIREMENTS

The demand for aircraft storage hangar area is based upon the forecast number and mix of aircraft expected to be based at Redding Municipal Airport in the future. Approximately 75 percent of based aircraft are currently stored in hangars. This percentage has been applied to forecasts of total based aircraft, with 100 percent of multi-engine, jets, and helicopters assigned to storage hangars. Requirements are calculated using 1,200 square feet per single engine aircraft and 3,000 square feet per multi-engine aircraft (including jet aircraft and helicopters). Maintenance area requirements are based upon 15 percent of total storage area needs.

Future hangar requirements for the airport are summarized in **Table 3H**. As shown in the table, additional hangar area will be required before the end of the planning period. The landside alternatives evaluation will examine the options available for hangar development at the airport and determine the best location for each type of hangar facility.

TABLE 3H
Hangar and Apron Requirements
Redding Municipal Airport

	Currently Available	Short Term Need	Intermediate Term Need	Long Term Need
Aircraft To Be Hangared	156	178	188	209
Single Engine	106	119	121	126
Multi-Engine, Jet, Helicopter	50	59	67	83
Hangar Area Requirements (s.f.)				
T-Hangar/Port-a-Port Area	183,000	143,000	145,000	151,000
Executive/Conventional Area	205,000	177,000	201,000	378,000
Maintenance Area	N/A	48,000	52,000	79,000
Total Hangar Area (s.f.)	**388,000**	**368,000**	**398,000**	**608,000**

A parking apron should provide for the number of locally based aircraft that are not stored in hangars, as well as for those aircraft used for air taxi and training activity. Parking should be provided for itinerant aircraft as well. Approximately 75 percent of based aircraft at Redding Municipal Airport are currently stored in hangars, with the remainder occupying tie-down positions. The IASCO flight training aircraft (which are locally based) use the itinerant ramp for tie-down apron. This apron also shares space with the UPS sorting operation.

For planning purposes, 30 percent of the based aircraft total will be used to determine the parking apron requirements of local aircraft, due to some aircraft requiring both hangar storage and parking apron space. Since the majority of locally based aircraft are stored in hangars, the area requirement for parking locally based aircraft is smaller than for transient aircraft. Therefore, a planning criterion of 650 square yards per aircraft was used to determine the apron requirements for local aircraft.

Transient aircraft parking needs must also be considered when determining apron requirements. A planning criterion of 800 square yards was used for single and multi-engine itinerant aircraft and 1,600 square yards for itinerant jets. Total aircraft parking apron requirements are presented in **Table 3J**. While the total number of tie-down positions is expected to be sufficient through the planning period, an increase in apron area is projected. This can be attributed to the fact that the current square footage per aircraft parking position is much lower than the planning standards used for the forecasts.

Consideration should be given to relocation/replacement of underground fuel tanks. The current capacity should be increased (when consideration is given to replacement) if the Airport/FBO is unable to maintain an adequate 14-day reserve of AvGas or Jet A on the airfield.

All-weather perimeter roads on the airfield provide for the segregation of authorized vehicles from operational areas; therefore, during the alternatives evaluations, perimeter roads should be considered.

TABLE 3J
General Aviation Aircraft Parking Apron Requirements
Redding Municipal Airport

	Currently Available	Short Term	Intermediate Term	Long Term
Single, Multi-Engine Transient Aircraft Positions		10	15	20
Apron Area (s.y.)		8,000	12,000	16,000
Transient Jet Aircraft Positions		6	6	6
Apron Area (s.y.)		10,000	10,000	10,000
Locally Based Aircraft Positions		71	75	83
Apron Area (s.y.)		46,000	49,000	54,000
Total Positions	**150**	**87**	**96**	**109**
Total Apron Area (s.y.)	**43,000**	**64,000**	**71,000**	**80,000**

SUMMARY

This chapter has outlined facility requirements for Redding Municipal Airport for a 20-year planning period, and outlined some of the planning criteria that will need to be examined in the following chapter with regard to runway, taxiway, and taxilane locational placement. The purpose of this section is to consider the actual physical facilities which are needed to accommodate projected demand and to meet the program requirements.

AIRSIDE FACILITIES

The runway analysis indicated a potential need for a parallel runway configuration which would better meet the needs of aircraft currently operating at the airport. This would have the added benefit of reducing the amount of pavement that would need rehabilitation in future years, and minimize or delay the need for additional infrastructure to support apron and storage hangars on the east side (by providing expansion capability on the west side of the airfield after closure of Runway 12-30).

Runway 16-34

At its current length of 7,003 feet, Runway 16-34 meets the needs of the majority of commercial carriers and firefighting operators currently utilizing Redding Municipal Airport. In the future, some aircraft

may require additional runway length. However, the need for an extension will be aircraft-specific and require FAA-approved justification.

Parallel Runway

The runway analysis indicated that the airfield would be better served with a parallel runway configuration (in lieu of the existing intersecting configuration). This would provide for separation between lighter aircraft traffic (such as training operations) and heavier commercial or firefighting aircraft.

The recommended runway length for small aircraft (less than 12,500 pounds) would be in the range of 3,300-4,000 feet. This length would allow the runway to handle training operations and operations by other small aircraft, thus increasing the availability of existing Runway 16-34 in peak periods for heavier traffic. Consideration will also need to be given to the separation distance between the runways. Considerable helicopter training activity takes place on the airfield and proper areas need to be reserved for this activity.

LANDSIDE FACILITIES

With recent expansion of the terminal building, the Airport is well-positioned to meet the needs of scheduled passenger traffic and charter activity. A major goal of the Airport at the present time is to enhance air service and destination opportunities for local residents. The aircraft parking areas and auto parking areas have adequate capacity to meet growth in passenger demands, even with significant recapture of the passenger market.

While one of the existing air cargo companies has a segregated sort facility and adequate capacity for growth, other air cargo activity is being handled on the itinerant aircraft parking ramp. Consideration needs to be given for better segregation of the sort operation from other itinerant and local general aviation users.

Parking and hangar requirements are projected to increase over the planning period and consideration will need to be given to the best locations for various users. Generally, smaller individual T-hangars are segregated from larger commercial hangars and areas are chosen to provide the greatest flexibility for expansion configurations.

The following chapter will consider various airside and landside layouts for consideration by the Planning Advisory Committee and the City of Redding.

Chapter Four

AIRPORT DEVELOPMENT ALTERNATIVES

AIRPORT DEVELOPMENT ALTERNATIVES

In the previous chapter, airside and landside facilities required to satisfy the demand through the long range planning period were identified. The next step in the planning process is to evaluate reasonable ways these facilities can be provided. There can be numerous combinations of design alternatives, but the alternatives presented here are those with the perceived greatest potential for implementation.

Any development proposed for a Master Plan evolves from an analysis of projected needs for a set period of time. Though the needs were determined by utilizing industry accepted statistical methodologies, unforeseen future events could impact the timing of the needs identified. The master planning process attempts to develop a viable concept for meeting the needs caused by projected demands for the next 20 years. However, no plan of action should be developed which may be inconsistent with the future goals and objectives of the City of Redding, which has a vested interest in the development and operation of the Airport.

The development alternatives for Redding Municipal Airport can be categorized into two functional areas: the airside (runways, navigational aids, taxiways, etc.) and landside (hangars, apron, and terminal area). Within each of these areas, specific capabilities and facilities are required or desired. In addition, the utilization of airport property to provide revenue support for the airport and to benefit the economic development and well-being of the region must be considered.

Each functional area interrelates and affects the development potential of the others. Therefore, all areas are examined individually and then coordinated as a whole to ensure that the final plan is functional, efficient, and cost-effective. The total impact of all these factors on the existing Airport must be

evaluated to determine if the investment in Redding Municipal Airport will meet the needs of the community, both during and beyond the 20-year planning period.

The alternatives considered are compared using environmental, economic, and aviation factors to determine which of the alternatives will best fulfill the local aviation needs. With this information, as well as input from various airport stakeholders, a final airport concept can evolve into a realistic development plan.

AIRPORT DEVELOPMENT OBJECTIVES

It is the goal of this effort to produce a balanced development plan to best serve forecast aviation demands. However, before defining and evaluating specific alternatives, airport development objectives should be considered. As owner and operator, the City of Redding provides the overall guidance for the operation and development of the Airport. It is of primary concern that the Airport is marketed, developed, and operated for the betterment of the community and its users. With this in mind, the following development objectives have been defined for this planning effort:

- To research and evaluate socioeconomic factors likely to affect the air transportation demand in the region.
- To determine the projected facility needs of airport users through the year 2034, by which to support airport development alternatives.
- To recommend improvements that will enhance the airport's safety capabilities to the maximum extent possible.
- To evaluate a future parallel Runway 16L-34R, as well as the potential closure of Runway 12-30.
- To recommend improvements that will enhance airport capacity to the maximum extent.
- To produce current and accurate airport base maps and Airport Layout Plans.
- To establish a schedule of development priorities and a program for the improvements proposed in the Master Plan.
- To prioritize the airport capital improvement program and develop a detailed financial plan.
- To develop a robust and productive public involvement throughout the planning process.

REVIEW OF THE PREVIOUS AIRPORT PLAN

The last Master Plan was adopted by the City of Redding on June 21, 2005, and included data gathered and analyzed from 2002 to 2004. **Table 4A** is a summary of the major findings addressed in the alternatives chapter of the 2005 Master Plan. **Exhibit 4A** presents the previous master plan concept that resulted from the 2005 master planning effort and a subsequent Airport Layout Plan (ALP) update in 2010.

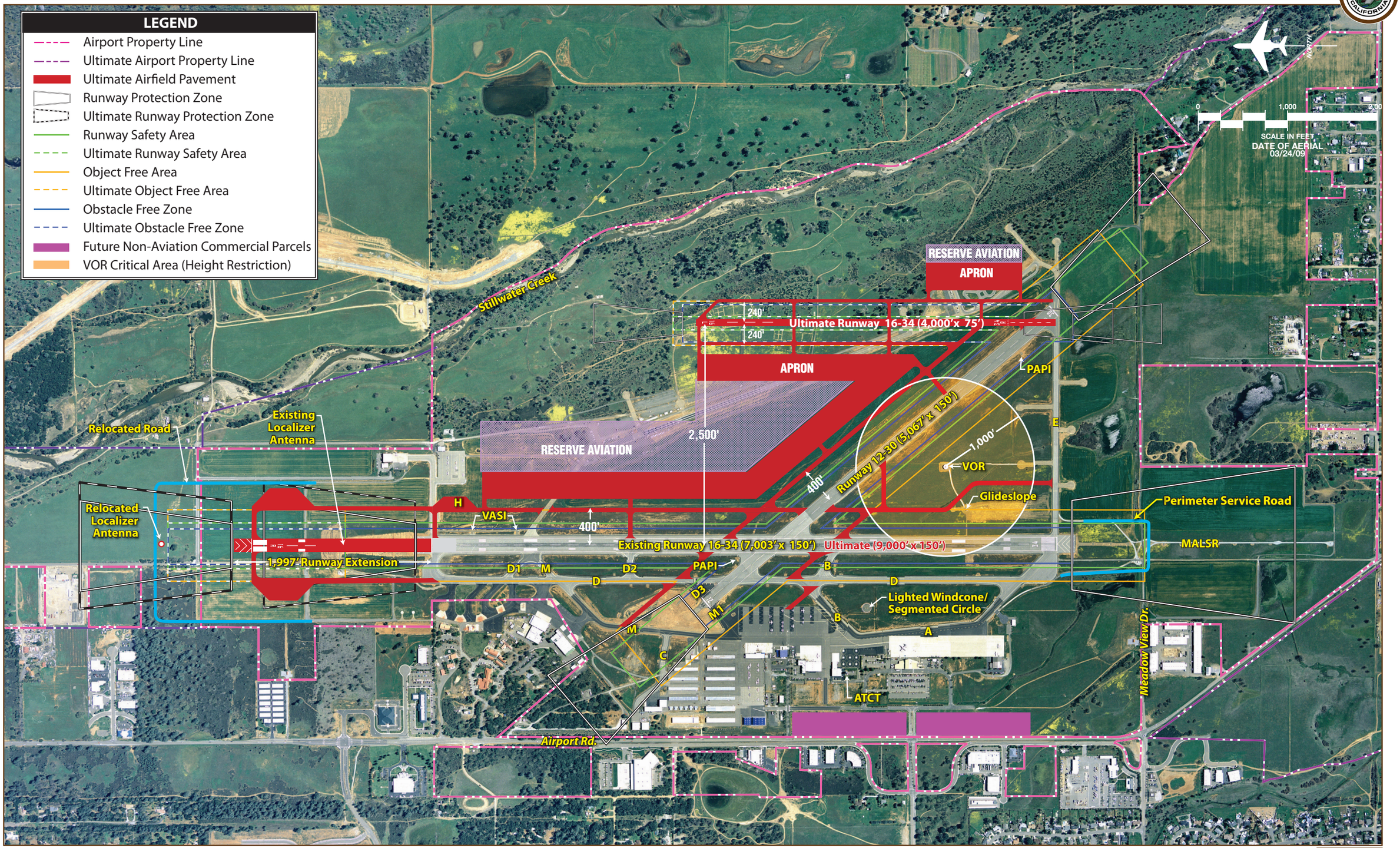


Exhibit 4A
PREVIOUS MASTER PLAN CONCEPT

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TABLE 4A
Summary of Capital/Program Conclusions from 2005 Master Plan
Redding Municipal Airport

Facility/Program	Conclusion
Runways	Provide for extension of Runway 16-34 to 9,000 feet. Retain Runway 12-30 at existing length. Provide for future parallel runway (16L-34R) of 4,000 feet at separation distance of 2,500 feet from Runway 16-34.
Taxiways	Provide parallel taxiways for existing/future runway system and exit taxiways to increase airfield capacity.
Airfield Navigational Aids	Relocate navigational aids upon extension of Runway 16-34 .
Airfield Markings	Existing adequate. Future pavements to be appropriately striped.
Transient Aircraft Parking	Provide for expanded transient apron as required.
Based Aircraft Apron/Tie-downs	Provide for expanded local apron as required.
Based Aircraft Hangars	Limited in-fill available on west side. Provide for east side expansion.
Aircraft Fueling	Reserve area for fuel farm expansion in current location.
Helicopter Facilities	Maintain existing helipad and parking positions on west side.
Maintenance Facilities	Reserve area for facility expansion near current facility.
ARFF Facilities	Program capital funds for replacement facility.
Landside Development	Short Term – Terminal building expansion and Municipal Blvd. extension. Intermediate – Executive hangars, roadway and utility extensions, parking expansion, and equipment replacement. Long Term – Apron and roadway extensions, hangar expansion.
Airport Access	Access to be extended into new development areas.
Pavement Maintenance	Short Term – Rehabilitation of Taxiways A and B, T-hangar taxiway, airport access roads, and GA apron. Intermediate/Long Term – Rehabilitation of airfield pavements.
Land Acquisition/Easements	Land acquisition needs identified for approach protection.

Source: 2005 Airport Master Plan, Coffman Associates.

RUNWAYS

The 2005 Master Plan concluded that Runway 16-34 met the requirements of aircraft in the current operational fleet, although a small number of aircraft may experience payload and/or fuel limitations. It was concluded that long range planning should consider a potential length of 9,000 feet, while retaining the precision instrument approach on Runway 34. Runway 12-30 was retained, while a parallel runway (16L-34R) was recommended at a 2,500-foot separation from the primary runway to provide "simultaneous instrument approach capability" and aviation-related development potential between the parallel runways (Note: Current rules as outlined in AC 150/5300-13A only allow simultaneous radar-controlled approach and departure or radar-controlled departures with a 2,500-foot separation. This separation requirement may be reduced by 100 feet for each 500 feet of runway threshold stagger if the radar-controlled approach is too the near runway threshold).

TAXIWAYS

Several recommendations were made regarding the taxiway system at the Airport. A parallel taxiway was planned at a separation distance of 400 feet to be located on the east side of Runway 16-34. This taxiway would provide access to both thresholds of the runway. At the south end of the runway, it would be necessary to flare the taxiway at a greater separation distance from the runway to avoid the glideslope critical area.

A full-length parallel taxiway was recommended for Runway 12-30 on the north side of the runway and a partial parallel taxiway was shown on the south side (limited by the location of the current VOR facility). A high-speed exit was provided on Runway 30 at mid-runway, and the parallel taxiways would serve as high-speed exits for Runway 34 on either side of the runway crossing.

AIRFIELD NAVIGATIONAL AIDS

No additional navigational aids were recommended, although any extension to Runway 16-34 will require relocation of the localizer antenna and perimeter roads.

LANDSIDE DEVELOPMENT

The previous Master Plan considered some in-filling of conventional, executive, and T-hangars on the west side, although development areas were limited. Most long-term hangar development was tied to development of new areas on the east side of the airfield. In conjunction with this potential development, new access roads were proposed to access the new development areas.

Terminal expansion and public parking expansion were also recommended. Boarding areas were shown pushing onto the ramp, while building expansion was proposed on the south side of the current building. The public parking expansion was depicted on both the north and south ends of the current lot, with additional employee parking depicted on the south side of the terminal building.

PAVEMENT MAINTENANCE

Rehabilitation of Taxiways A and B, the T-hangar taxiway, access roads, and the GA apron were identified as short-term needs. In the intermediate and long-term period, other airfield pavements were identified for maintenance.

NO ACTION/RELOCATION ALTERNATIVES

The City of Redding is charged with managing the Airport for the economic betterment of the community and region. Previous strategic planning undertaken for the Airport has identified several strengths

of the region, including: availability of labor force, interstate access, utility supply (water and low cost electricity), and the quality of life in the Redding area. To pursue a "no action" alternative for the Airport effectively reduces the quality of services being provided to the general public and affects the region's ability to support commercial and general aviation needs. Past studies have also documented that the Airport provides substantial economic benefit to the region through on-airport economic activity, capital projects, employment and earnings, and air visitors.

The Airport also serves as a vital link in the overall National Airport System, which is important for both economic development and national security. The "no action" alternative is also inconsistent with the long term goals of the Federal Aviation Administration (FAA) and Caltrans, which are to enhance local and interstate commerce. Therefore, an overall "no action" alternative is not considered further in this Master Plan.

Likewise, this study will not consider the relocation of services to another airport or development of a new airport site as viable alternatives. The development of a new commercial service airport is a very complex and expensive option. A new site will require significant land area, duplication of investment in airport facilities, installation of supporting infrastructure that is already available at the existing site, and greater potential for negative impacts to natural, biological, and cultural resources.

AIRSIDE PLANNING ALTERNATIVES

Generally, airside issues relate to those elements that contribute to the safe and efficient transition of aircraft and passengers from air transportation to the landside facilities at the Airport. This includes the established design standard for the Airport and runways, the instrument approach capability, the capacity of the airfield, the length and strength of the runways, and the layout of the taxiways. Each of these elements was introduced in the previous chapters and is summarized as follows:

- The Airport's current design aircraft fall within the AAC/ADG C-III category, represented by the Boeing 737, Bae-146, Embraer 170, or the Bombardier Q400. However, future planning should not preclude the future capability of the Airport to accommodate ARC D-IV.
- The 16-34 runway orientation provides 99.5 percent wind coverage in all-weather and instrument flight rules (IFR) conditions. While the annual operations on the airfield currently represent approximately 50 percent of capacity, a parallel runway configuration (assuming closure of Runway 12-30) would enhance safety and create opportunities for a more sustainable airfield operation.
- Every effort should be made to preserve the instrument landing system (and current visibility minimums) to Runway 34 while encouraging the establishment of an improved approach to Runway 16.
- All taxiway geometry should be improved whenever feasible, consistent with FAA Advisory Circular 150/5300-13A, *Airport Design*.

Exhibit 4B presents a summary of the primary airside and landside planning issues to be considered. Proper placement location for a parallel runway is noted as the first item under airfield considerations since this will play a key role in future aviation-related development opportunity on the airfield. Upon opening of the parallel runway, it will be possible to close Runway 12-30 and allow additional hangar development on the west side. Every effort should be taken on the east and south sides of the airport to avoid unnecessary impacts to the Stillwater Creek corridor or near wetlands and vernal pools on airport property. In addition, the location of the VOR facility and other navaid facilities will need to be protected from possible interference from new building construction. While the previous chapter did not project the need for a runway extension within this planning period, the area north of Runway 16-34 should be protected for a potential 2,000-foot extension should justification be provided at a future date.

Not all airside or landside elements will require a detailed alternatives analysis. The alternatives analysis is reserved for presenting viable solutions to specific problems. For those airside or landside elements where only one solution is reasonable or where no alternative is necessary, an explanatory narrative will be provided.

RUNWAY 16L-34R

Runway 16L-34R is the proposed parallel general aviation runway – to serve a minimum of 95 percent of the general aviation fleet (with less than 10 seats) the runway should be a minimum of 3,300 feet long and 75 feet wide. To serve 100 percent of the general aviation fleet, it should be 4,000 feet long and 75 feet wide. However, if the runway is to eventually serve as a back-up to the primary runway for regional jet operations, it would be preferable to have the capability of extending the runway to 5,000 feet. The 2005 Airport Master Plan recommended placement of a 4,000-foot runway at a 2,500-foot separation from Runway 16-34, with the south threshold of the runway located at Taxiway E. This would allow for runway safety areas and runway protection zones to remain on existing airport property. Each end of the runway would have an elevation of approximately 490 feet MSL, which is consistent with elevations on the existing airfield. However, development along the east side of the runway/taxiway system would be limited unless areas along Stillwater Creek were filled and graded to a higher elevation. The 2005 master plan concept reflected only a small amount of ramp/aviation-related development along the east side of the runway to minimize potential impact on the Stillwater Creek corridor. The most efficient areas for aviation-related development would be between the parallel runways and north of Taxiway E. Any development south of Taxiway E would potentially impact wetlands and vernal pools; therefore, these development areas were minimized.

The 16-34 runway orientation provides 99.5 percent coverage in all-weather and instrument conditions, reducing the underlying justification for maintaining Runway 12-30 with the addition of a parallel runway in the 16-34 orientation. With closure of Runway 12-30, additional development area becomes available between the runways as well as on the west side, where expansion of hangar development has been restricted by the runway safety area and runway protection zone beyond the west end of Runway 30.

AIRSIDE PLANNING CONSIDERATIONS

Runways:

- Placement of parallel runway (16L-34R) on the airfield (3,300-4,000 x 75 feet)
- Closure of Runway 12-30 upon opening of Runway 16L-34R
- Separation of helicopter training and fixed wing traffic
- Avoidance of Stillwater Creek corridor, wetlands, and vernal pools
- Potential for extension of Runway 16R-34L to 9,000 feet
- Avoidance of navaid critical areas

Taxiways:

- Correct taxiway geometry consistent with FAA AC 150/5300-13A (intersections, runway crossings, apron access, etc.)
- Realign taxiways to allow potential aviation development based upon future terminal or general aviation needs

LANDSIDE PLANNING CONSIDERATIONS

- Re-use of property on west side upon closure of Runway 12-30
- ***Separation of activity levels:*** Plan future facilities so that similar types are grouped together (large vs. small aircraft)
- ***Hangar area access:*** Provide for potential public access without the need to drive on aircraft movement areas
- ***Airport Land Use:*** Identify property for aviation vs. non-aviation uses
- ***Air Cargo:*** Provide for dedicated air cargo activity area
- ***All-weather perimeter road:*** Segregate all vehicular access from aircraft movement areas whenever possible
- ***Fuel storage:*** Designate area for above-ground storage
- ***Long term vision:*** Provide facility layout that preserves viability of the airport terminal, commercial, and general aviation areas

Layout for Runway 16L-34R/2,500-foot Separation/Closure of Runway 12-30

The layout presented in **Exhibit 4C** reflects a modified version of the development concept presented in the 2005 Airport Master Plan. The parallel runway remains separated from the primary runway at 2,500 feet and is depicted at 4,000 feet in length (although a length of 5,000 feet is possible with an extension to the south). Runway 12-30 is shown as closed on this layout following construction of the parallel runway and connecting taxiway system. Upon closure of Runway 12-30, additional aviation-related development can take place on the west side. A full length parallel taxiway is provided along Runway 16-34 to provide access to the primary runway, and the taxiway is flared around the glideslope antenna critical area for the instrument approach to Runway 34. The potential enlargement of the runway protection zone on Runway 16 is noted, reflecting an upgrade in the instrument capability of this approach (¾-mile visibility minimums).

The parallel runway system is connected by a dual taxiway system (allowing two-way access between the runway system), leaving areas on either side of the connecting taxiway system available for aviation-related development, although the height of metal structures will be limited inside the VOR critical area. Roadway access from the south would extend from Fig Tree Road and/or Venture Parkway, while access from the north would be provided via an extension or alternative alignment of Old Oregon Trail. As shown on the exhibit, the road extension from Old Oregon Trail could be developed as a loop road, with crossovers to allow for non-aviation related development inside the loop. While this alternative does not directly interfere with the VOR facility or PHI Air Medical, it will require the closure of the Redding Dragstrip and Shasta Kart Klub.

Two other options may be considered if the parallel runway separation is reduced to 700 feet, as presented in the following paragraphs:

Option 1 – 700-foot Separation/North Runway Threshold at Taxiway H

Both of the options presented in **Exhibit 4D** consider a parallel runway separation distance of 700 feet, which allows simultaneous landings and departures on the parallel runway system during visual flight rule (VFR) conditions. Based on the latest 10-year period, VFR conditions occur 89.05% of the time on the airfield. While the two options do not allow for development between the runways, they provide a parallel taxiway at 400 feet of separation from the primary runway and 300 feet of separation from the GA runway—meeting design standards for the respective design groups of the two runways. The first option provides the added capability of extending the runway farther to the south without interfering with the VOR facility. Runways may be sited as close as 500 feet from the VOR facility, while taxiways may be sited as close as 250 feet from the facility. It is assumed under this option that Runway 12-30 will still be closed upon construction of the parallel runway, reducing potential air traffic conflicts and allowing for the potential of added aviation-related development on the west side. This option would not impact other landside facilities (e.g., PHI Air Medical, Jim and I Aviation, the Redding Dragstrip, or the Shasta Kart Klub) on the east side.

LEGEND

- Existing Airport Property Line
- Ultimate Airfield Pavement
- Ultimate Road
- Existing Runway Protection Zone (RPZ)
- Ultimate RPZ
- Runway Safety Area (RSA)
- Object Free Area (OFA)
- Aviation Development
- Non-Aviation Development
- VOR Critical Area (Height Restriction)

0 800 1600
SCALE IN FEET
DATE OF AERIAL: 7-13-2014
NORTH

Venture Parkway
Stillwater Creek
Venture Parkway Extension
Shasta Kart Klub
Runway 16L-34R (4,000' x 75')
16L
34R
240'
AVIATION DEVELOPMENT
AVIATION DEVELOPMENT
Dual Taxiway
NON-AVIATION DEVELOPMENT
Runway 12-30 to be closed
1,000'
VOR
E
PHI Air Medical
Old Oregon Trail
AVIATION DEVELOPMENT
H
Glideslope
All-weather service road
VASI
Localizer
400'
All-weather service road
REIL
16
Runway 16R-34L (7,003' x 150')
34
MALSR
PAPI
D1
M
D2
B
D
D
D3
M1
Lighted Windcone/ Segmented Circle
B
A
Solar Farm
M
C
AVIATION DEVELOPMENT
ATCT
Meadow View Drive
Airport Rd.
Meadow View Dr.

Exhibit 4C
REVISED MASTER PLAN CONCEPT
(RUNWAY 12-30 CLOSURE)

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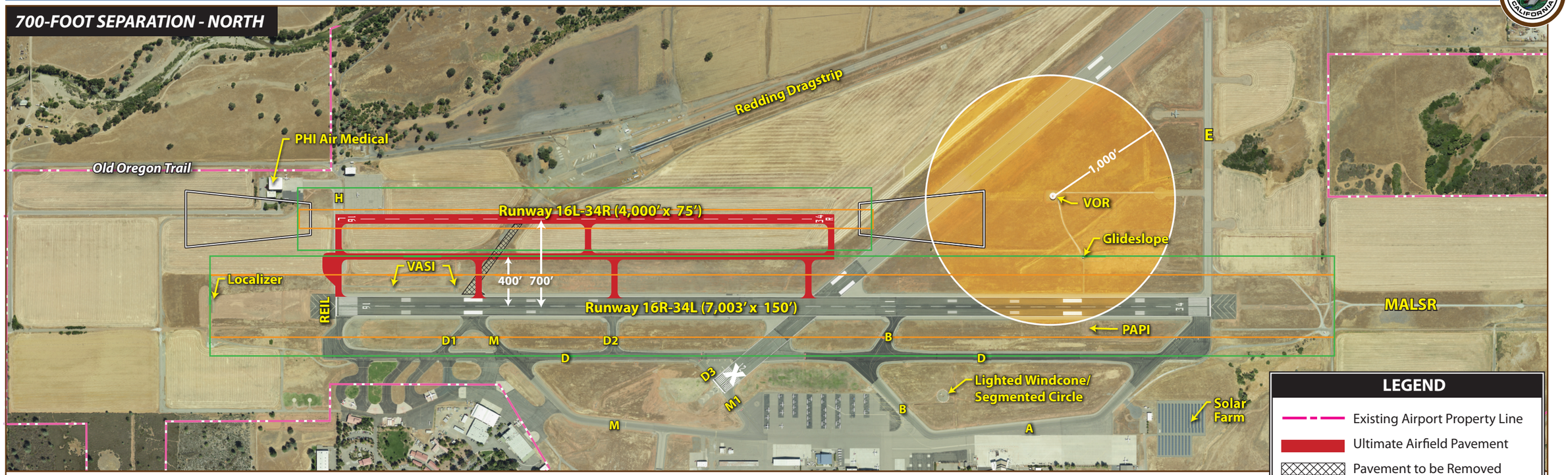
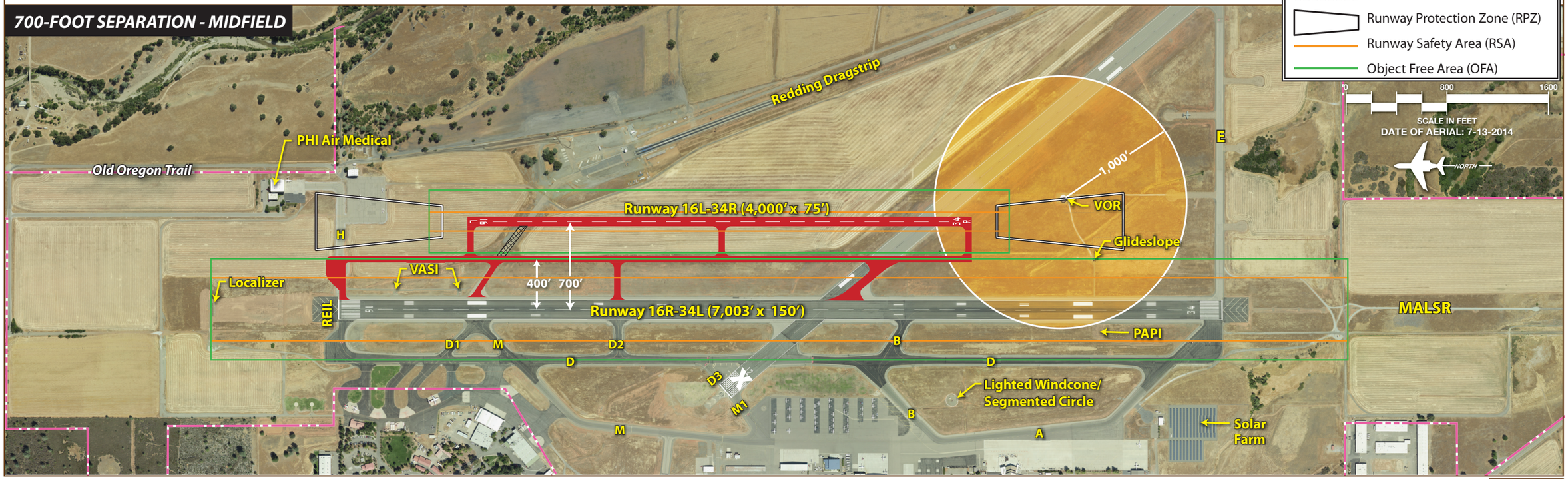
700-FOOT SEPARATION - NORTH



700-FOOT SEPARATION - MIDFIELD



LEGEND

- Existing Airport Property Line
- Ultimate Airfield Pavement
- Pavement to be Removed
- Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Object Free Area (OFA)

0 800 1600

SCALE IN FEET

DATE OF AERIAL: 7-13-2014

NORTH

Exhibit 4D
PARALLEL RUNWAY OPTIONS

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Option 2 – 700-foot Separation/Midfield-South Location

The second option presented in **Exhibit 4D** also considers the 700-foot runway separation, but with the parallel runway pushed to the south. This is similar to an alternative that was considered in the 2005 Airport Master Plan. It presents many of the same advantages as the previous option, although potential extensions beyond 4,000 feet are limited to the south by the existing location of the VOR facility. However, relocation of the VOR facility would allow the runway to easily be extended to a point even with Runway 34/Taxiway E, providing the potential for an additional 2,000 feet of runway. The FAA plans to transition from VOR-defined route structures as the primary means of navigation to performance-based navigation over the next decade. However, a VOR minimum operational network (MON) will be maintained—reducing from a legacy network of 967 VOR facilities in the U.S. to approximately 500 VORs by 2025. The potential opportunity this may create on airside development possibilities is unknown at this time, but should continue to be monitored over time. This option also maintains other landside facilities in current operation on the east side, including PHI Air Medical, Jim and I Aviation, the Redding Dragstrip, and Shasta Kart Klub.

Taxiway Considerations

Several taxiways on the airfield do not meet current FAA-recommended geometry standards:

- Taxiway D at Runway 34 threshold.
- Taxiway D1/M exits at Runway 16-34.
- Taxiway B exit from Runway 16-34.

Taxiway A at the Runway 34 threshold provides a large expanse of pavement—making lighting and marking more difficult and creating the potential for pilot confusion. **Exhibit 4E** depicts a potential solution by maintaining an entrance taxiway at the runway end and a separate hold apron. The hold apron may not be located beyond the threshold of the runway in this situation, since the precision approach on Runway 34 requires a "precision object free area" beyond the end of the runway/taxiway that is 800 feet wide and centered on the runway.

The Taxiway D1/M exit on Runway 16-34 is to be avoided since it creates a multiple taxiway exit intersection which can create pilot confusion. The FAA recommends a right-angled exit taxiway at this location to provide the best visual perspective to a pilot approaching the intersection. This in turn will require the pilot to turn onto Taxiway D before entering several entrance taxiways to the USFS/CDF ramp.

Taxiway B provides the opportunity for a high speed exit upon landing Runway 34, but is greater than the FAA recommended angle for an acute-angled exit. The FAA recommends that an acute-angled high speed exit be no greater than 45 degrees from the runway centerline. The existing exit is approximately 60 degrees. The alignment of Taxiway B—crossing Taxiway D and extending onto the ramp—also should be avoided. Therefore, Taxiway B is shown as a right-angled exit from the runway, requiring aircraft to turn onto Taxiway D before proceeding into ramp parking areas.

Future closure of Runway 12-30 will provide the opportunity to create either a 45-degree acute angled exit on Runway 34 at the intersection or a right-angled exit. **Exhibit 4E** depicts an angled exit, taking advantage of existing runway pavement for the exit. The exit should not be continued along the old runway alignment (crossing Taxiway D) since the itinerant parking ramp will potentially be extended in a northerly direction, and straight-line access between the runway and ramp should be avoided to be consistent with FAA guidelines.

An additional right-angled exit has been shown between Taxiway B and the Runway 34 threshold to improve the runway exit rating. The current spacing between the runway threshold and the first exit opportunity would be reduced from 2,500 feet to 1,250 feet. A possibility for renumbering of the exits along Runway 16-34 has been depicted on the exhibit, proceeding north to south.

Instrument Navigational Aids

As identified in the previous chapter, the instrument landing system (ILS) approach on Runway 34 and MALSR approach lighting system will need to be retained for all-weather capabilities. Furthermore, an improvement in the approach to Runway 16 should be anticipated with the advancements in GPS technology. If an LPV or RNP approach to Runway 16 can achieve ¾-mile visibility minimums, the runway protection zone (RPZ) will increase in width, adding 500 feet in width while remaining 1700 feet in length. This approach will not require the addition of approach lighting or added equipment on the ground.

All-Weather Perimeter Service Roads

Vehicle service roads are of significant importance at 14 CFR Part 139 commercial service airports, including Redding Municipal Airport. Such roads provide access to critical operational areas for airport staff, security, and aircraft rescue and firefighting teams. Vehicle service roads also provide a means for unimpeded access to potential accident areas on the airfield, while reducing the possibility of a runway incursion. On a daily basis, airport staff is required to perform inspections of the Airport and service roads provide the necessary access to accomplish this task.

Currently, the perimeter service road transitions a variety of runway and taxiway protection surfaces which require tower clearance. Under an ideal layout, a perimeter service road would remain outside of these protected surfaces. There are several FAA documents providing guidelines defining the function and location of perimeter service roads.

FAA AC 150/5210-20, *Ground Vehicle Operations on Airports*, defines vehicle service roads as “a designated roadway for vehicles in a non-movement area.” Paragraph 7 of the AC states: “Airport operators should keep vehicular and pedestrian activity on the airside of the airport to a minimum…Vehicles should use service roads or public roads in lieu of crossing movement areas whenever possible.”

LEGEND

- Existing Airport Property Line
- Ultimate Airfield Pavement
- Pavement to be Removed
- VOR Critical Area (Height Restriction)

DATE OF AERIAL: 7-13-2014

0 600 1200

SCALE IN FEET

NORTH

Shasta Kart Klub

Redding Dragstrip

Runway 12-30 to be closed

PHI Air Medical

Old Oregon Trail

1,000'

VOR

Glideslope

E

H

VASI

Localizer

REIL

16

34

Runway 16R-34L (7,003' x 150')

D1 D2 D3 D4 D5 D6 D7

PAPI

D

M

B

A

C

Solar Farm

ATCT

Airport Rd.

Meadow View Dr.

Exhibit 4E
TAXIWAY CONSIDERATIONS

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FAA AC 150/5300-13A, *Airport Design*, states in Paragraph 318(a), "It is recommended that the entire RSA and RPZ be accessible to rescue and firefighting vehicles such that no part of the RSA or RPZ is more than 330 feet (100 m) from either an all-weather road or a paved operational surface."

FAA Order 5190.6B, *FAA Airport Compliance Manual*, states in Appendix R, Paragraph VII (I) (1) that an airport should "Look for opportunities to enhance safety, such as reducing runway crossings (ex., adding perimeter service roads, etc.)."

FAA Order 5280.5C, *Airport Certification Program Handbook*, Paragraph 421, Section 139.329(a)(1) states that a Part 139 certificate holder is responsible for "Limiting access to movement areas and safety areas to only those pedestrian and ground vehicles necessary for airport operations. Unless required to support a specific operational requirement on the airport, vehicles and equipment should use perimeter access [service] roads whenever possible" (FAA 2006).

FAA Order 5100.38D, *Airport Improvement Handbook*, Table P-3 provides several functions for airport service roads, including:

- ARFF access to a runway or runway safety area;
- Airport operations and maintenance;
- Separation of ground vehicles and aircraft;
- Airport security;
- Incidental access to FAA-owned facilities; and
- Temporary construction access (FAA 2014).

FAA Order 6940.1, *Access Roads to FAA Facilities*, Paragraph 3, states, in part, that "At no time shall an access road be constructed parallel to a runway closer than 200-feet edge to edge and 100-feet edge to edge when parallel to a taxiway…."

The specific location of all-weather perimeter service roads parallel to the runway system will be dependent upon the final recommended concept. The perimeter service roads should be planned to meet the FAA specifications to the greatest degree feasible.

The "No Action" Option

The "no action" option keeps the Airport in its existing condition, without improvement to existing airside facilities, at a time when operations and the number of active aircraft based at the airport are continuing to increase. The forecasting effort verified that the airport's market share of aircraft that are registered in Shasta County has increased from 48 percent to 62 percent in the past five years. This indicates a desire by operators to base at this facility. The "no action" option fails to meet the needs of commercial, air cargo, and general aviation operators on the airfield. Since the last master plan was completed and adopted by the City of Redding, the Airport has received over $19 million in grants to expand and improve terminal facilities, replace the fire station, rehabilitate the primary runway, up-

date safety equipment, and acquire land for approach protection. A "no action" option would ignore the needs of existing and future aircraft operators and would not meet federally mandated standards for operations and maintenance.

LANDSIDE PLANNING ALTERNATIVES

The previous chapter did not identify a need to expand terminal facilities within the 20-year planning period. However, the existing terminal area should be reserved for the potential expansion of the building and public parking areas, as identified on **Exhibit 4F**. The aircraft parking ramp provides capacity for several overnighting (RON) aircraft positions. The existing setback of the terminal from the primary runway (approximately 1200 feet) provides the opportunity (with the relocation of Taxiway A) to extend the terminal concourse to the east (towards the runway), providing additional gate positions and boarding areas.

The existing FedEx facility provides a segregated area for air cargo handling, which does not interfere with other airport operations. Area adjacent to this facility should be reserved for expansion of the air cargo sort facility and van transfers. However, vans leaving the FedEx facility are required to pass by the front of the terminal building since Woodrum Circle has a one-way circulation pattern. This could be remedied with a two-way extension of Municipal Boulevard to a dedicated entrance into the cargo area. The one-way loop on Woodrum Circle would remain, allowing for the segregation of air cargo and passenger terminal traffic.

As discussed in the previous chapter, UPS is currently handling aircraft and vans on the itinerant ramp. An alternative should be considered to avoid the mixing of aircraft and vans on the ramp—either relocating this operation to the dedicated air cargo area at the south end of the commercial ramp, or providing another segregated area on the airfield for the air cargo operation. It is recognized that without a sort building on the airfield, the operator needs to move parcels as quickly as possible into vans; however, the operation should be located so as to not interfere with other transient aircraft on the ramp.

Other areas are noted on **Exhibit 4F** for commercial aviation reserve and general aviation reserve. The commercial aviation reserve areas are already accessible from a taxilane extension, while the general aviation reserve area borders the permanent tie-down ramp. Each of the commercial aviation reserve areas are approximately 1.7 acres in size.

Following construction of Runway 16L-34R and closure of Runway 12-30, additional area on the west side will become available for aviation-related development. The area provides the opportunity for a mix of aviation-related businesses, small, medium and large storage hangars, and expansion of the itinerant parking ramp. Public access should be provided to businesses from Airport Road since it is not feasible to extend Municipal Boulevard any farther north. Auto parking should be provided adjacent to aviation businesses and storage hangars.

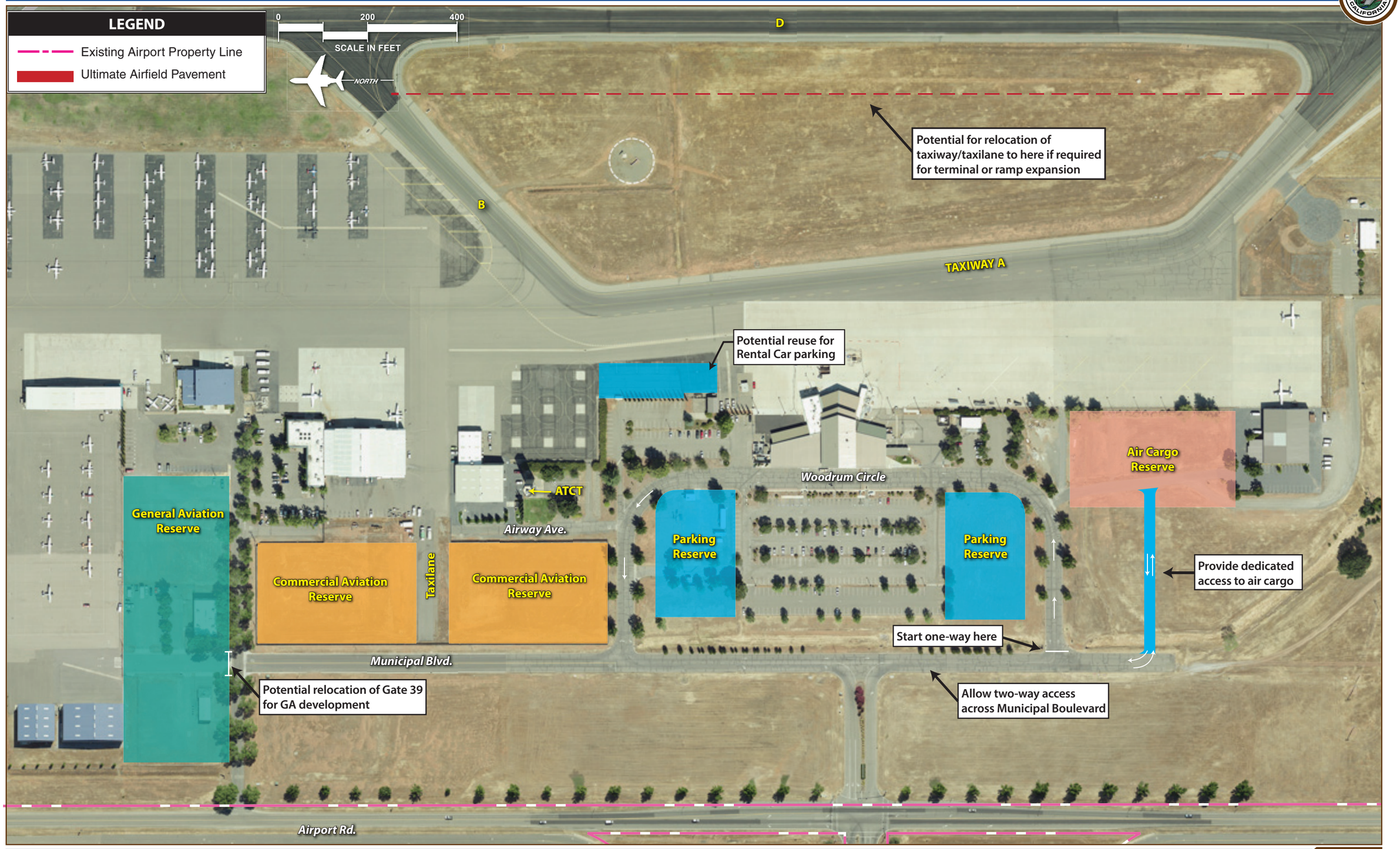

Exhibit 4F
LANDSIDE ALTERNATIVE - AREA A

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Exhibit 4G presents a possible layout for the area. It is assumed that Taxiway C continues to provide taxilane access into the hangar area, while Taxiway M is slightly realigned but continues to provide access to aviation businesses along the flight line. While a realignment of Taxiway M is not required, it provides more efficient use of area for expansion of the itinerant parking ramp. The alternative also assumes that Taxiways D3/M1 remain open after closure of Runway 12-30 and provide access into aviation businesses and ramp areas. An aviation support area is depicted adjacent to the entrance roadway; this provides a location for fuel farm expansion/replacement and an alternate area for airport maintenance should the existing building and/or support area need to be replaced or expanded in a new location.

While expansion of facilities on the west side will meet the projected needs for aviation-related business, hangar storage, and parking ramp during the planning period, additional area will eventually become available on the east side to meet long-term needs. The exact boundaries for potential aviation-related development will depend on the final master plan concept; however, the general boundaries are depicted on **Exhibit 4H**. Roadway access will need to be established from Fig Tree Lane, Venture Parkway, and Rancho Road (using existing Old Oregon Trail or a new realignment from Rancho Road). Primary public and non-public access surrounding the airport has been depicted on **Exhibit 4H**. Initial hangar development could extend southerly from PHI Air Medical without interfering with the Redding Dragstrip. Long term, both Redding Dragstrip and Shasta Kart Klub will need to be relocated.

The existing VOR facility (and the critical area surrounding this antenna) may create a conflict with potential development in the southern portion of the development parcel shown on **Exhibit 4H** following closure of Runway 12-30 (and assuming the VOR remains in FAA's MON). VOR facilities are sited as close as 500 feet to a runway and 250 feet to a taxiway; however, the FAA will frequently request that a 750 to 1,000-foot critical area be established around the antenna to prevent the construction of tall structures (e.g., hangars or offices) that may impact radio signals. Metal structures should be sited below a 1.2 degree clearance angle; therefore, at a distance of 750 feet from the antenna, a metal building should not exceed an elevation of 15.7 feet (assuming level ground). At 1,000 feet from the antenna, a metal building should not exceed an elevation of 20.9 feet. Many clearspan storage hangars may exceed this height, requiring even greater setbacks from the VOR facility.

Another important consideration with regard to future development is the imaginary surfaces defined under Subpart C of Title 14 CFR Part 77 *Standards for Determining Obstructions to Air Navigation or Navigational Aids or Facilitie*s. The updated Airport Layout Plan Drawing will include a Part 77 airspace drawing which will identify any obstructions to the Part 77 surfaces. If there are obstructions, the FAA can conduct an airspace study to determine if any of the obstructions are hazards needing mitigation. One surface that is frequently penetrated at airports is the Part 77 transitional surface, which begins at the edge of the primary surface and extends outward at a 7:1 slope to an elevation of 150 feet above the airport elevation. The primary surface along Runway 16-34 extends 500 feet to either side of the runway; therefore, the transitional surface reaches a height of 35 feet at a distance of 745 feet from the runway centerline.

DEVELOPMENT OF NON-AVIATION PROPERTIES

The City of Redding has remained very active with the development of non-aviation properties adjacent to the airport. In the past, the City has concentrated on development of parcels in the Redding Airport Business and Industrial Park—extending along Airport Drive and west of the terminal. Only half a dozen parcels remain undeveloped in this business park. More recently, the City has developed the roadway and utility infrastructure for the Stillwater Business Park, a 700-acre site on the east side of the airport offering large lots for office and industrial development.

Redding Municipal Airport provides the region with several functions: commercial, air freight, and general aviation services; aerial fire support through the U.S. Forest Service and California Department of Forestry and Fire Protection; medical and law enforcement air support; and development sites for the commercial/ industrial sector. While all but the last of these functions are directly dependent on the ability of Redding Municipal Airport to provide facilities which meet their respective need, economic development is not specifically dependent upon the operational capabilities of the airport.

While proximity or access to airport services may be desirable for some industrial firms, most of the potential tenants will not have an aviation connection. In addition, firms would be required to pay fair market rental value. The airport may provide a site and support services as an alternative location within the overall availability of properties that are zoned and master planned for commercial/industrial uses in the Redding area. In that sense, the airport sites may compete with other locations that are developed by private firms, individuals, non-profit foundations, and other municipal agencies.

The City can support a wide variety of discretionary uses on the airport, including: airport-related commercial service businesses; aviation-related business; aviation/aerospace manufacturers; non-aviation industrial/commercial uses; and low-density uses in approach/transition areas.

AIRPORT-RELATED COMMERCIAL SERVICE BUSINESSES

The airport can offer locational advantages for commercial businesses that either support the airport operations nor provide services to users of the airport, such as motels, restaurants, car rental agencies, service stations, and small executive offices that provide services and facilities for business travelers. In many locations, these businesses are accommodated in off-airport locations, especially where air transportation plays a relatively minor role in the overall commercial activity of the area. The location of the airport within 2.5 miles of Interstate 5 makes it suitable for many of these uses.

AVIATION-ORIENTED BUSINESSES

Redding Municipal Airport has played a key role in providing a location for this type of business. These firms generally require direct access to the airfield, although some firms (such as parts suppliers and avionics repair shops) often operate from locations not directly accessible to the airfield. However,

LEGEND

- Existing Airport Property Line
- Ultimate Airfield Pavement
- Ultimate Building
- Ultimate Road/Parking

Date Of Aerial: 7-13-2014

0 200 400

SCALE IN FEET

NORTH

USFS/CDF

Itinerant Ramp Expansion

M1

Itinerant Ramp

Partially Relocate Taxiway M

Aviation Businesses

Auto Parking

T-Hangars

T-Hangars

T-Hangars

Conventional Hangars

Aviation Related Support Area

Fuel Farm

Taxiway C

Redding Aerotronics

REACH Air Ambulance Service

Air Shasta

ARFF

A (1-10)

B (11-20)

C (21-30)

D (31-40)

E (41-50)

F (1-6)

G (1-8)

H (81-88)

I (51-60)

J (61-70)

K (71-80)

L (1-6)

M (89-99)

Permanent Tie-Down Ramp

Office Building

Gate 39

Rental Car Service

Sierra Pacific

Wong Hangar

Stringer Hangar

Maintenance Building

Tullis Hangar

Baker-Barr Hangar

Airport Rd.

Exhibit 4G
LANDSIDE ALTERNATIVE - AREA B

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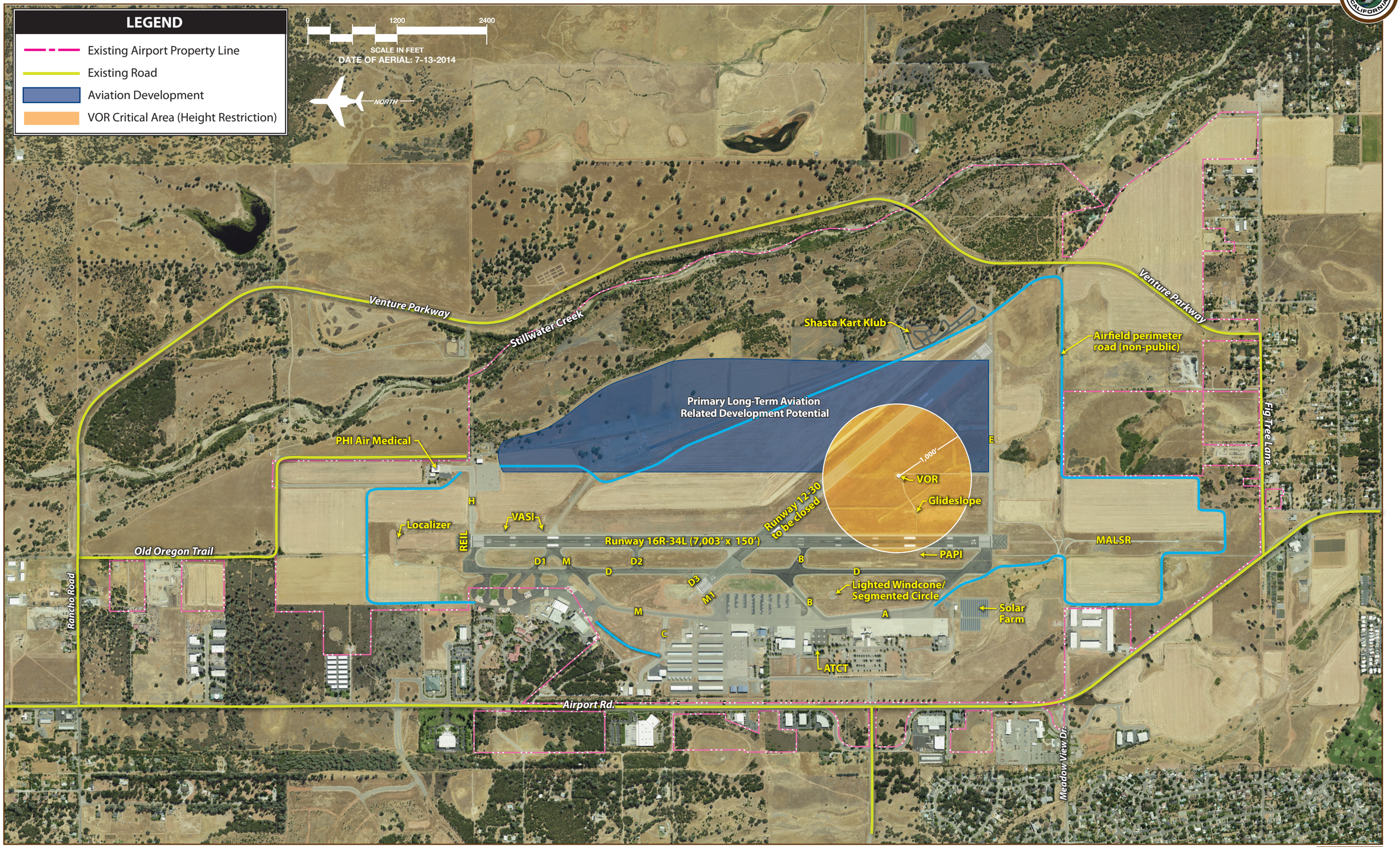

Exhibit 4H
LANDSIDE ALTERNATIVE - AREA C

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through-the-fence operations should not normally be allowed, or the City should enact an ordinance to regulate such proposals.

There is also a wide variety of companies that prefer to locate on airports because they have an orientation to aviation through their products, markets, or operations. These include many firms that operate their own aircraft in addition to using commercial air services.

AVIATION/AEROSPACE MANUFACTURERS

Consolidation of the industry in recent years has created fewer options for aviation/aerospace manufacturers. With the recent resurgence of general aviation aircraft manufacturing, several of these companies have opened new manufacturing plants, although these facilities are frequently located at general aviation and small commercial service airports. Typically, these companies will locate in areas with an aviation-oriented labor base. Many manufacturers of specialized parts or components do not require sites on an airport, but their aviation orientation makes it a preferred location.

NON-AVIATION INDUSTRIAL/COMMERCIAL USES

Current City efforts to attract non-aviation industrial and commercial uses in both the Redding Airport Business and Industrial Park and the Stillwater Business Park reflect a continuing effort to create strong business and employment opportunities near the airport and a favorable climate for other aviation-related businesses.

SUMMARY

The purpose of the alternatives discussion is to present a variety of solutions to specific issues on the airside and landside which have emerged during the master planning process. The alternatives should be considered by the Planning Advisory Committee and the City of Redding representatives. Based upon feedback received by the consultant, a master plan concept will be developed which combines a composite of the airside and landside alternatives that have been considered. Following the presentation of a master plan concept, detailed cost estimates and phasing schedules will be developed, and updated Airport Layout Plan drawings will be prepared for subsequent FAA reviews.

Chapter Five

RECOMMENDED MASTER PLAN CONCEPT

RECOMMENDED MASTER PLAN CONCEPT

The airport master planning process for Redding Municipal Airport has evolved through the development of forecasts of aviation demand, an assessment of facility needs, and an evaluation of airport development alternatives. The planning process has included the development of four sets of draft working papers which were presented to the Planning Advisory Committee (PAC) in coordination meetings beginning in August 2014. The PAC represented a cross-section of airport tenants, users, and government agencies. This group has provided valuable input into the planning process and contributed to the final master plan recommendations.

In the previous chapter, several development alternatives were considered for future airside and landside development. These alternatives have been refined and merged into a final development concept, as presented in **Exhibit 5A**. The following narrative will provide an overview of the recommendations, while Chapter Six will provide a proposed schedule for development priorities, estimated costs, and potential funding. The airport layout drawings and environmental overview will be presented in appendices to this document.

Since the airport is classified by the FAA as a primary commercial service non-hub airport, it is included in the National Plan of Integrated Airport Systems (NPIAS), allowing the Airport to qualify for development grants under the Airport Improvement Program (AIP)—a grant program funded exclusively by user fees and user taxes. As a condition of grant acceptance, the City of Redding must adhere to various grant assurances, which include maintaining the facility safely and efficiently in accordance with specific conditions and mandates. With acceptance of each grant, the City of Redding is obligated to

maintain the facility for a minimum of (at least) another 20 years. Chapter One in this report provided an overview of the grants received by the City of Redding over the past ten years.

AIRSIDE RECOMMENDATIONS

The airside recommendations include improvements related to the runway and taxiway system. Operations at the Airport are projected to grow modestly over the 20-year forecast period (at an annualized growth rate of 1.3 percent), while commercial passengers are projected to increase at an annualized rate of 1.6 percent (it should also be noted that scheduled service has transitioned in 2015 from turboprop to regional jet service). Commercial service is expected to transition into slightly larger regional jets over the time period of this plan. However, this service will not require a longer runway to accommodate their operations.

IASCO international flight training over the past five years has continued to push operational levels on the airfield to record levels, while also increasing the number of aircraft that are based on the airfield. This has led to a continuing examination of improved operational efficiencies for the runway and taxiway system.

RUNWAY CONFIGURATION

The existing runway system consists of Runway 16-34 (the primary) and Runway 12-30. Runway 16-34 is 7,003 feet long, 150 feet wide, and provides 99.5 percent wind coverage in all-weather conditions. It has a full-length parallel taxiway and multiple exits located along its entire length. The precision instrument approach on Runway 34 provides properly equipped aircraft with landing capabilities down to a 200-foot cloud ceiling and one-half mile visibility. An area navigation (RNAV) approach is also available to this runway. This runway meets the needs of the majority of commercial and firefighting operators currently using the Airport. While some aircraft may require a longer length on occasion, any additional length will need to be aircraft-specific and require FAA-approved justification.

Runway 12-30 is 5,067 feet long, 150 feet wide, and provides secondary crosswind capabilities. It is not equipped with instrument landing capabilities or a parallel taxiway. The master plan concept reflects the eventual transition of this pavement to a taxiway upon construction of a parallel runway on the airfield.

The runway analysis undertaken for this study has indicated that the airfield will be better served by a parallel runway configuration in lieu of the existing intersecting runway configuration. This will provide for the separation of lighter aircraft used in training from the heavier aircraft used in commercial and firefighting operations. It has been recommended that this runway be built to a length of 4,000 feet, although a length of 3,300 feet will accommodate a majority of small aircraft weighing less than 12,500 pounds. After a review of potential separation distances between the parallel runways, it has been recommended that the runways be separated by a distance of 2,500 feet, thus permitting use of the runway with little or no restrictions and proper wake turbulence separation.

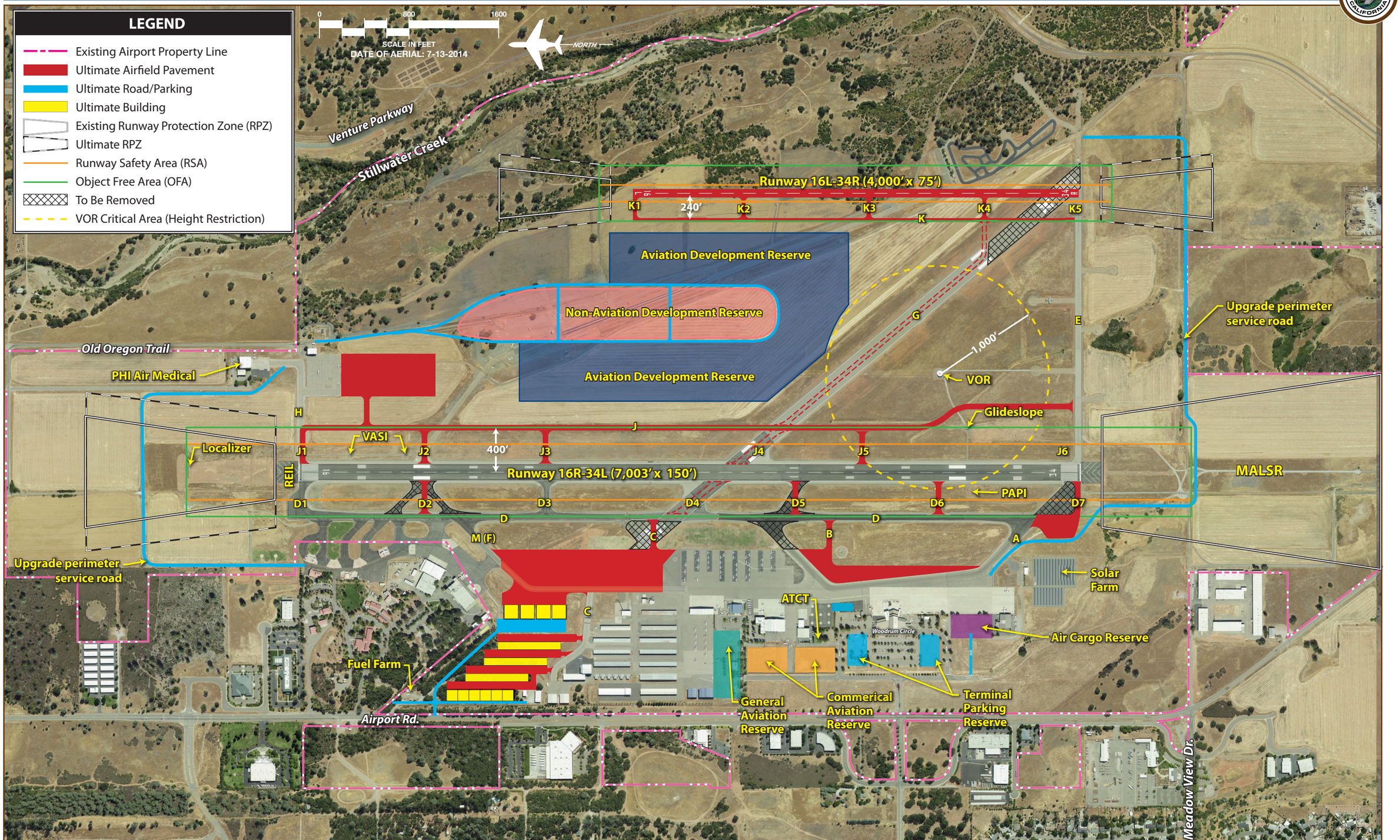

Exhibit 5A
MASTER PLAN CONCEPT

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RUNWAY DIMENSIONAL STANDARDS

The FAA has established design criteria to define the physical dimensions of runways and taxiways, as well as the imaginary surfaces surrounding them which protect the safe operation of aircraft at the Airport. These design standards also define the separation criteria for the placement of landside facilities.

As discussed previously, the design criteria primarily center on the Airport's critical design aircraft. The critical aircraft is the most demanding aircraft or family of aircraft which currently (or are projected to) conduct 500 or more itinerant operations per year at the Airport. Factors included in airport design are an aircraft's wingspan, approach speed, tail height, and undercarriage width. The FAA has established the Runway Design Code (RDC) to relate these design aircraft factors to airfield design standards. The most restrictive RDC is also considered the overall Airport Reference Code (ARC).

Analysis conducted in Chapter Two concluded that the current and future RDC for Runway 16-34 falls in C-III. The future parallel runway should be designed to a lesser B-II RDC.

TAXIWAYS

Several new taxiways are planned on the Airfield to either improve operations or correct existing taxiways to FAA-recommended geometry standards.

The configuration of the entrance/exit taxiway at the threshold of Runway 34 is reconfigured from a large expanse of pavement to a single right-angled entrance/exit taxiway. The new taxiway has been designated as Taxiway D7 and a run-up area has been provided adjacent to Taxiway D.

An additional right-angled exit has been shown between Taxiway B and the Runway 34 threshold (designated as D6) to improve the runway exit rating. The current spacing between the existing exits will be reduced from 2,500 feet to 1,250 feet.

The runway exit at Taxiway B has been reconfigured to a right-angled exit to avoid a direct exit from the runway into a ramp area. The right-angled exit is re-designated as D5. Pilots exiting the runway onto the realigned taxiway will be required to turn onto Taxiway D, and then negotiate a turn onto Taxiway B before entering aircraft parking ramps. Taxiway B has also be repositioned to provide for short-term expansion of the itinerant parking ramp. The existing alignment of Taxiway A is also realigned to a parallel position with Taxiway D, providing improved wingtip clearance to aircraft on the commercial ramp in front of the terminal.

Future closure of Runway 12-30 will allow for an angled exit (designated as D4) at the mid-landing rollout on Runway 34. A right-angled taxiway between Taxiway D and aircraft parking ramp, using a portion of existing Taxiway M1 (designated as C), will provide access into aircraft parking ramps.

The taxiway exit at D1/M will need to be converted to a single right-angled exit (designated D2) to eliminate a multiple taxiway exit intersection. Pilots will be required to turn onto Taxiway D, and then negotiate a turn onto various taxiways which provide access onto parking ramps.

The future parallel runway has been depicted with a full length parallel taxiway (designated as K) at a runway-taxiway separation of 240 feet, consistent with a B-II RDC. Several connecting taxiways have been depicted along the length of the parallel runway-taxiway. Since Runway 12-30 will be closed following the construction of the new runway, the existing runway pavement will be re-marked and lighted as a taxiway (designated as G), providing access between the parallel runway system and access to aviation-related development between the parallel runway systems. Taxiway E will also remain open as a connecting taxiway, providing a second connecting taxiway to the parallel runway systems.

As the need develops for additional aviation-related development south of PHI Air Medical on the east side of the primary runway, a full length parallel taxiway (designated as J) will be required. This parallel taxiway has been depicted at a runway-taxiway separation distance of 400 feet, consistent with the separation requirement for a precision instrument runway. Several connecting taxiways have been depicted along the length of this runway to improve the runway exit rating. At the south end of the runway, the parallel taxiway will need to be flared outside of the critical area for the existing glide slope antenna. The placement of this taxiway will not interfere with the existing VOR facility.

AIRCRAFT PARKING APRONS

While airfield elements, such as safety areas, must meet design standards associated with the applicable RDC, landside elements can be designed to accommodate specific categories of aircraft. For example, a taxilane into a T-hangar area only needs to meet the object free area (OFA) width standard for smaller single and multi-engine piston aircraft expected to utilize the taxilane, not those standards for the larger transport jets representing the overall critical aircraft for the Airport.

Additional parking apron on the west side of the airfield has been depicted as a southerly extension of the itinerant ramp (with realignment of Taxiway B) and as a northerly extension of the itinerant ramp (after closure of Runway 12-30). Each of these areas can be extended in phases to accommodate itinerant parking needs. The southerly expansion of the ramp will provide the opportunity for as many as 24 additional tie-down positions. IASCO international flight training has added 33 based aircraft since 2009, and these aircraft use tie-down positions on the existing itinerant ramp. In addition, an area is being used on the existing ramp to support UPS/contract carrier operations and package transfer. It has been recommended that this operation be relocated to the south end of the commercial ramp.

The local parking ramp is limited by adjacent hangar development, although a general aviation reserve area is noted on the master plan concept for potential hangar development and/or parking apron, next to FedEx.

LANDSIDE RECOMMENDATIONS

The primary goal of the landside recommendations is to provide adequate areas for commercial and general aviation-related development (even beyond the 20-year planning period) in a manner which will work in conjunction with planned changes in the ultimate airfield configuration. To the extent possible, areas which are served by existing infrastructure will be initially developed to minimize development costs and maximize revenue to the Airport. Vehicular access must serve all of these areas efficiently while maintaining a secure airfield.

HANGAR DEVELOPMENT

While the master plan concept has shown additional hangar development north of the existing hangar storage areas along Airport Road, this area will generally be unavailable until Runway 12-30 is closed. Very few parcels remain on the west side for potential hangar development, with the exception of a general aviation reserve parcel adjacent to the local parking apron, two commercial aviation reserve parcels west of the Redding Jet Center, and the air cargo reserve parcel. Any aviation-related development requiring a large land parcel will need to be developed on the east side of the primary runway, south of PHI Air Medical.

TERMINAL AREA DEVELOPMENT

While the recent terminal building expansion is expected to meet the needs of scheduled passenger traffic during the plan period, the potential for a dedicated air cargo access road has been recommended to segregate this traffic from the passenger terminal building enplaning and deplaning curb. This alternative will require that the one-way traffic loop on Woodrum Circle begin at Municipal Boulevard, and that two-way traffic be allowed across Municipal Boulevard to the new entrance to the air cargo facilities. It is also recommended that air cargo activities on the Airport be consolidated into the area south of the terminal. The potential for vehicular parking expansion to support a 60 percent increase in parking capacity has been reserved inside Woodrum Circle.

VEHICULAR ACCESS AND CIRCULATION

Primary access to the Airport from Interstate 5 will continue to be provided via Knighton Road, with entrance to the terminal provided by Municipal Boulevard and Woodrum Circle. Airport Road will continue to provide access from points north and south along the western perimeter, with Rancho Road/Old Oregon Trail providing access to hangar development on the east side of the primary runway. The extension of Rancho Road—Venture Parkway—provides access to the Stillwater Business Park and a connection with Fig Tree Lane/Airport Road around the southern perimeter of the airport. It has been anticipated that an extension of Old Oregon Trail will provide access to additional aviation-related development on the east side of the airfield. The master plan concept does not provide for vehicular access to future development on the east side from Fig Tree Lane or Venture Parkway, since a

connecting taxiway system will need to be provided between the parallel runway system and these connections are anticipated from existing Taxiway E and the future closure of Runway 12-30.

LAND USE CONSIDERATIONS

Identifying existing and planned land uses, both on and off the Airport, is an important consideration. By understanding the issues related to land use in the area, the City of Redding and jurisdictions in the vicinity of the airport can take proactive steps to protect the airport from incompatible land uses. There are three basic categories of land use to consider:

- On-Airport Land Use
- Off-Airport Land Use Compatibility
- Height and Hazard Zoning

ON-AIRPORT LAND USE

The objective of on-airport land use planning is to coordinate uses of airport property in a manner that is both functional with the design of the airport and compatible with the airport environs. There are two primary considerations for on-airport land use planning. First is to secure those areas essential to the safe and efficient operation of the airport. Second is to determine compatible land uses for the balance of the property which would be most advantageous to the airport and the community.

The FAA views airport property as either aeronautical or non-aeronautical. Aeronautical use is defined as all activities that involve or are directly related to the operation of aircraft. Essentially, aeronautical uses are those that require access to the runway and taxiway system. Non-aeronautical uses are those that do not need runway and taxiway access. For example, a business that manufactures aircraft component parts but delivers those parts by ground would be non-aeronautical in nature.

Redding Municipal Airport encompasses 1,500 acres. For on-airport land use planning purposes, the property can be classified as the Airfield Operations area, the Aviation Development area, and the Revenue Support area. **Exhibit 5B** presents the suggested on-airport land use map for the Airport based on the recommended master plan concept.

Airfield Operations (AO)

The Airfield Operations area is that portion of airport property that encompasses the major airside elements such as runways, taxiways, runway safety area, runway object free area, runway obstacle free zone, runway protection zone, taxiway safety area, taxiway object free area, navigational aids and their critical areas, and the runway visibility zone. The Airfield Operations area is intended to provide for safe and efficient aircraft taxiing, take-off, and landing.

LEGEND

- Existing Airport Property Line
- Ultimate Airfield Pavement
- Ultimate Road/Parking
- Ultimate Building
- Existing Runway Protection Zone (RPZ)
- Ultimate RPZ
- Runway Safety Area (RSA)
- Object Free Area (OFA)
- To Be Removed
- VOR Critical Area (Height Restriction)

Land Use:

- Airfield Operations (AO)
- Aviation Development (AD)
- Revenue Support (RS)

0 800 1600
SCALE IN FEET
DATE OF AERIAL: 7-13-2014
NORTH

Stillwater Creek
Old Oregon Trail
PHI Air Medical
Runway 16L-34R (4,000' x 75')
K1 K2 K3 K4 K5 K
240'
1,000'
VOR
Glideslope
PAPI
MALSR
Localizer
VASI
REIL
H J J1 J2 J3 J4 J5 J6
400'
Runway 16R-34L (7,003' x 150')
D1 D2 D3 D4 D5 D6 D7 D
M (F) B A
Upgrade perimeter service road
Upgrade perimeter service road
Solar Farm
ATCT
C
Air Cargo Reserve
Fuel Farm
General Aviation Reserve
Commerical Aviation Reserve
Terminal Parking Reserve
Airport Rd.
Meadow View Dr.

Exhibit 5B
ON-AIRPORT LAND USE MAP

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Aviation Development (AD)

The Aviation Development area is defined as those areas that must be reserved for development that needs access to the Airfield Operations area. In general, current and future aircraft access must be preserved in these areas.

Typical uses permitted in the Aviation Development area include:

- Commercial airline terminal
- Cargo airline(s) freight terminal
- Fixed base operator(s)
- Specialized aviation service operations
- Aircraft maintenance providers
- Aircraft equipment sales/rental offices
- Food and beverage retail sales outlets
- Retail fueling services
- Vehicle parking lots
- Warehouses
- Aircraft hangars
- Vocational schools
- Flight training facilities

Certain non-aviation related uses may be permissible within the Aviation Development area provided they are temporary (five years or less) in nature and can be removed in a timely manner to allow for aviation development (i.e., agricultural activities).

Generally, those areas adjacent to the runways and taxiways are identified for current and future aviation development. Enough property should be reserved to accommodate future taxiways, aprons, hangar development and vehicle parking lots. Typically, this is approximately 1,200 feet from the centerline of a runway or taxiway. Property in proximity to existing aprons is also reserved for aviation development.

Revenue Support (RS)

The revenue support classification includes all potential development that is compatible with airport activities but is unlikely to require access to the runway and taxiway system. This classification may include both aviation and non-aviation development.

Typical revenue support land uses may include:

- Airport related facilities
- Research facilities
- Testing laboratories
- Facilities for the manufacturing, processing, and/or assembly of products
- Warehouses
- Vocational schools
- Eating and drinking establishments

The Airport has accepted grants for capital improvements from the FAA. As such, the City of Redding has agreed to certain grant assurances. Grant assurances related to land use assures that airport property will be reserved for the benefit of the airport and the community. If the sponsor wishes to sell (release) airport land or lease airport land for a non-aeronautical purpose (land use change), they must petition the FAA for approval. The Airport Layout Plan and the Airport Property Map must then be updated to reflect the sale or land use change of the identified property.

Airport sponsors are obligated to pursue policies that contribute to the self-sufficiency of the airport. The FAA will consider requests to use aviation land for non-aviation revenue producing purposes in pursuit of this goal under certain circumstances. These requests fall into two general categories: concurrent use and interim use.

If aeronautical land is to remain in use for its primary purpose but also be used for compatible revenue producing non-aeronautical purposes, this is considered a concurrent use. An example of a concurrent use is farming of low-growing crops within an RPZ.

The FAA may consent to the interim use (not more than five years) of aeronautical land for non-aeronautical revenue producing purposes. Interim use represents a temporary arrangement; therefore, it must be anticipated that the interim use will end and the land will be returned to aeronautical use. If the proposed non-aeronautical use will involve granting a long-term lease or constructing improvements, it will be difficult, if not impossible, to recover the land on short notice if it is needed for aeronautical purposes.

Both concurrent and interim uses must not degrade the aeronautical utility of the land. Typically, improved aeronautical land/facilities are not eligible for non-aeronautical uses. Neither concurrent nor interim uses require a formal FAA release of property or a land use change; however, FAA approval of the non-aeronautical use is required.

On-Airport Land Use Summary

Part of the master plan identifies any property on the Airport that could be released or be subject to a land use change. The Airport sponsor may desire to market certain portions of property to both aeronautical and non-aeronautical businesses. Aeronautical businesses are defined as those that require access to the runway/taxiway system. Non-aeronautical businesses include all other types of businesses and public institutions that are permissible under local zoning which is compatible in close proximity of the Airport. The FAA has the authority to review and approve any requests to change the status of all or a portion of Airport property.

OFF-AIRPORT LAND USE COMPATIBILITY

Land use compatibility is the responsibility of the airport sponsor and must be pursued in order to comply with FAA grant assurances. In effect since 1964, Grant Assurance 21, *Compatible Land Use*, implementing Title 49 United States Code (U.S.C.) § 47107 (a) (10), requires, in part, that the sponsor:

"…take appropriate action, to the extent reasonable, including the adoption of zoning laws, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft."

Grant Assurance 20, *Hazard Removal and Mitigation*, states that the airport sponsor:

"…will take appropriate action to assure that such terminal airspace as is required to protect instrument and visual operations to the airport (including established minimum flight altitudes) will be adequately cleared and protected by removing, lowering, relocating, marking, lighting, or otherwise mitigating existing airport hazards and by preventing the establishment or creation of future airport hazards."

In all cases, the FAA expects a sponsor to take appropriate actions to the extent reasonably possible to minimize incompatible land uses. FAA Order 5190.6B, *Airport Compliance Manual*, provides guidance on land use compatibility and other airport compliance issues.

The FAA provides further guidance in Advisory Circular (AC) 150/5200-33, *Hazardous Wildlife Attractants on or Near Airport*s. The distance between the airport movement areas and wildlife attractants should be at least 10,000 feet for airports serving turbine-powered aircraft and should include approach and departure airspace to a distance of five miles. Examples of potential wildlife attractants (particularly for birds) include landfills, waste water treatment facilities, lakes, and wetlands.

HEIGHT AND HAZARD LAND USE ZONING

The City of Redding, City of Anderson, and Shasta County have worked together to ensure that land uses in the vicinity of the Airport are compatible in nature by implementing height and hazard zoning for the protection of the Airport. These entities utilized guidance provided by the FAA in the Code of Federal Regulations (CFR) Part 77, *Objects affecting Navigable Airspace* to develop the height and hazard zoning. The guidance is flexible enough to account for planned changes in the future layout of the Airport. Nonetheless, it is good practice for the airport sponsor to review the local zoning ordinances to be sure it still applies to the new master plan layout. The Airport Airspace Drawing, which is included as part of the Airport Layout Plan drawing set, may be the basis for an updated height and hazard zoning ordinance, should that be needed.

SUMMARY

The recommended master plan concept has been developed with significant input from the PAC, which included representation from the City of Redding, FAA Control Tower, Caltrans Aeronautics, IASCO international flight training, airport businesses, and airport users. This plan provides the necessary development to accommodate and satisfy the anticipated growth over the next 20 years and beyond.

The Airport currently meets design standards for its critical aircraft (that grouping of similar aircraft types that account for 500 or more annual itinerant operations) in ARC C-III. The representative aircraft include the Boeing 737/MD-80, Bae-146, Embraer 170, and Bombardier Q-400. The future critical aircraft is planned to remain in the same design category.

The next chapter of the Master Plan will present both a short term capital improvement program (CIP) and a 20-year long term CIP. Strategies for funding the recommended improvements and a reasonable schedule for undertaking the projects will be presented.

Chapter Six

FINANCIAL PROGRAM

FINANCIAL PROGRAM

The CIP is organized into two sections. The first is discussion of the various capital improvement funding sources on the federal, state, and local levels. The second section presents the airport development schedule and cost summaries in graphic and narrative form.

CAPITAL IMPROVEMENT FUNDING SOURCES

There are generally four sources of funds used to finance airport development: airport cash flow, revenue/general obligation bonds, federal/state/local grants, and passenger facility charges (PFCs), which are reserved for commercial service airports. Access to these sources of financing varies widely among airports, with some large airports maintaining substantial cash reserves and most small commercial service and general aviation airports often requiring subsidies from their sponsors (local and state governments) to fund operating expenses and to finance modest improvements. Airports such as Redding Municipal Airport do not typically maintain large cash reserves and rely on fees and charges to fund operating and small capital expenditures.

Financing capital improvements at the Airport will not rely solely on the financial resources of the City of Redding, acting as the airport sponsor. Capital improvement funding is available through various grant-in-aid programs on both the state and federal levels. While some years more funds could be available, the CIP was developed with project phasing in order to appropriately space projects. The following discussion outlines key sources of funding potentially available for capital improvements at Redding Municipal Airport.

FEDERAL GRANTS

Through federal legislation over the years, various grant-in-aid programs have been established to develop and maintain a system of public-use airports across the United States. The purpose of this system and its federally based funding is to maintain national defense and to promote interstate commerce. The most recent legislation affecting federal funding was enacted on February 17, 2012 and is titled, *FAA Modernization and Reform Act of 2012*.

Some airport projects are eligible for FAA funding through the Airport Improvement Program (AIP), which provides entitlement funds for airports based, in part, on their annual enplaned passengers and pounds of landed cargo weight. Additional AIP funds, designated as discretionary, may also be used for eligible projects, based on the FAA's national priority system. Although the AIP has been reauthorized several times and the funding formulas have been periodically revised to reflect changing national priorities, the program has remained essentially the same. Public-use airports that serve civil aviation like Redding Municipal Airport may receive AIP funding for eligible projects, as described in FAA's *Airport Improvement Program Handbook.* The Airport must fund the remaining project costs using a combination of other funding sources, as discussed further below.

The law authorizes the FAA's AIP at $3.35 billion for fiscal years 2012 through 2015. Eligible airports, which include those in the *National Plan of Integrated Airport Systems* (NPIAS), such as Redding Municipal Airport, can apply for airport improvement grants. **Table 6A** presents the approximate distribution of the AIP funds. Currently, Redding Municipal Airport is eligible to apply for grants which may be funded through several categories.

Funding for AIP-eligible projects is undertaken through a cost-sharing arrangement in which FAA share varies by airport size and is generally 75 percent for large and medium hub airports and 90 percent for all other airports. Since the early days of federal participation in airport infrastructure projects, Congress has provided a higher federal share at airports with more than five percent of their geographic acreage comprised of public lands and nontaxable Indian lands. For states that qualify, such as California with 15.74% public/Indian lands, the federal share is increased depending on the airport classification. As a non-hub commercial service airport, the federal share of eligible capital improvement projects for Redding Municipal Airport is up to 90.66 percent of eligible project costs. In exchange for this level of funding, the airport sponsor is required to meet various Grant Assurances, including maintaining the improvement for its useful life, usually 20 years.

The source for AIP funds is the Aviation Trust Fund. The Aviation Trust Fund was established in 1970 to provide funding for aviation capital investment programs (aviation development, facilities and equipment, and research and development). The Aviation Trust Fund also finances the operation of the FAA. It is funded by user fees, including taxes on airline tickets, aviation fuel, and various aircraft parts.

TABLE 6A
Federal AIP Funding Distribution

Funding Category	Percent of Total	Funds*
Apportionment/Entitlement		
Passenger Entitlements	29.19%	$977,865,000
Cargo Entitlements	3.00%	$100,500,000
Alaska Supplemental	0.65%	$21,775,000
State Apportionment for Nonprimary Entitlements	10.35%	$346,725,000
State Apportionment Based on Area and Population	9.65%	$323,275,000
Carryover	10.77%	$360,795,000
Small Airport Fund		
Small Hubs	1.67%	$55,945,000
Nonhubs	6.68%	$223,780,000
Nonprimary (GA and Reliever)	3.34%	$111,890,000
Discretionary		
Capacity/Safety/Security/Noise	11.36%	$380,560,000
Pure Discretionary	3.79%	$126,965,000
Set Asides		
Noise	8.40%	$281,400,000
Military Airports Program	0.99%	$33,165,000
Reliever	0.16%	$5,360,000
Totals	100.00%	$3,350,000,000

* FAA *Modernization and Reform Act of 2012*
AIP: Airport Improvement Program
Source: FAA Order 5100.38D, Airport Improvement Program Handbook

Apportionment (Entitlement) Funds

AIP provides funding for eligible projects at airports through an apportionment (entitlement) program. Primary commercial service airports receive a guaranteed minimum level of federal assistance each year, based on their enplaned passenger levels and Congressional appropriation levels. A primary airport is defined as any commercial service airport enplaning at least 10,000 passengers annually.

Redding Municipal Airport is projected to receive the minimum entitlement level of $1.0 million each year throughout the remainder of the planning period. The Airport is not projected to qualify for air cargo entitlement funds.

Small Airport Fund

If a large or medium hub commercial service airport chooses to institute a passenger facility charge (PFC), discussed in more detail below, which is a fee of up to $4.50 on each airline ticket for funding of capital improvement projects, then their apportionment is reduced. A portion of the reduced appor-

tionment goes to the small airport fund. The small airport fund is reserved for small-hub primary commercial service airports, non-hub commercial service airports, and general aviation airports. As a non-hub commercial service airport, Redding Municipal Airport is eligible for funds from this source.

Discretionary Funds

In a number of cases, airports face major projects that will require funds in excess of the airport's annual entitlements. Thus, additional funds from discretionary apportionments under AIP become desirable. The primary feature about discretionary funds is that they are distributed on a priority basis. These priorities are established by the FAA, utilizing a priority code system. Under this system, projects are ranked by their purpose. Projects ensuring airport safety and security are ranked as the most important priorities, followed by maintaining current infrastructure development, mitigating noise and other environmental impacts, meeting standards, and increasing system capacity.

It is important to note that competition for discretionary funding is not limited to airports in the State of California or those within the FAA Western Pacific Region. The funds are distributed to all airports in the country and, as such, are more difficult to obtain. High priority projects will often fare favorably, while lower priority projects many times will not receive discretionary grants.

Set-Aside Funds

Portions of AIP funds are set-asides designed to achieve specific funding minimums for noise compatibility planning and implementation, select former military airfields (Military Airport Program), and select reliever airports. It is not anticipated that Redding Municipal Airport will be eligible for this funding category.

FAA Facilities and Equipment (F&E) Program

The Airway Facilities Division of the FAA administers the Facilities and Equipment (F&E) Program. This program provides funding for the installation and maintenance of various navigational aids and equipment of the national airspace system. Under the F&E program, funding is provided for FAA Airport Traffic Control Towers (ATCTs), enroute navigational aids, on-airport navigational aids, and approach lighting systems.

Facilities at Redding Municipal Airport that are eligible to receive funding from the F&E program include the ATCT and navaids, including the instrument landing system.

PASSENGER FACILITY CHARGES

The *Aviation Safety and Capacity Expansion Act of 1990* contained a provision for airports to levy passenger facility charges (PFCs) for the purposes of preserving, enhancing, or making a significant contribution to airport safety, capacity, security, or to reduce or mitigate noise impacts, improve local air quality, enhance competition, or reduce current or anticipated congestion. PFC revenue may be used on a "pay-as-you-go" basis or leveraged to pay debt service on bonds or other debt used to pay for PFC-eligible projects.

14 CFR, Part 158, of May 29, 1991, establishes the regulations that must be followed by airports choosing to levy PFCs. Passenger facility charges may be imposed by public agencies controlling a commercial service airport with at least 2,500 annual passengers with scheduled service. Authorized agencies were allowed to impose a charge of $1.00, $2.00, or $3.00 per enplaned passenger. Legislation (*AIR-21*) passed in 2000 allowed the cap to increase to $4.50, which remains the current cap level. Prior approval is required from the Department of Transportation (DOT) before an airport is allowed to levy a PFC. The DOT must find that the projected revenues are needed for specific, approved projects. Although FAA is required to approve the collection and use of PFCs, the program permits local collection of PFC revenue through the airlines operating at an airport and provides more flexibility to airport sponsors than AIP funds.

Any AIP-eligible project, whether development or planning related, is eligible for PFC funding. Gates and related areas for the movement of passengers and baggage are eligible, as are on-airport ground access projects. Any project approved must preserve or enhance safety, security, or capacity; reduce/mitigate noise impacts; or enhance competition among carriers.

PFCs may be used only on approved projects. However, PFCs can be utilized to fund 100 percent of a project. They may also be used as matching funds for AIP grants or to augment AIP-funded projects. PFCs can be used for debt service and financing costs of bonds for eligible airport development. These funds may also be commingled with general revenue for bond debt service. Before submitting a PFC application, the airport must give notice and an opportunity for consultation with airlines operating at the airport.

PFCs are to be treated similar to other airport improvement grants, rather than as airport revenues, and are administered by the FAA. Airlines retain up to 11 cents per passenger for collecting PFCs. It should also be noted that only revenue passengers pay PFCs. Non-revenue passengers, such as those using frequent flier rewards or airline personnel, are counted as enplanements but do not generate PFCs. Redding Municipal Airport has imposed a $4.50 PFC to fund projects.

STATE FUNDING PROGRAMS

All state grant programs for airports are funded from the Aeronautics Account in the California State Transportation Fund. Tax revenues, which are collected on general aviation fuel, are deposited in the Aeronautics Account. General aviation jet fuel is taxed at $0.02 per gallon, and Avgas is taxed at $0.18 per gallon.

The Revenue and Taxation Code spells out the priority for expenditure of funds:

- Administration and collection of taxes;
- Operations of Division of Aeronautics; and
- Grants to airports.

The Public Utilities Code further specifies the priority of allocation of Aeronautics Account funds to airports:

- Annual Credit Grants;
- AIP Matching; and
- Acquisition and Development (A&D) grants.

Annual Credit Grants

To receive an Annual Credit Grant, the airport cannot be designated by the FAA as a reliever or commercial service airport. The Annual Credit Grant can fund projects for "airports and aviation purposes" as defined in the *State Aeronautics Act*. It can also be used to fund fueling facilities, restrooms, showers, wash racks, and operations and maintenance. The annual funding level is $10,000, and up to five years' worth of Annual Credit Grants may be accrued at the sponsor's discretion. No local match is required. Redding Municipal Airport is not eligible for an Annual Credit Grant as it is a commercial service airport.

AIP Matching Grants

A portion of FAA AIP grants can be matched with state funds. The current matching rate is 5.0 percent of the federal portion of the total project cost. A project which is being funded by an AIP grant must be included in the airport CIP. The amount set aside for AIP matching is determined by the California Transportation Commission (CTC) each year. Unused set-aside funds are available for additional A&D Grants.

State matching is limited to projects at airports that are not designated as commercial service airports. Redding Municipal Airport is not eligible for AIP Matching Grants as it is a commercial service airport.

Acquisition & Development (A&D) Grants

This grant program is open to general aviation, reliever, and commercial service airports. Also, a city or county may receive grants on behalf of a privately owned, public-use airport. An airport land use commission (ALUC) can receive funding to either prepare or update a comprehensive land use plan. Similar to state Annual Grants, an A&D grant can fund projects for "airport and aviation purposes" as defined in the *State Aeronautics Act*. An A&D grant cannot be used as a local match for an AIP grant.

The minimum amount of an A&D grant is $10,000, while the maximum amount that can be allocated to an airport in a single fiscal year is $500,000 through single or multiple grants. The local match can vary from 10 to 50 percent of the project's cost and is set annually by the CTC. A 10 percent rate has been used the past 15 years.

California Airport Loan Program

Eligible airports, including Redding Municipal Airport, can obtain low interest loans for airport development projects, the local matching portion of an AIP grant, and revenue-generating projects such as fuel farms and hangars. Land banking, airport access roads, parking lots, and airline facilities are not eligible under the loan program. Currently, there is no limit on the size of the loans except the availability of funds. Redding Municipal Airport has not utilized this program recently.

LOCAL FUNDING

The balance of project costs, after consideration has been given to grants, must be funded through local resources. A goal for any airport is to generate enough revenue to cover all operating and capital expenditures, if possible. For most airports, this is not always possible and other financing methods may be needed.

There are several local financing options to fund future development at airports, including airport revenues, issuance of a variety of bond types, and leasehold financing. These strategies could be used to fund the local matching share, or complete a project if grant funding cannot be arranged.

Bonding

Bonding is a common method to finance large capital projects at airports. A bond is an instrument of indebtedness of the bond issuer to the bond holders; thus, a bond is a form of loan or IOU. While bond terms are negotiable, typically the bond issuer is obligated to pay the bond holder interest at regular intervals and/or repay the principal at a later date.

Leasehold Financing

Leasehold financing refers to a developer or tenant financing improvements under a long-term ground lease. The advantage of this arrangement is that is relieves the airport sponsor of the responsibility of having to raise capital funds for the improvement. As an example, a fixed base operator (FBO) might consider constructing hangars and charging fair market lease rates while paying the airport for a ground lease. A fuel farm can be undertaken in the same manner with the developer of the facility paying the airport a fuel flowage fee.

Customer Facility Charge (CFC)

A CFC is the imposition of an additional fee charged to customers for the use of certain facilities. The most common example is when an airport constructs a consolidated rental car facility and imposes a fee for each rental car contract. That fee is then used by the airport to pay down the debt incurred from building the facility.

AIRPORT DEVELOPMENT SCHEDULES AND COST SUMMARIES

Now that the specific needs and improvements for the Airport have been established, the next step is to determine a realistic schedule and the associated costs for implementing the plan. The implementation plan considers the interrelationships among the projects in the recommended alternative in order to determine a sequence to minimize conflicts and establish a master schedule.

This section will examine the overall cost of each item in the recommended development alternative and present a development schedule. The implementation plan covers the same years as the forecasts in the planning effort. A CIP, programmed by years, has been developed to cover the first five years of the plan. The remaining projects will be grouped into intermediate (years 6-10) and long (years 11-20) term planning horizons. More detailed information is provided for the five-year horizon, with less detail provided for the longer planning periods. By utilizing planning horizons instead of specific years for intermediate and long term development, the Airport will have greater flexibility to adjust capital needs as demand dictates. **Table 6B** summarizes the key milestones for each of the three planning horizons.

TABLE 6B
Planning Horizon Activity Levels
Redding Municipal Airport

	BASE YEAR	PLANNING HORIZONS		
	2013	Short Term	Inter. Term	Long Term
Enplaned Passengers	**24,875**	**45,800**	**49,200**	**56,100**
Itinerant Operations				
Air Carrier/Air Taxi	34,497	38,900	40,900	45,100
General Aviation	19,346	21,000	22,000	25,000
Military	393	400	400	400
Total Itinerant Operations	54,236	60,300	63,300	70,500
Local Operations				
General Aviation	44,695	49,000	52,000	57,000
Military	206	200	200	200
Total Local Operations	44,901	49,200	52,200	57,200
Total Airport Operations	99,137	109,500	115,500	127,700
Peak General Aviation Operations				
Peak Month	6,628	7,210	7,620	8,450
Busy Day	276	300	318	352
Annual Air Cargo (million pounds)	1.480	1.728	1.839	2.077
Registered Aircraft – Shasta County	353	372	386	418
Based Aircraft	218	233	245	272

Source: Master Plan, Chapter Two

A key aspect of this planning document is the use of demand-based planning milestones. The short term planning horizon contains items of highest need and/or priority. These items should be considered for development based on actual demand levels within the next five years. As short term horizon activity levels are reached, it will then be time to program for the intermediate term based upon the next activity milestones. Similarly, when the intermediate term milestones are reached, it will be time to program for the long term activity milestones.

Several development items included in the recommended alternative will need to follow demand indicators which essentially establish triggers for key improvements. For example, the recommended alternative includes construction of new hangar aprons and taxilanes. Based aircraft will be the indicator for additional hangar needs. If based aircraft growth occurs as projected, additional hangars and apron will need to be constructed to meet the demand. If growth slows or does not occur as projected, hangar pavement projects can be delayed. As a result, capital expenditures will be undertaken as needed, which leads to a responsible use of capital assets. Some development items do not depend on demand, such as pavement maintenance. These types of projects typically are associated with day-to-day operations and should be monitored and identified by Airport management.

Not all potential projects considered in the recommended alternative will need to follow specific demand milestones. Many projects are necessary to maintain existing facilities and to meet FAA design standards for safety. These projects need to be programmed in a timely manner regardless of changes in demand indicators.

As a master plan is a conceptual document, implementation of these capital projects will require environmental documentation prior to design and construction. Each project will only be undertaken after further refinement of their design and costs through specific project implementation process activities associated with architectural and engineering analyses. Moreover, some projects may require associated infrastructure improvements such as utilities. Some projects may also require agency coordination activities as well as public coordination activities that carry the public involvement process into the project implementation phase.

The cost estimates presented in this chapter have been increased by 15-25 percent to allow for contingencies that may arise on the project. Capital costs presented here should be viewed only as estimates subject to further refinement during design. Nevertheless, these estimates are considered sufficiently accurate for planning purposes. The cost estimates are in 2015 dollars and should be increased accordingly for the actual year of implementation.

Table 6C presents the proposed CIP for the Redding Municipal Airport. The first funding column presents an estimate of the total cost of the project. The second funding column presents that portion of the project that is likely eligible for FAA funding through the AIP. In California, the maximum funding level through AIP is 90.66 percent for non-hub and small hub airports. The third funding column considers the Airport's matching share responsibility. The matching share is eligible for funding through PFCs that the Airport can impose on airline tickets. The last funding column is for those projects, or a portion thereof, that are not typically eligible for funding through AIP or PFCs.

TABLE 6C
Capital Improvement Program
Redding Municipal Airport

Project Description	Quantity	Total Cost	Federal Share	Local Share
SHORT TERM				
2016				
West Tiedown Apron Reconstruction	17,000 s.y.	$1,300,000	$1,178,580	$121,420
T-Hangar Taxilanes Reconstruction – Phase 1	25,000 s.y.	$1,700,000	$1,541,220	$158,780
Relocate PAPI Power Units from Rwy 30 & 34 RSA/OFA	Lump Sum	$130,000	$117,858	$12,142
2016 Total		$3,130,000	$2,719,800	$280,200
2017				
T-Hangar Taxilanes Reconstruction – Phase 2	25,000 s.y.	$1,700,000	$1,541,200	$158,780
Installation of Passenger Terminal Exit Lane Turnstiles	Lump Sum	$250,000	$226,650	$23,350
Environmental Assessment (Parallel Runway)	Lump Sum	$350,000	$317,310	$32,690
2017 Total		$2,300,000	$2,085,180	$214,820
2018				
Reconstruct Runway 16 Blast Pad & Taxiway H	Lump Sum	$1,500,000	$1,359,900	$140,100
Reconstruct the Terminal Loop Access Road	15,000 s.y.	$1,650,000	$1,495,890	$154,110
2018 Total		$3,150,000	$2,855,790	$294,210
2019				
Parallel Runway/Taxiway Design	Lump Sum	$500,000	$453,300	$46,700
2019 Total		$500,000	$453,300	$46,700
2020				
Construct Parallel Runway/Taxiway	55,000 s.y.	$4,300,000	$3,898,380	$401,620
2020 Total		$4,300,000	$3,898,380	$401,620
Short Term Total		**$13,380,000**	**$12,012,450**	**$1,237,550**
INTERMEDIATE TERM (2021-2025)				
East Side Cargo Expansion (Design)	Lump Sum	$120,000	$108,792	$11,208
New Aircraft Parking Apron (Design)	Lump Sum	$120,000	$108,792	$11,208
All Weather Perimeter Road – RSAP Recommendation (Design)	Lump Sum	$90,000	$81,594	$8,406
Upgrade Airfield Electrical System (Design)	Lump Sum	$150,000	$135,990	$14,010
Security Fencing (Design)	Lump Sum	$55,000	$49,863	$5,137
East Side Cargo Expansion	17,100 s.y.	$1,200,000	$1,087,920	$112,080
New Aircraft Parking Apron	17,100 s.y.	$1,200,000	$1,087,920	$112,080
All Weather Perimeter Road – RSAP Recommendation	Lump Sum	$600,000	$543,960	$56,040
Upgrade Airfield Electrical System	Lump Sum	$1,250,000	$1,133,250	$116,750
Security Fencing	15,000 l.f.	$480,000	$435,168	$44,832
Pavement Preservation (East Apron) – Seal Coat (Design)	Lump Sum	$18,000	$16,319	$1,681
Pavement Preservation (Rwy 12/30, Apron, Twys) (Design)	Lump Sum	$120,000	$108,792	$11,208
Install MITL (Txy M, C, H) (Design)	Lump Sum	$67,500	$61,196	$6,305
Eastside Apron Expansion (Design)	Lump Sum	$165,000	$149,589	$15,411
Pavement Preservation (East Apron) – Seal Coat	15,000 s.y.	$120,000	$108,792	$11,208
Pavement Preservation (Rwy 12/30, Apron, Twys)	170,000 s.y.	$800,000	$725,280	$74,720
Install MITL (Txy M, C, H)	2,500 l.f.	$450,000	$407,970	$42,030
Eastside Apron Expansion	15,000 s.y.	$1,100,000	$997,260	$102,740
Intermediate Term Total		**$8,105,500**	**$7,348,447**	**$757,054**
LONG TERM (2026-2035)				
Extend Parallel Taxiway	42,000 s.y.	$3,150,000	$2,855,790	$294,210
Expand West Side Apron (Phase)	45,000 s.y.	$3,375,000	$3,059,770	$315,230
Sealcoat West Side Pavement (Phase)	120,000 s.y.	$960,000	$870,330	$89,670
T-Hangar Pavements (Phase)	23,000 s.y.	$1,150,000	$1,042,590	$107,410
On-Airport Road Extensions	7,500 l.f.	$1,500,000	$1,359,900	$140,100
Upgrade Rwy/Twy Lighting (LED)	Lump Sum	$350,000	$317,310	$32,690
Upgrade ARFF Equipment	Lump Sum	$1,000,000	$906,600	$93,400
Long Term Total		**$11,485,000**	**$10,412,290**	**$1,072,710**
GRAND TOTAL		**$32,970,500**	**$29,773,187**	**$3,067,314**

Short Term Projects (2016-2020)

Several projects in the first few years of the plan deal with pavement preservation on the west tiedown (local) apron, in the T-hangar area, primary runway, and terminal loop access road. The T-hangar taxilane pavement preservation project has been split over two years. Also, relocation of PAPI units for Runways 30 and 34 are programmed. In the third year, the rehabilitation of the Runway 16 blast pad and Taxiway H is programmed. In 2017/2019, the environmental processing for the parallel runway and the design work for this project can be undertaken. One new terminal area project included in the short term is the extension of a dedicated access road into the air cargo area, segregating this traffic from the passenger traffic on the terminal curb. This project will also require the re-marking of Municipal Boulevard for two-way traffic. The construction of the parallel runway, followed by the closure of Runway 12-30, is programmed beginning in 2020, although completion of the new runway and closure of Runway 12-30 is not anticipated until the intermediate term.

Intermediate Term Projects (2021-2025)

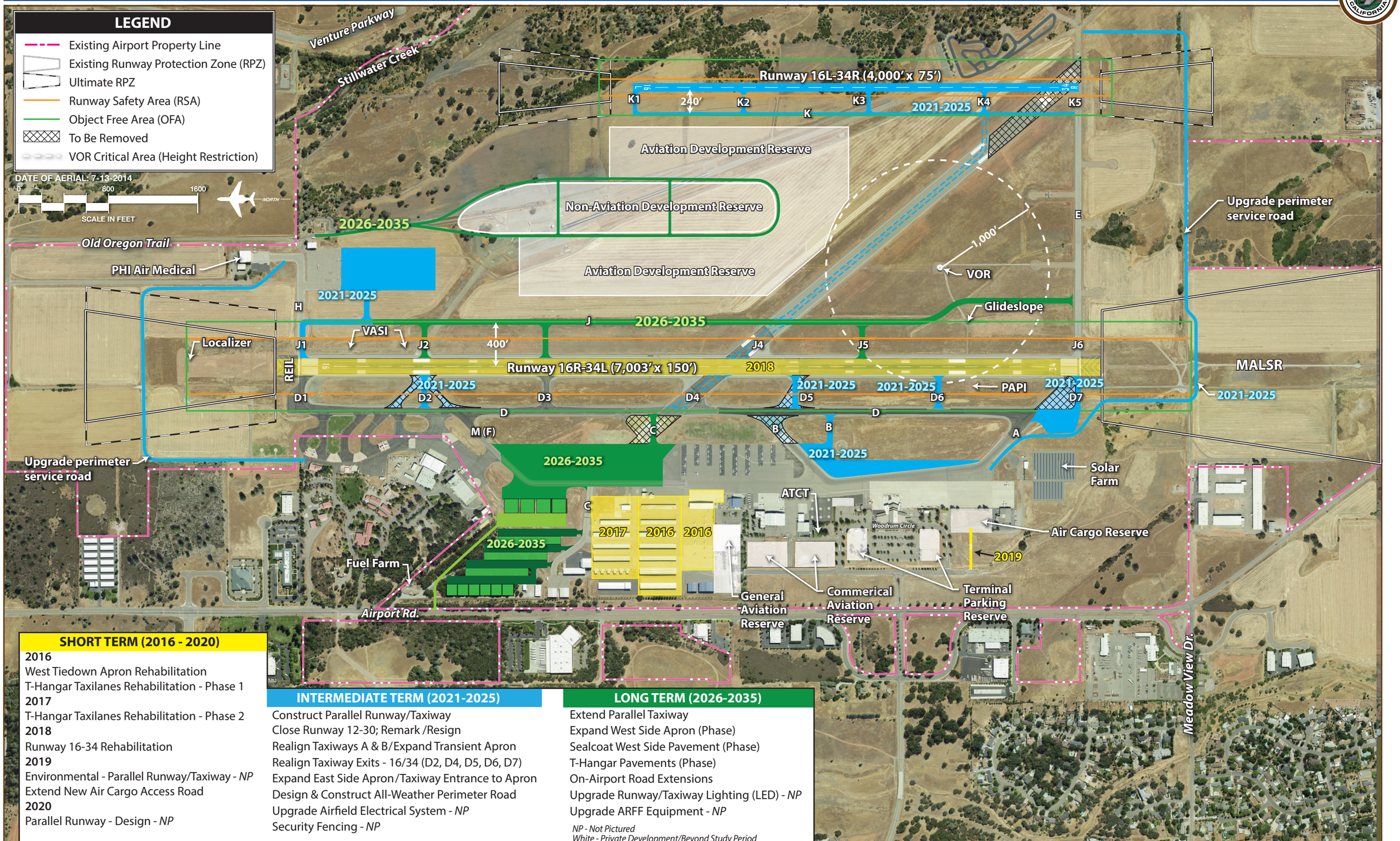
Several projects included in the intermediate term can be phased to meet the needs of based aircraft and helicopter activity. Apron expansions are included on both the east and west sides of the airfield. The eastside expansion also includes a partial construction of parallel taxiway and new taxilane connection into the expanded ramp. While the entire project is included in the intermediate term, it could be phased to meet demand. The expansion of ramp area on the west side is intended to expand the itinerant ramp while realigning both Taxiways A and B. The project will result in a net gain of 24 tiedown positions, reposition Taxiway A to be parallel with the commercial ramp, and relocate Taxiway B farther south and at a right angle with Taxiway D.

Also included in the intermediate term is the reconfiguration of the taxiway exits between the primary runway and Taxiway D to conform to new FAA design standards. The exits (based upon new nomenclature) would become D2, D5, D6, and D7. A project is included to design and construct all-weather perimeter roads. The alignment of the perimeter road on the south end of the runway will need to remain outside of the runway safety area and wetland areas. Several other projects included in the intermediate term include the upgrade of the airfield electrical system, added security fencing, and new medium intensity taxiway lights.

Long Term Projects (2026-2035)

The long term projects include the extension of the parallel taxiway (along the east side of the primary runway), expansion of itinerant apron on the west side, pavement preservation on the west side, extension of roadways to serve future aviation development areas on the east side, upgrades to LED runway and taxiway lighting, and new aircraft rescue and firefighting (ARFF) equipment. It has been assumed that all new hangar construction will be undertaken by private developers on leased airport property. However, the construction of taxilanes between the hangars is included as an AIP-eligible project.

Exhibit 6A graphically presents the master plan projects on an aerial photograph of the Airport. The CIP establishes a list of projects recommended over the next 20-years. The key activities and responsibilities for implementation will vary from project to project, but will include project funding activities, environmental processing activities, sponsor-specific project implementation process activities associated with designing and constructing projects, agency coordination, and public involvement coordination.



SHORT TERM (2016 - 2020)

2016
West Tiedown Apron Rehabilitation
T-Hangar Taxilanes Rehabilitation - Phase 1
2017
T-Hangar Taxilanes Rehabilitation - Phase 2
2018
Runway 16-34 Rehabilitation
2019
Environmental - Parallel Runway/Taxiway - *NP*
Extend New Air Cargo Access Road
2020
Parallel Runway - Design - *NP*

INTERMEDIATE TERM (2021-2025)

Construct Parallel Runway/Taxiway
Close Runway 12-30; Remark /Resign
Realign Taxiways A & B/Expand Transient Apron
Realign Taxiway Exits - 16/34 (D2, D4, D5, D6, D7)
Expand East Side Apron/Taxiway Entrance to Apron
Design & Construct All-Weather Perimeter Road
Upgrade Airfield Electrical System - *NP*
Security Fencing - *NP*

LONG TERM (2026-2035)

Extend Parallel Taxiway
Expand West Side Apron (Phase)
Sealcoat West Side Pavement (Phase)
T-Hangar Pavements (Phase)
On-Airport Road Extensions
Upgrade Runway/Taxiway Lighting (LED) - *NP*
Upgrade ARFF Equipment - *NP*

NP - Not Pictured
White - Private Development/Beyond Study Period

Exhibit 6A
PROJECT PHASING

REDDING
Municipal Airport

Appendix A

GLOSSARY OF TERMS

Glossary of Terms

A

ABOVE GROUND LEVEL: The elevation of a point or surface above the ground.

ACCELERATE-STOP DISTANCE AVAILABLE (ASDA): See declared distances.

ADVISORY CIRCULAR: External publications issued by the FAA consisting of nonregulatory material providing for the recommendations relative to a policy, guidance and information relative to a specific aviation subject.

AIR CARRIER: An operator which: (1) performs at least five round trips per week between two or more points and publishes flight schedules which specify the times, days of the week, and places between which such flights are performed; or (2) transports mail by air pursuant to a current contract with the U.S. Postal Service. Certified in accordance with Federal Aviation Regulation (FAR) Parts 121 and 127.

AIRCRAFT: A transportation vehicle that is used or intended for use for flight.

AIRCRAFT APPROACH CATEGORY: A grouping of aircraft based on 1.3 times the stall speed in their landing configuration at their maximum certificated landing weight. The categories are as follows:

- Category A: Speed less than 91 knots.
- Category B: Speed 91 knots or more, but less than 121 knots.
- Category C: Speed 121 knots or more, but less than 141 knots.
- Category D: Speed 141 knots or more, but less than 166 knots.
- Category E: Speed greater than 166 knots.

AIRCRAFT OPERATION: The landing, takeoff, or touch-and-go procedure by an aircraft on a runway at an airport.

AIRCRAFT OPERATIONS AREA (AOA): A restricted and secure area on the airport property designed to protect all aspects related to aircraft operations.

AIRCRAFT OWNERS AND PILOTS ASSOCIATION: A private organization serving the interests and needs of general aviation pilots and aircraft owners.

AIRCRAFT RESCUE AND FIRE FIGHTING: A facility located at an airport that provides emergency vehicles, extinguishing agents, and personnel responsible for minimizing the impacts of an aircraft accident or incident.

AIRFIELD: The portion of an airport which contains the facilities necessary for the operation of aircraft.

AIRLINE HUB: An airport at which an airline concentrates a significant portion of its activity and which often has a significant amount of connecting traffic.

AIRPLANE DESIGN GROUP (ADG): A grouping of aircraft based upon wingspan. The groups are as follows:

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

AIRPORT AUTHORITY: A quasi-governmental public organization responsible for setting the policies governing the management and operation of an airport or system of airports under its jurisdiction.

AIRPORT BEACON: A navigational aid located at an airport which displays a rotating light beam to identify whether an airport is lighted.

AIRPORT CAPITAL IMPROVEMENT PLAN: The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute funds for airport development and the needs of the National Airspace System to meet specified national goals and objectives.

AIRPORT ELEVATION: The highest point on the runway system at an airport expressed in feet above mean sea level (MSL).

AIRPORT IMPROVEMENT PROGRAM: A program authorized by the Airport and Airway Improvement Act of 1982 that provides funding for airport planning and development.

AIRPORT LAYOUT DRAWING (ALD): The drawing of the airport showing the layout of existing and proposed airport facilities.

AIRPORT LAYOUT PLAN (ALP): A scaled drawing of the existing and planned land and facilities necessary for the operation and development of the airport.

AIRPORT LAYOUT PLAN DRAWING SET: A set of technical drawings depicting the current and future airport conditions. The individual sheets comprising the set can vary with the complexities of the airport, but the FAA-required drawings include the Airport Layout Plan (sometimes referred to as the Airport Layout Drawing (ALD), the Airport Airspace Drawing, and the Inner Portion of the Approach Surface Drawing, On-Airport Land Use Drawing, and Property Map.

AIRPORT MASTER PLAN: The planner's concept of the long-term development of an airport.

AIRPORT MOVEMENT AREA SAFETY SYSTEM: A system that provides automated alerts and warnings of potential runway incursions or other hazardous aircraft movement events.

AIRPORT OBSTRUCTION CHART: A scaled drawing depicting the Federal Aviation Regulation (FAR) Part 77 surfaces, a representation of objects that penetrate these surfaces, runway, taxiway, and ramp areas, navigational aids, buildings, roads and other detail in the vicinity of an airport.

AIRPORT REFERENCE CODE (ARC): A coding system used to relate airport design criteria to the operational (Aircraft Approach Category) to the physical characteristics (Airplane Design Group) of the airplanes intended to operate at the airport.

AIRPORT REFERENCE POINT (ARP): The latitude and longitude of the approximate center of the airport.

AIRPORT SPONSOR: The entity that is legally responsible for the management and operation of an airport, including the fulfillment of the requirements of laws and regulations related thereto.

AIRPORT SURFACE DETECTION EQUIPMENT: A radar system that provides air traffic controllers with a visual representation of the movement of aircraft and other vehicles on the ground on the airfield at an airport.

AIRPORT SURVEILLANCE RADAR: The primary radar located at an airport or in an air traffic control terminal area that receives a signal at an antenna and transmits the signal to air traffic control display equipment defining the location of aircraft in the air. The signal provides only the azimuth and range of aircraft from the location of the antenna.

AIRPORT TRAFFIC CONTROL TOWER (ATCT): A central operations facility in the terminal air traffic control system, consisting of a tower, including an associated instrument flight rule (IFR) room if radar equipped, using air/ground communications and/or radar, visual signaling and other devices to provide safe and expeditious movement of terminal air traffic.

AIR ROUTE TRAFFIC CONTROL CENTER: A facility which provides en route air traffic control service to aircraft operating on an IFR flight plan within controlled airspace over a large, multi-state region.

AIRSIDE: The portion of an airport that contains the facilities necessary for the operation of aircraft.

AIRSPACE: The volume of space above the surface of the ground that is provided for the operation of aircraft.

AIR TAXI: An air carrier certificated in accordance with FAR Part 121 and FAR Part 135 and authorized to provide, on demand, public transportation of persons and property by aircraft. Generally operates small aircraft "for hire" for specific trips.

AIR TRAFFIC CONTROL: A service operated by an appropriate organization for the purpose of providing for the safe, orderly, and expeditious flow of air traffic.

AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC): A facility established to provide air traffic control service to aircraft operating on an IFR flight plan within controlled airspace and principally during the en route phase of flight.

AIR TRAFFIC CONTROL SYSTEM COMMAND CENTER: A facility operated by the FAA which is responsible for the central flow control, the central altitude reservation system, the airport reservation position system, and the air traffic service contingency command for the air traffic control system.

AIR TRAFFIC HUB: A categorization of commercial service airports or group of commercial service airports in a metropolitan or urban area based upon the proportion of annual national enplanements existing at the airport or airports. The categories are large hub, medium hub, small hub, or non-hub. It forms the basis for the apportionment of entitlement funds.

AIR TRANSPORT ASSOCIATION OF AMERICA: An organization consisting of the principal U.S. airlines that represents the interests of the airline industry on major aviation issues before federal, state, and local government bodies. It promotes air transportation safety by coordinating industry and governmental safety programs and it serves as a focal point for industry efforts to standardize practices and enhance the efficiency of the air transportation system.

ALERT AREA: See special-use airspace.

ALTITUDE: The vertical distance measured in feet above mean sea level.

ANNUAL INSTRUMENT APPROACH (AIA): An approach to an airport with the intent to land by an aircraft in accordance with an IFR flight plan when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude.

APPROACH LIGHTING SYSTEM (ALS): An airport lighting facility which provides visual guidance to landing aircraft by radiating light beams by which the pilot aligns the aircraft with the extended centerline of the runway on his final approach and landing.

APPROACH MINIMUMS: The altitude below which an aircraft may not descend while on an IFR approach unless the pilot has the runway in sight.

APPROACH SURFACE: An imaginary obstruction limiting surface defined in FAR Part 77 which is longitudinally centered on an extended runway centerline and extends outward and upward from the primary surface at each end of a runway at a designated slope and distance based upon the type of available or planned approach by aircraft to a runway.

APRON: A specified portion of the airfield used for passenger, cargo or freight loading and unloading, aircraft parking, and the refueling, maintenance and servicing of aircraft.

AREA NAVIGATION: The air navigation procedure that provides the capability to establish and maintain a flight path on an arbitrary course that remains within the coverage area of navigational sources being used.

AUTOMATED TERMINAL INFORMATION SERVICE (ATIS): The continuous broadcast of recorded non-control information at towered airports. Information typically includes wind speed, direction, and runway in use.

AUTOMATED SURFACE OBSERVATION SYSTEM (ASOS): A reporting system that provides frequent airport ground surface weather observation data through digitized voice broadcasts and printed reports.

AUTOMATIC WEATHER OBSERVATION STATION (AWOS): Equipment used to automatically record weather conditions (i.e. cloud height, visibility, wind speed and direction, temperature, dew point, etc.)

AUTOMATIC DIRECTION FINDER (ADF): An aircraft radio navigation system which senses and indicates the direction to a non-directional radio beacon (NDB) ground transmitter.

AVIGATION EASEMENT: A contractual right or a property interest in land over which a right of unobstructed flight in the airspace is established.

AZIMUTH: Horizontal direction expressed as the angular distance between true north and the direction of a fixed point (as the observer's heading).

B

BASE LEG: A flight path at right angles to the landing runway off its approach end. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline. See "traffic pattern."

BASED AIRCRAFT: The general aviation aircraft that use a specific airport as a home base.

BEARING: The horizontal direction to or from any point, usually measured clockwise from true north or magnetic north.

BLAST FENCE: A barrier used to divert or dissipate jet blast or propeller wash.

BLAST PAD: A prepared surface adjacent to the end of a runway for the purpose of eliminating the erosion of the ground surface by the wind forces produced by airplanes at the initiation of takeoff operations.

BUILDING RESTRICTION LINE (BRL): A line which identifies suitable building area locations on the airport.

C

CAPITAL IMPROVEMENT PLAN: The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute Airport Improvement Program funds for airport development and the needs of the National Airspace System to meet specified national goals and objectives.

CARGO SERVICE AIRPORT: An airport served by aircraft providing air transportation of property only, including mail, with an annual aggregate landed weight of at least 100,000,000 pounds.

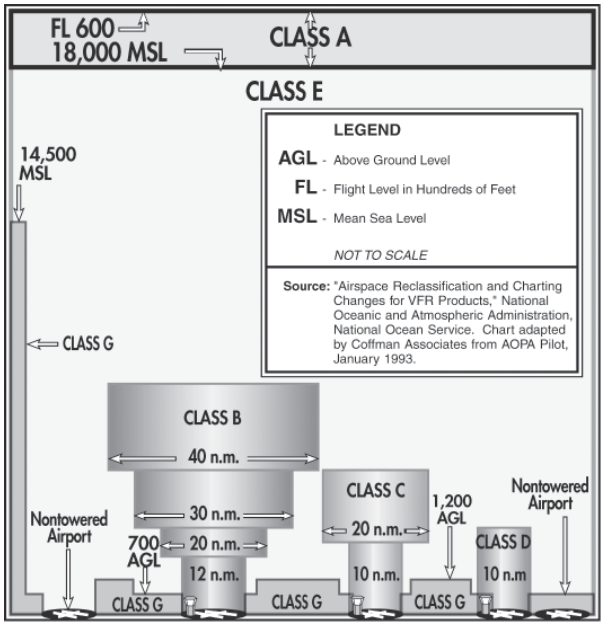
CATEGORY I: An Instrument Landing System (ILS) that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 200 feet above the horizontal plane containing the runway threshold.

CATEGORY II: An ILS that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 100 feet above the horizontal plane containing the runway threshold.

CATEGORY III: An ILS that provides acceptable guidance information to a pilot from the coverage limits of the ILS with no decision height specified above the horizontal plane containing the runway threshold.

CEILING: The height above the ground surface to the location of the lowest layer of clouds which is reported as either broken or overcast.

CIRCLING APPROACH: A maneuver initiated by the pilot to align the aircraft with the runway for landing when flying a predetermined circling instrument approach under IFR.



CLASS A AIRSPACE: See Controlled Airspace.

CLASS B AIRSPACE: See Controlled Airspace.

CLASS C AIRSPACE: See Controlled Airspace.

CLASS D AIRSPACE: See Controlled Airspace.

CLASS E AIRSPACE: See Controlled Airspace.

CLASS G AIRSPACE: See Controlled Airspace.

CLEAR ZONE: See Runway Protection Zone.

COMMERCIAL SERVICE AIRPORT: A public airport providing scheduled passenger service that enplanes at least 2,500 annual passengers.

COMMON TRAFFIC ADVISORY FREQUENCY: A radio frequency identified in the appropriate aeronautical chart which is designated for the purpose of transmitting airport advisory information and procedures while operating to or from an uncontrolled airport.

COMPASS LOCATOR (LOM): A low power, low/medium frequency radio-beacon installed in conjunction with the instrument landing system at one or two of the marker sites.

CONICAL SURFACE: An imaginary obstruction-limiting surface defined in FAR Part 77 that extends

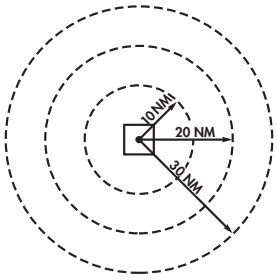
from the edge of the horizontal surface outward and upward at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

CONTROLLED AIRPORT: An airport that has an operating airport traffic control tower.

CONTROLLED AIRSPACE: Airspace of defined dimensions within which air traffic control services are provided to instrument flight rules (IFR) and visual flight rules (VFR) flights in accordance with the airspace classification. Controlled airspace in the United States is designated as follows:

- **CLASS A**: Generally, the airspace from 18,000 feet mean sea level (MSL) up to but not including flight level FL600. All persons must operate their aircraft under IFR.

- **CLASS B**:



Generally, the airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The configuration of Class B airspace is unique to each airport, but typically consists of two or more layers of air space and is designed to contain all published instrument approach procedures to the airport. An air traffic control clearance is required for all aircraft to operate in the area.

- **CLASS C**: Generally, the airspace from the surface to 4,000 feet above the airport elevation (charted as MSL) surrounding those airports that have an operational control tower and radar approach control and are served by a qualifying number of IFR operations or passenger enplanements. Although individually tailored for each airport, Class C airspace typically consists of a surface area with a five nautical mile (nm) radius and an outer area with a 10 nautical mile radius that extends from 1,200 feet to 4,000 feet above the airport elevation. Two-way radio communication is required for all aircraft.

- **CLASS D**: Generally, that airspace from the surface to 2,500 feet above the air port elevation (charted as MSL) surrounding those airports that have an operational control tower. Class D airspace is individually tailored and configured to encompass published instrument approach procedure. Unless otherwise authorized, all persons must establish two-way radio communication.

- **CLASS E**: Generally, controlled airspace that is not classified as Class A, B, C, or D. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. When designated as a surface area, the airspace will be configured to contain all instrument procedures. Class E airspace encompasses all Victor Airways. Only aircraft following instrument flight rules are required to establish two-way radio communication with air traffic control.

- **CLASS G**: Generally, that airspace not classified as Class A, B, C, D, or E. Class G airspace is uncontrolled for all aircraft. Class G airspace extends from the surface to the overlying Class E airspace.

CONTROLLED FIRING AREA: See special-use airspace.

CROSSWIND: A wind that is not parallel to a runway centerline or to the intended flight path of an aircraft.

CROSSWIND COMPONENT: The component of wind that is at a right angle to the runway centerline or the intended flight path of an aircraft.

CROSSWIND LEG: A flight path at right angles to the landing runway off its upwind end. See "traffic pattern."

D

DECIBEL: A unit of noise representing a level relative to a reference of a sound pressure 20 micro newtons per square meter.

DECISION HEIGHT/ DECISION ALTITUDE: The height above the end of the runway surface at which a decision must be made by a pilot during the ILS or Precision Approach Radar approach to either continue the approach or to execute a missed approach.

DECLARED DISTANCES: The distances declared available for the airplane's takeoff runway, takeoff distance, accelerate-stop distance, and landing distance requirements. The distances are:

- **TAKEOFF RUNWAY AVAILABLE (TORA):** The runway length declared available and suitable for the ground run of an airplane taking off.

- **TAKEOFF DISTANCE AVAILABLE (TODA):** The TORA plus the length of any remaining runway and/or clear way beyond the far end of the TORA.

- **ACCELERATE-STOP DISTANCE AVAILABLE (ASDA):** The runway plus stopway length declared available for the acceleration and deceleration of an aircraft aborting a takeoff.

- **LANDING DISTANCE AVAILABLE (LDA):** The runway length declared available and suitable for landing.

DEPARTMENT OF TRANSPORTATION: The cabinet level federal government organization consisting of modal operating agencies, such as the Federal Aviation Administration, which was established to promote the coordination of federal transportation programs and to act as a focal point for research and development efforts in transportation.

DISCRETIONARY FUNDS: Federal grant funds that may be appropriated to an airport based upon designation by the Secretary of Transportation or Congress to meet a specified national priority such as enhancing capacity, safety, and security, or mitigating noise.

DISPLACED THRESHOLD: A threshold that is located at a point on the runway other than the designated beginning of the runway.

DISTANCE MEASURING EQUIPMENT (DME): Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.

DNL: The 24-hour average sound level, in Aweighted decibels, obtained after the addition of ten decibels to sound levels for the periods between 10 p.m. and 7 a.m. as averaged over a span of one year. It is the FAA standard metric for determining the cumulative exposure of individuals to noise.

DOWNWIND LEG: A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg. Also see "traffic pattern."

E

EASEMENT: The legal right of one party to use a portion of the total rights in real estate owned by another party. This may include the right of passage over, on, or below the property; certain air rights above the property, including view rights; and the rights to any specified form of development or activity, as well as any other legal rights in the property that may be specified in the easement document.

ELEVATION: The vertical distance measured in feet above mean sea level.

ENPLANED PASSENGERS: The total number of revenue passengers boarding aircraft, including originating, stop-over, and transfer passengers, in scheduled and nonscheduled services.

ENPLANEMENT: The boarding of a passenger, cargo, freight, or mail on an aircraft at an airport.

ENTITLEMENT: Federal funds for which a commercial service airport may be eligible based upon its annual passenger enplanements.

ENVIRONMENTAL ASSESSMENT (EA): An environmental analysis performed pursuant to the National Environmental Policy Act to determine whether an action would significantly affect the environment and thus require a more detailed environmental impact statement.

ENVIRONMENTAL AUDIT: An assessment of the current status of a party's compliance with applicable environmental requirements of a party's environmental compliance policies, practices, and controls.

ENVIRONMENTAL IMPACT STATEMENT (EIS): A document required of federal agencies by the National Environmental Policy Act for major projects are legislative proposals affecting the environment. It is a tool for decision-making describing the positive and negative effects of a proposed action and citing alternative actions.

ESSENTIAL AIR SERVICE: A federal program which guarantees air carrier service to selected small cities by providing subsidies as needed to prevent these cities from such service.

F

FEDERAL AVIATION REGULATIONS: The general and permanent rules established by the executive departments and agencies of the Federal Government for aviation, which are published in the Federal Register. These are the aviation subset of the Code of Federal Regulations.

FEDERAL INSPECTION SERVICES: The provision of customs and immigration services including passport inspection, inspection of baggage, the collection of duties on certain imported items, and the inspections for agricultural products, illegal drugs, or other restricted items.

FINAL APPROACH: A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway. See "traffic pattern."

FINAL APPROACH AND TAKEOFF AREA (FATO). A defined area over which the final phase of the helicopter approach to a hover, or a landing is completed and from which the takeoff is initiated.

FINAL APPROACH FIX: The designated point at which the final approach segment for an aircraft landing on a runway begins for a non-precision approach.

FINDING OF NO SIGNIFICANT IMPACT (FONSI): A public document prepared by a Federal agency that presents the rationale why a proposed action will not have a significant effect on the environment and for which an environmental impact statement will not be prepared.

FIXED BASE OPERATOR (FBO): A provider of services to users of an airport. Such services include, but are not limited to, hangaring, fueling, flight training, repair, and maintenance.

FLIGHT LEVEL: A measure of altitude used by aircraft flying above 18,000 feet. Flight levels are indicated by three digits representing the pressure altitude in hundreds of feet. An airplane flying at flight level 360 is flying at a pressure altitude of 36,000 feet. This is expressed as FL 360.

FLIGHT SERVICE STATION: An operations facility in the national flight advisory system which utilizes data interchange facilities for the collection and dissemination of Notices to Airmen, weather, and administrative data and which provides pre-flight and in-flight advisory services to pilots through air and ground based communication facilities.

FRANGIBLE NAVAID: A navigational aid which retains its structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft.

G

GENERAL AVIATION: That portion of civil aviation which encompasses all facets of aviation except air carriers holding a certificate of convenience and necessity, and large aircraft commercial operators.

GENERAL AVIATION AIRPORT: An airport that provides air service to only general aviation.

GLIDESLOPE (GS): Provides vertical guidance for aircraft during approach and landing. The glideslope consists of the following:

1. Electronic components emitting signals which provide vertical guidance by reference to airborne instruments during instrument approaches such as ILS; or

2. Visual ground aids, such as VASI, which provide vertical guidance for VFR approach or for the visual portion of an instrument approach and landing.

GLOBAL POSITIONING SYSTEM (GPS): A system of 48 satellites used as reference points to enable navigators equipped with GPS receivers to determine their latitude, longitude, and altitude.

GROUND ACCESS: The transportation system on and around the airport that provides access to and from the airport by ground transportation vehicles for passengers, employees, cargo, freight, and airport services.

H

HELIPAD: A designated area for the takeoff, landing, and parking of helicopters.

HIGH INTENSITY RUNWAY LIGHTS: The highest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

HIGH-SPEED EXIT TAXIWAY: A long radius taxiway designed to expedite aircraft turning off the runway after landing (at speeds to 60 knots), thus reducing runway occupancy time.

HORIZONTAL SURFACE: An imaginary obstruction-limiting surface defined in FAR Part 77 that is specified as a portion of a horizontal plane surrounding a runway located 150 feet above the established airport elevation. The specific horizontal dimensions of this surface are a function of the types of approaches existing or planned for the runway.

I

INITIAL APPROACH FIX: The designated point at which the initial approach segment begins for an instrument approach to a runway.

INSTRUMENT APPROACH PROCEDURE: A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

INSTRUMENT FLIGHT RULES (IFR): Procedures for the conduct of flight in weather conditions below Visual Flight Rules weather minimums. The term IFR is often also used to define weather conditions and the type of flight plan under which an aircraft is operating.

INSTRUMENT LANDING SYSTEM (ILS): A precision instrument approach system which normally consists of the following electronic components and visual aids:

1. Localizer.
2. Glide Slope.
3. Outer Marker.
4. Middle Marker.
5. Approach Lights.

INSTRUMENT METEOROLOGICAL CONDITIONS: Meteorological conditions expressed in terms of specific visibility and ceiling conditions that are less than the minimums specified for visual meteorological conditions.

ITINERANT OPERATIONS: Operations by aircraft that are not based at a specified airport.

K

KNOTS: A unit of speed length used in navigation that is equivalent to the number of nautical miles traveled in one hour.

L

LANDSIDE: The portion of an airport that provides the facilities necessary for the processing of passengers, cargo, freight, and ground transportation vehicles.

LANDING DISTANCE AVAILABLE (LDA): See declared distances.

LARGE AIRPLANE: An airplane that has a maximum certified takeoff weight in excess of 12,500 pounds.

LOCAL AREA AUGMENTATION SYSTEM: A differential GPS system that provides localized measurement correction signals to the basic GPS signals to improve navigational accuracy integrity, continuity, and availability.

LOCAL OPERATIONS: Aircraft operations performed by aircraft that are based at the airport and that operate in the local traffic pattern or within sight of the airport, that are known to be departing for or arriving from flights in local practice areas within a prescribed distance from the airport, or that execute simulated instrument approaches at the airport.

LOCAL TRAFFIC: Aircraft operating in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from the local practice areas, or aircraft executing practice instrument approach procedures. Typically, this includes touch and-go training operations.

LOCALIZER: The component of an ILS which provides course guidance to the runway.

LOCALIZER TYPE DIRECTIONAL AID (LDA): A facility of comparable utility and accuracy to a localizer, but is not part of a complete ILS and is not aligned with the runway.

LONG RANGE NAVIGATION SYSTEM (LORAN): Long range navigation is an electronic navigational aid which determines aircraft position and speed by measuring the difference in the time of reception of synchronized pulse signals from two fixed transmitters. Loran is used for en route navigation.

LOW INTENSITY RUNWAY LIGHTS: The lowest classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

M

MEDIUM INTENSITY RUNWAY LIGHTS: The middle classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

MICROWAVE LANDING SYSTEM (MLS): An instrument approach and landing system that provides precision guidance in azimuth, elevation, and distance measurement.

MILITARY OPERATIONS: Aircraft operations that are performed in military aircraft.

MILITARY OPERATIONS AREA (MOA): See special-use airspace

MILITARY TRAINING ROUTE: An air route depicted on aeronautical charts for the conduct of military flight training at speeds above 250 knots.

MISSED APPROACH COURSE (MAC): The flight route to be followed if, after an instrument approach, a landing is not affected, and occurring normally:

1. When the aircraft has descended to the decision height and has not established visual contact; or

2. When directed by air traffic control to pull up or to go around again.

MOVEMENT AREA: The runways, taxiways, and other areas of an airport which are utilized for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports with a tower, air traffic control clearance is required for entry onto the movement area.

N

NATIONAL AIRSPACE SYSTEM: The network of air traffic control facilities, air traffic control areas, and navigational facilities through the U.S.

NATIONAL PLAN OF INTEGRATED AIRPORT SYSTEMS: The national airport system plan developed by the Secretary of Transportation on a biannual basis for the development of public use airports to meet national air transportation needs.

NATIONAL TRANSPORTATION SAFETY BOARD: A federal government organization established to investigate and determine the probable cause of transportation accidents, to recommend equipment and procedures to enhance transportation safety, and to review on appeal the suspension or revocation of any certificates or licenses issued by the Secretary of Transportation.

NAUTICAL MILE: A unit of length used in navigation which is equivalent to the distance spanned by one minute of arc in latitude, that is, 1,852 meters or 6,076 feet. It is equivalent to approximately 1.15 statute mile.

NAVAID: A term used to describe any electrical or visual air navigational aids, lights, signs, and associated supporting equipment (i.e. PAPI, VASI, ILS, etc.)

NAVIGATIONAL AID: A facility used as, available for use as, or designed for use as an aid to air navigation.

NOISE CONTOUR: A continuous line on a map of the airport vicinity connecting all points of the same noise exposure level.

NON-DIRECTIONAL BEACON (NDB): A beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his or her bearing to and from the radio beacon and home on, or track to, the station. When the radio beacon is installed in conjunction with the Instrument Landing System marker, it is normally called a Compass Locator.

NON-PRECISION APPROACH PROCEDURE: A standard instrument approach procedure in which no electronic glide slope is provided, such as VOR, TACAN, NDB, or LOC.

NOTICE TO AIRMEN: A notice containing information concerning the establishment, condition, or change in any component of or hazard in the National Airspace System, the timely knowledge of which is considered essential to personnel concerned with flight operations.

O

OBJECT FREE AREA (OFA): An area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

OBSTACLE FREE ZONE (OFZ): The airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be kept clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance for aircraft landing or taking off from the runway, and for missed approaches.

ONE-ENGINE INOPERABLE SURFACE: A surface emanating from the runway end at a slope ratio of 62.5:1. Air carrier airports are required to maintain a technical drawing of this surface depicting any object penetrations by January 1, 2010.

OPERATION: The take-off, landing, or touch-and-go procedure by an aircraft on a runway at an airport.

OUTER MARKER (OM): An ILS navigation facility in the terminal area navigation system located four to seven miles from the runway edge on the extended centerline, indicating to the pilot that he/she is passing over the facility and can begin final approach.

P

PILOT CONTROLLED LIGHTING: Runway lighting systems at an airport that are controlled by activating the microphone of a pilot on a specified radio frequency.

PRECISION APPROACH: A standard instrument approach procedure which provides runway alignment and glide slope (descent) information. It is categorized as follows:

- **CATEGORY I (CAT I)**: A precision approach which provides for approaches with a decision height of not less than 200 feet and visibility not less than 1/2 mile or Runway Visual Range (RVR) 2400 (RVR 1800) with operative touchdown zone and runway centerline lights.
- **CATEGORY II (CAT II)**: A precision approach which provides for approaches with a decision height of not less than 100 feet and visibility not less than 1200 feet RVR.
- **CATEGORY III (CAT III)**: A precision approach which provides for approaches with minima less than Category II.

PRECISION APPROACH PATH INDICATOR (PAPI): A lighting system providing visual approach slope guidance to aircraft during a landing approach. It is similar to a VASI but provides a sharper transition between the colored indicator lights.

PRECISION APPROACH RADAR: A radar facility in the terminal air traffic control system used to detect and display with a high degree of accuracy the direction, range, and elevation of an aircraft on the final approach to a runway.

PRECISION OBJECT FREE AREA (POFA): An area centered on the extended runway centerline, beginning at the runway threshold and extending behind the runway threshold that is 200 feet long by 800 feet wide. The POFA is a clearing standard which requires the POFA to be kept clear of above ground objects protruding above the runway safety area edge elevation (except for frangible NAVAIDS). The POFA applies to all new authorized instrument approach procedures with less than 3/4 mile visibility.

PRIMARY AIRPORT: A commercial service airport that enplanes at least 10,000 annual passengers.

PRIMARY SURFACE: An imaginary obstruction limiting surface defined in FAR Part 77 that is specified as a rectangular surface longitudinally centered about a runway. The specific dimensions of this surface are a function of the types of approaches existing or planned for the runway.

PROHIBITED AREA: See special-use airspace.

PVC: Poor visibility and ceiling. Used in determining Annual Service Volume. PVC conditions exist when the cloud ceiling is less than 500 feet and visibility is less than one mile.

R

RADIAL: A navigational signal generated by a Very High Frequency Omni-directional Range or VORTAC station that is measured as an azimuth from the station.

REGRESSION ANALYSIS: A statistical technique that seeks to identify and quantify the relationships between factors associated with a forecast.

REMOTE COMMUNICATIONS OUTLET (RCO): An unstaffed transmitter receiver/facility remotely controlled by air traffic personnel. RCOs serve flight service stations (FSSs). RCOs were established to provide ground-to-ground communications between air traffic control specialists and pilots at satellite airports for delivering en route clearances, issuing departure authorizations, and acknowledging instrument flight rules cancellations or departure/ landing times.

REMOTE TRANSMITTER/RECEIVER (RTR): See remote communications outlet. RTRs serve ARTCCs.

RELIEVER AIRPORT: An airport to serve general aviation aircraft which might otherwise use a congested air-carrier served airport.

RESTRICTED AREA: See special-use airspace.

RNAV: Area navigation - airborne equipment which permits flights over determined tracks within prescribed accuracy tolerances without the need to overfly ground-based navigation facilities. Used en route and for approaches to an airport.

RUNWAY: A defined rectangular area on an airport prepared for aircraft landing and takeoff. Runways are normally numbered in relation to their magnetic direction, rounded off to the nearest 10 degrees. For example, a runway with a magnetic heading of 180 would be designated Runway 18. The runway heading on the opposite end of the runway is 180 degrees from that runway end. For example, the opposite runway heading for Runway 18 would be Runway 36 (magnetic heading of 360). Aircraft can takeoff or land from either end of a runway, depending upon wind direction.

RUNWAY ALIGNMENT INDICATOR LIGHT: A series of high intensity sequentially flashing lights installed on the extended centerline of the runway usually in conjunction with an approach lighting system.

RUNWAY DESIGN CODE: A code signifiying the design standards to which the runway is to be built.

RUNWAY END IDENTIFICATION LIGHTING (REIL): Two synchronized flashing lights, one on each side of the runway threshold, which provide rapid and positive identification of the approach end of a particular runway.

RUNWAY GRADIENT: The average slope, measured in percent, between the two ends of a runway.

RUNWAY PROTECTION ZONE (RPZ): An area off the runway end to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape. Its dimensions are determined by the aircraft approach speed and runway approach type and minima.

RUNWAY REFERENCE CODE: A code signifying the current operational capabilities of a runway and associated taxiway.

RUNWAY SAFETY AREA (RSA): A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

RUNWAY VISIBILITY ZONE (RVZ): An area on the airport to be kept clear of permanent objects so that there is an unobstructed line of- site from any point five feet above the runway centerline to any point five feet above an intersecting runway centerline.

RUNWAY VISUAL RANGE (RVR): An instrumentally derived value, in feet, representing the horizontal distance a pilot can see down the runway from the runway end.

S

SCOPE: The document that identifies and defines the tasks, emphasis, and level of effort associated with a project or study.

SEGMENTED CIRCLE: A system of visual indicators designed to provide traffic pattern information at airports without operating control towers.

SHOULDER: An area adjacent to the edge of paved runways, taxiways, or aprons providing a transition between the pavement and the adjacent surface; support for aircraft running off the pavement; enhanced drainage; and blast protection. The shoulder does not necessarily need to be paved.

SLANT-RANGE DISTANCE: The straight line distance between an aircraft and a point on the ground.

SMALL AIRCRAFT: An aircraft that has a maximum certified takeoff weight of up to 12,500 pounds.

SPECIAL-USE AIRSPACE: Airspace of defined dimensions identified by a surface area wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. Special-use airspace classifications include:

- **ALERT AREA**: Airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft.
- **CONTROLLED FIRING AREA**: Airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons or property on the ground.
- **MILITARY OPERATIONS AREA (MOA)**: Designated airspace with defined vertical and lateral dimensions established outside Class A airspace to separate/segregate certain military activities from instrument flight rule (IFR) traffic and to identify for visual flight rule (VFR) traffic where these activities are conducted.
- **PROHIBITED AREA**: Designated airspace within which the flight of aircraft is prohibited.
- **RESTRICTED AREA**: Airspace designated under Federal Aviation Regulation (FAR) 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use. When not in use by the using agency, IFR/VFR operations can be authorized by the controlling air traffic control facility.
- **WARNING AREA:** Airspace which may contain hazards to nonparticipating aircraft.

STANDARD INSTRUMENT DEPARTURE (SID): A preplanned coded air traffic control IFR departure routing, preprinted for pilot use in graphic and textual form only.

STANDARD INSTRUMENT DEPARTURE PROCEDURES: A published standard flight procedure to be utilized following takeoff to provide a transition between the airport and the terminal area or en route airspace.

STANDARD TERMINAL ARRIVAL ROUTE (STAR): A preplanned coded air traffic control IFR arrival routing, preprinted for pilot use in graphic and textual or textual form only.

STOP-AND-GO: A procedure wherein an aircraft will land, make a complete stop on the runway, and then commence a takeoff from that point. A stop-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.

STOPWAY: An area beyond the end of a takeoff runway that is designed to support an aircraft during an aborted takeoff without causing structural damage to the aircraft. It is not to be used for takeoff, landing, or taxiing by aircraft.

STRAIGHT-IN LANDING/APPROACH: A landing made on a runway aligned within 30 degrees of the final approach course following completion of an instrument approach.

T

TACTICAL AIR NAVIGATION (TACAN): An ultrahigh frequency electronic air navigation system which provides suitably-equipped aircraft a continuous indication of bearing and distance to the TACAN station.

TAKEOFF RUNWAY AVAILABLE (TORA):
See declared distances.

TAKEOFF DISTANCE AVAILABLE (TODA):
See declared distances.

TAXILANE: The portion of the aircraft parking area used for access between taxiways and aircraft parking positions.

TAXIWAY: A defined path established for the taxiing of aircraft from one part of an airport to another.

TAXIWAY DESIGN GROUP: A classification of airplanes based on outer to outer Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance.

TAXIWAY SAFETY AREA (TSA): A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

TERMINAL INSTRUMENT PROCEDURES: Published flight procedures for conducting instrument approaches to runways under instrument meteorological conditions.

TERMINAL RADAR APPROACH CONTROL: An element of the air traffic control system responsible for monitoring the en-route and terminal segment of air traffic in the airspace surrounding airports with moderate to high levels of air traffic.

TETRAHEDRON: A device used as a landing direction indicator. The small end of the tetrahedron points in the direction of landing.

THRESHOLD: The beginning of that portion of the runway available for landing. In some instances the landing threshold may be displaced.

TOUCH-AND-GO: An operation by an aircraft that lands and departs on a runway without stopping or exiting the runway. A touch-and go is recorded as two operations: one operation for the landing and one operation for the takeoff.

TOUCHDOWN: The point at which a landing aircraft makes contact with the runway surface.

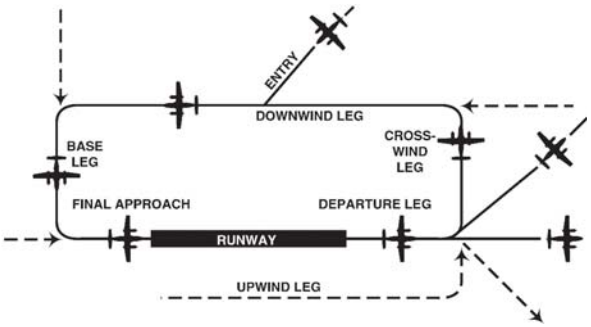
TOUCHDOWN AND LIFT-OFF AREA (TLOF): A load bearing, generally paved area, normally centered in the FATO, on which the helicopter lands or takes off.

TOUCHDOWN ZONE (TDZ): The first 3,000 feet of the runway beginning at the threshold.

TOUCHDOWN ZONE ELEVATION (TDZE): The highest elevation in the touchdown zone.

TOUCHDOWN ZONE (TDZ) LIGHTING: Two rows of transverse light bars located symmetrically about the runway centerline normally at 100- foot intervals. The basic system extends 3,000 feet along the runway.

TRAFFIC PATTERN: The traffic flow that is prescribed for aircraft landing at or taking off from an airport. The components of a typical traffic pattern are the upwind leg, crosswind leg, downwind leg, base leg, and final approach.



U

UNCONTROLLED AIRPORT: An airport without an air traffic control tower at which the control of Visual Flight Rules traffic is not exercised.

UNCONTROLLED AIRSPACE: Airspace within which aircraft are not subject to air traffic control.

UNIVERSAL COMMUNICATION (UNICOM):
A nongovernment communication facility which may provide airport information at certain airports. Locations and frequencies of UNICOM's are shown on aeronautical charts and publications.

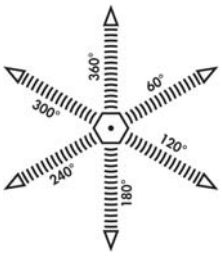
UPWIND LEG: A flight path parallel to the landing runway in the direction of landing. See "traffic pattern."

V

VECTOR: A heading issued to an aircraft to provide navigational guidance by radar.

VERY HIGH FREQUENCY/ OMNIDIRECTIONAL RANGE (VOR): A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the national airspace system. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature.

VERY HIGH FREQUENCY OMNI-DIRECTIONAL RANGE/ TACTICAL AIR NAVIGATION (VORTAC): A navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance-measuring equipment (DME) at one site.



VICTOR AIRWAY: A control area or portion thereof established in the form of a corridor, the centerline of which is defined by radio navigational aids.

VISUAL APPROACH: An approach wherein an aircraft on an IFR flight plan, operating in VFR conditions under the control of an air traffic control facility and having an air traffic control authorization, may proceed to the airport of destination in VFR conditions.

VISUAL APPROACH SLOPE INDICATOR (VASI): An airport lighting facility providing vertical visual approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot that he is on path if he sees red/ white, above path if white/white, and below path if red/red. Some airports serving large aircraft have three-bar VASI's which provide two visual guide paths to the same runway.

VISUAL FLIGHT RULES (VFR): Rules that govern the procedures for conducting flight under visual conditions. The term VFR is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

VISUAL METEOROLOGICAL CONDITIONS: Meteorological conditions expressed in terms of specific visibility and ceiling conditions which are equal to or greater than the threshold values for instrument meteorological conditions.

VOR: See "Very High Frequency Omnidirectional Range Station."

VORTAC: See "Very High Frequency Omnidirectional Range Station/Tactical Air Navigation."

W

WARNING AREA: See special-use airspace.

WIDE AREA AUGMENTATION SYSTEM: An enhancement of the Global Positioning System that includes integrity broadcasts, differential corrections, and additional ranging signals for the purpose of providing the accuracy, integrity, availability, and continuity required to support all phases of flight.

Abbreviations

AC: advisory circular

ADF: automatic direction finder

ADG: airplane design group

AFSS: automated flight service station

AGL: above ground level

AIA: annual instrument approach

AIP: Airport Improvement Program

AIR-21: Wendell H. Ford Aviation Investment and Reform Act for the 21st Century

ALS: approach lighting system

ALSF-1: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT I configuration)

ALSF-2: standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT II configuration)

AOA: Aircraft Operation Area

APV: instrument approach procedure with vertical guidance

ARC: airport reference code

ARFF: aircraft rescue and fire fighting

ARP: airport reference point

ARTCC: air route traffic control center

ASDA: accelerate-stop distance available

ASR: airport surveillance radar

ASOS: automated surface observation station

ATCT: airport traffic control tower

ATIS: automated terminal information service

AVGAS: aviation gasoline - typically 100 low lead (100LL)

AWOS: automatic weather observation station

BRL: building restriction line

CFR: Code of Federal Regulation

CIP: capital improvement program

DME: distance measuring equipment

DNL: day-night noise level

DWL: runway weight bearing capacity of aircraft with dual-wheel type landing gear

DTWL: runway weight bearing capacity of aircraft with dual-tandem type landing gear

FAA: Federal Aviation Administration

FAR: Federal Aviation Regulation

FBO: fixed base operator
FY: fiscal year

GPS: global positioning system

GS: glide slope

HIRL: high intensity runway edge lighting

IFR: instrument flight rules (FAR Part 91)

ILS: instrument landing system

IM: inner marker

LDA: localizer type directional aid

LDA: landing distance available

LIRL: low intensity runway edge lighting

LMM: compass locator at middle marker

LOM: compass locator at outer marker

LORAN: long range navigation

MALS: medium intensity approach lighting system with indicator lights

MIRL: medium intensity runway edge lighting

MITL: medium intensity taxiway edge lighting

MLS: microwave landing system

MM: middle marker

MOA: military operations area

MSL: mean sea level

NAVAID: navigational aid

NDB: nondirectional radio beacon

NM: nautical mile (6,076.1 feet)

NPES: National Pollutant Discharge Elimination System

NPIAS: National Plan of Integrated Airport Systems

NPRM: notice of proposed rule making

ODALS: omnidirectional approach lighting system

OFA: object free area

OFZ: obstacle free zone

OM: outer marker

PAC: planning advisory committee

PAPI: precision approach path indicator

PFC: porous friction course

PFC: passenger facility charge

PCL: pilot-controlled lighting

PIW public information workshop

PLASI: pulsating visual approach slope indicator

POFA: precision object free area

PVASI: pulsating/steady visual approach slope indicator

PVC: poor visibility and ceiling

RCO: remote communications outlet

RRC: Runway Reference Code

RDC: Runway Design Code

REIL: runway end identification lighting

RNAV: area navigation

RPZ: runway protection zone

RSA: runway safety area

RTR: remote transmitter/receiver

RVR: runway visibility range

RVZ: runway visibility zone

SALS: short approach lighting system

SASP: state aviation system plan

SEL: sound exposure level

SID: standard instrument departure

SM: statute mile (5,280 feet)

SRE: snow removal equipment

SSALF: simplified short approach lighting system with runway alignment indicator lights

STAR: standard terminal arrival route

SWL: runway weight bearing capacity for aircraft with single-wheel tandem type landing gear

TACAN: tactical air navigational aid

TAF: Federal Aviation Administration (FAA) Terminal Area Forecast

TDG: Taxiway Design Group

TLOF: Touchdown and lift-off

TDZ: touchdown zone

TDZE: touchdown zone elevation

TODA: takeoff distance available

TORA: takeoff runway available

TRACON: terminal radar approach control

VASI: visual approach slope indicator

VFR: visual flight rules (FAR Part 91)

VHF: very high frequency

VOR: very high frequency omni-directional range

VORTAC: VOR and TACAN collocated

REDDING
Municipal Airport

Appendix B

ENVIRONMENTAL OVERVIEW

Appendix B
ENVIRONMENTAL OVERVIEW

Redding Municipal Airport

This Environmental Overview begins with an environmental inventory that addresses the existing conditions at Redding Municipal Airport and is intended to help identify relevant environmental issues that should be considered during preparation of the proposed Airport Master Plan (AMP). The inventory is organized using the resource categories contained in Federal Aviation Administration (FAA) Orders 1050.1E, *Environmental Impacts: Policies and Procedures* and 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*. However, categories which are part of the developed environment at the airport, such as lighting, utilities, and energy storage facilities, have already been discussed as part of Chapter One of the AMP. Available information regarding the existing environmental conditions at the airport has been derived from internet resources, agency maps, and existing literature.

Following the environmental inventory information, an evaluation of the potential environmental impacts of proposed airport development projects, as discussed in Chapter Five of the AMP and depicted on Exhibit 5A, is provided. The primary purpose of this task is to evaluate the proposed development program to determine whether proposed actions could individually or collectively affect the quality of the environment using the significance thresholds for the various resource categories contained in FAA Orders 1050.1E and 5050.4B.

Finally, a preliminary determination of the most likely environmental action for proposed short term projects is given. The construction of improvements depicted on the recommended development concept plan would require compliance with the *National Environmental Policy Act* (NEPA) to receive Federal financial assistance. For projects not "categorically excluded" under FAA Order 1050.1E, compli-

ance with NEPA is generally satisfied through the preparation of an Environmental Assessment (EA). In instances where significant environmental impacts are expected, an Environmental Impact Statement (EIS) may be required. While this Environmental Overview is not designed to satisfy the NEPA requirements for a Documented Categorical Exclusion (CatEx), EA, or EIS, it is intended to supply a preliminary review of environmental issues.

ENVIRONMENTAL INVENTORY

Air Quality and Greenhouse Gases

The United States (U.S.) Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) based on health risks for six pollutants: carbon monoxide (CO); nitrogen dioxide (NO_2); sulfur dioxide (SO_2); lead (Pb); ozone (O_3); and two sizes of particulate matter (PM), PM measuring 10 micrometers or less in diameter (PM_{10}) and PM measuring 2.5 micrometers in diameter ($PM_{2.5}$).

An area with ambient air concentrations exceeding the NAAQS for a criteria pollutant is said to be a nonattainment area for the pollutant's NAAQS, while an area where ambient concentrations are below the NAAQS is considered an attainment area. EPA requires that areas designated as nonattainment demonstrate how they will attain the NAAQS by an established deadline. To accomplish this, states are required to prepare State Implementation Plans (SIPs). SIPs are typically a comprehensive set of reduction strategies and emissions budgets designed to bring the area into attainment. The State of California (State) also has ambient air quality standards (see **Exhibit B1**).

Redding Municipal Airport is located in Shasta County, California. According to EPA's *Green Book – Currently Designated Nonattainment Areas for All Criteria Pollutants*, as of January 30, 2015, Shasta County is in attainment for all of the NAAQS standards. According to the California Air Resources Board (CARB) State Designation Maps (2013), however, Shasta County is in nonattainment for State ozone and particulate matter (PM_{10}) standards.[1] The Shasta County Air Quality Management District (AQMD) is the local agency that implements State and Federal air quality regulations in Redding.

Greenhouse gases (GHGs) are those that trap heat in the earth's atmosphere. Greenhouse gases such as water vapor (H_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and O_3 are both naturally occurring and anthropogenic (man-made). For example, research has shown that there is a direct link between fuel combustion and GHG emissions. At an airport, therefore, sources that require fuel or power are the primary sources of GHG generation. Aircraft jet engines, like many other vehicle engines, produce CO_2, H_20, nitrogen oxides (NO_x), CO, sulfur oxides (SO_x), volatile organic compounds (VOCs), particulates, and other trace compounds.

The scientific community is developing areas of further study to enable them to more precisely estimate aviation's effects on the global atmosphere. The FAA is currently leading or participating in several efforts intended to clarify the role that commercial aviation plays relative to GHGs and climate

[1] http://www.arb.ca.gov/desig/adm/adm.htm, accessed April 2015.

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		National Standards[2]		
		Concentration[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.075 ppm (147 µg/m^3)		
Respirable Particulate Matter (PM10)[8]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)[8]	24 Hour	—	—	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[9]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 g/m^3)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[10]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 g/m^3)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[10]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[10]	—	
Lead[11,12]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m^3		
Visibility Reducing Particles[13]	8 Hour	See footnote 13	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[11]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

Source: California Air Resources Board 2013

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the U.S. EPA. An “equivalent method” of measurement may be used but must have a “consistent relationship to the reference method” and must be approved by the U.S. EPA.

8. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 g/m^3 to 12.0 g/m^3. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 g/m^3, as was the annual secondary standard of 15 g/m^3. The existing 24-hour PM10 standards (primary and secondary) of 150 g/m^3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

9. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

10. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

    Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

11. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

12. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 g/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

13. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

For more information please call ARB-PIO at (916) 322-2990

California Air Resources Board (6/4/13)

change. The most comprehensive and multi-year program geared towards quantifying the climate change effects of aviation is the Aviation Climate Change Research Initiative (ACCRI), funded by FAA and the National Aeronautics and Space Administration (NASA). ACCRI hopes to reduce key scientific uncertainties in quantifying aviation-related climate impacts and to provide timely scientific input to inform policy-making decisions.

The FAA also funds Project 12 of the Partnership for Air Transportation Noise & Emissions Reduction (PARTNER) Center of Excellence research initiative to quantify the effects of aircraft exhaust and contrails on global and U.S. climate and atmospheric composition. Finally, the Transportation Research Board's (TRB) Airport Cooperative Research Program (ACRP) project 02-06 published a guidebook on preparing airport GHG emission inventories in September 2008.

Federal regulations specific to the aviation sector under the *Clean Air Act* regarding the reduction of GHG emissions have yet to be approved. However, the State has adopted the following laws related to GHG emissions:

- The *California Global Warming Act of 2006* (Assembly Bill [AB] 32) - establishes a State goal of reducing GHG emissions to 1990 levels by 2020. Pursuant to AB 32, CARB adopted a scoping plan in December 2008 (updated May 2014), which provides a range of GHG-reducing actions.

- Senate Bill (SB) 97 - amended CEQA to require an analysis of GHG emissions and their effects (effective July 1, 2009). The 2009 amendments to the CEQA Guidelines (Title 14 California Code of Regulations §15064.4) revised the Guidelines to provide regulatory guidance on the determination of the significance of GHG emissions.

- SB 375 – identified metropolitan planning organizations as the agencies responsible for the establishment of sustainable community strategies for emission reductions related to land use development patterns and light duty/passenger vehicular use at the local level.

Coastal Resources

Federal activities involving or affecting coastal resources are governed by the *Coastal Barriers Resource Act* (CBRA), the *Coastal Zone Management Act* (CZMA), and Executive Order (E.O.) 13089, *Coral Reef Protection*.

The airport is located approximately 95 miles from the Pacific Ocean at its the nearest point; thus, the airport is not located within a Coastal Zone or near coastal barriers or reefs.

Compatible Land Use/Noise

Compatible land use evaluations for airports must consider the land uses in the vicinity of an airport to ensure those uses do not adversely affect safe aircraft operations. In addition, if an airport action

would result in impacts exceeding FAA thresholds of significance which have land use ramifications, such as disruption of communities, relocation of businesses or residences, and induced socioeconomic impacts, the effects of the land use impacts shall be discussed.

With respect to land use compatibility, FAA Order 1050.1E, Appendix A, also states that if the noise analysis concludes that there is no significant noise impact, a similar conclusion usually may be drawn with respect to compatible land use. Federal land use compatibility guidelines are established under Title 14 Code of Federal Regulations (CFR) Part 150, *Airport Noise Compatibility Planning*. According to 14 CFR 150, residential land uses and schools are not considered compatible with a 65 decibel (dB) Day-Night Equivalent Level (DNL) (or Community Noise Equivalent Level [CNEL]) noise exposure contour or higher.[2] Religious facilities, hospitals, or nursing homes located within a 65 dB DNL contour are generally compatible if an interior noise level reduction of 25 dB is incorporated into the design and construction of the structure.[3]

The Redding Municipal Airport is surrounded by a mix of commercial and industrial land uses, scattered rural residences, and open space. The airport is adjacent to the 700-acre Stillwater Business Center development, which offers large lots for office and industrial development, and incorporates elements of Stillwater Creek. Across Airport Road from the airport is additional light industrial land uses interspersed with open space. Residential areas in the vicinity of the airport include scattered single family lots located immediately south of the airport, the Wooded Acres and Wooded Acres North residential subdivisions approximately 0.15 mile west of the airport, and scattered large-lot residences also located to the west. Recreational land uses are located farther from the airport as discussed under the section on *Department of Transportation* (DOT) *Act*: Section 4(f) Resources.

In addition to residential areas, other noise-sensitive land uses in proximity to the airport are Prairie Elementary School, located approximately one mile south of the airport on Churn Creek Road, and Pacheco Elementary School located approximately 1.5 miles west of the airport on Knighton Road. There are two places of worship within one mile of the airport: Faith Tabernacle Assembly and Valley Christian Fellowship. Both are located north of the airport.

The airport's existing (2015) CNEL noise contours were modeled as part of the AMP process and are shown in **Exhibit B2**. Based on this information, the 65 dB CNEL noise exposure contour is located on airport property with the exception of a small area along the northwestern airport boundary. No noise-sensitive land uses are located within the 65 dB CNEL.

[2] In California, CNEL is used in place of DNL. DNL accounts for the increased sensitivity to noise at night (10:00 p.m. to 7:00 a.m.) and is the metric preferred by FAA, EPA, and Department of Housing and Urban Development (HUD) as an appropriate measure of cumulative noise exposure. In California, however, these agencies accept the use of CNEL which, in addition to nighttime sensitivities, also accounts for increased sensitivities during the evening hours (7:00 p.m. to 10:00 p.m.).

[3] Noise-sensitive receptors are generally residences, churches/places of worship, hospitals and health care facilities, and educational facilities. Churches/places of worship are defined as permanently established facilities intended solely for use as places of worship and not meant to be converted to other potential uses. For a hospital/health care facility to be considered a noise-sensitive medical facility, it must provide for overnight stays or provide for longer recovery periods, where rest and relaxation are key considerations for use of the facility. Schools are facilities that provide full time use for instruction and training to students.

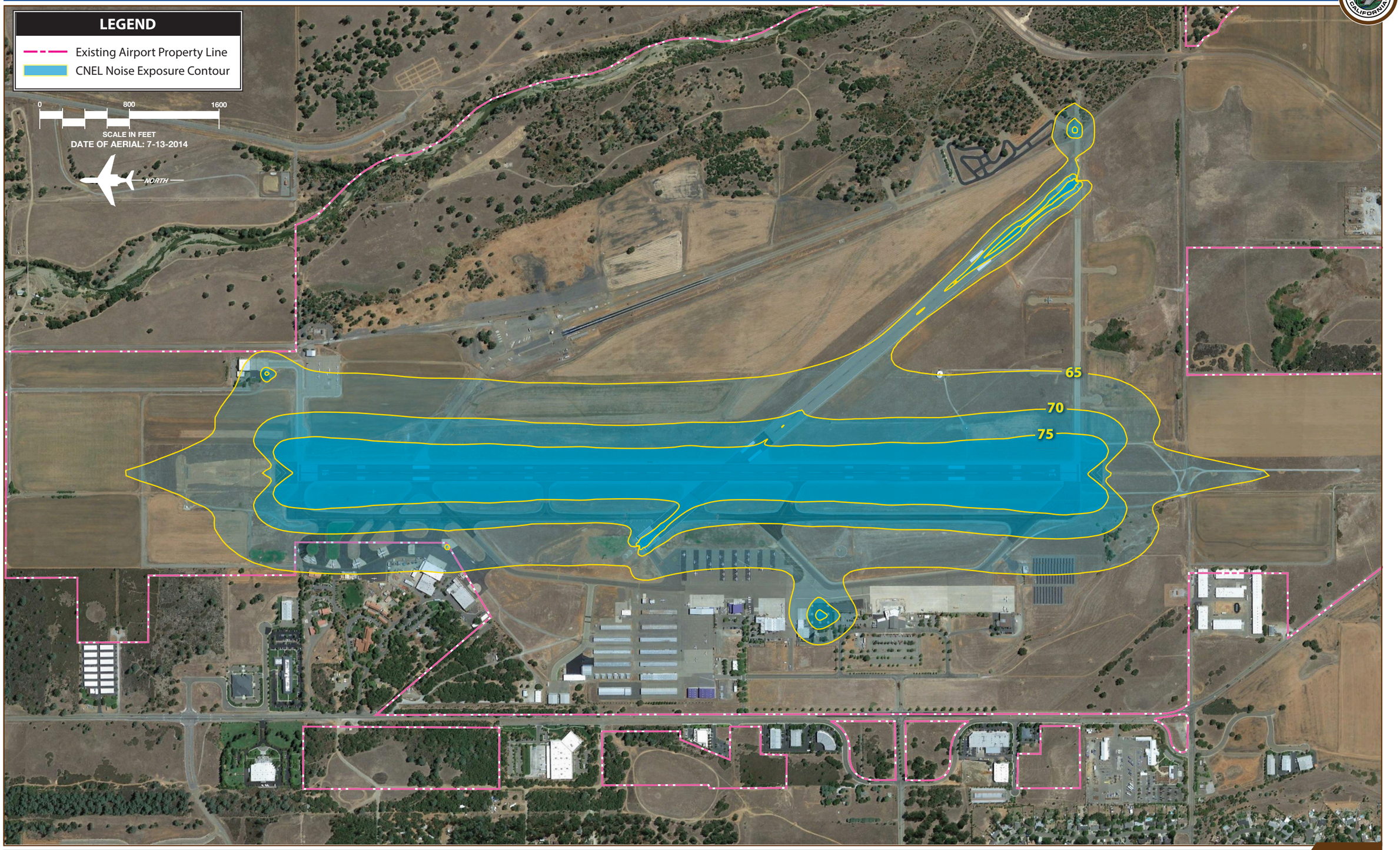


Exhibit B2
EXISTING 2015 NOISE CONTOURS

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Existing land use on the airport itself includes aviation-related infrastructure and support services and facilities. Portions of the airport not developed for aviation are used mostly for agriculture. The airport has approximately 557 acres of land leased for dry-farming, primarily for wheat or hay production. In addition, two additional non-aviation facilities are located on the eastern side of the airfield as discussed below.

Redding Dragstrip: This facility includes a 0.25-mile asphalt strip with guard rails, concrete launch pad, shut-down area and asphalt return road, and control tower, and is the oldest continuous National Hot Rod Association (NHRA) racing strip in the country (since the 1950s). It includes primitive campground facilities, picnic areas, and spectator seating. The facility is leased from the City and is operated by a 501(c)(3) non-profit corporation.[4] The Redding Drag Strip hosts several large drag racing events and car shows throughout the year.

Shasta Kart Klub: Just south of the Redding Drag Strip is a go-cart racing facility leased to the Shasta Kart Klub. This non-profit club hosts go-kart sprint racing events and provides lessons/practice sessions.[5]

Department of Transportation (DOT) Act: Section 4(f)

Section 4(f) of the DOT Act, which was recodified and renumbered as Section 303(c) of Title 49 United States Code (USC), states that the Secretary of Transportation shall not approve any program or project that requires the use of any publicly owned land from a historic site, public park, recreation area, or waterfowl or wildlife refuge of national, state, regional, or local importance unless there is no feasible and prudent alternative to the use of such land, and the project includes all possible planning to minimize harm resulting from the use.

The term "use" includes not only the physical taking of such lands, but "constructive use" of such lands. "Constructive use" of lands occurs when "a project's proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired" (23 CFR 771.135).

The closest Section 4(f) properties to the airport are two public golf courses. The Churn Creek golf course is a nine-hole course located approximately 0.75 mile east of the airport; Anderson Tucker Oaks golf course is a nine-hole course located approximately one mile from the Runway 34 end. In addition, immediately east of the airport, land is designated for Park and Greenway land use in the City of Redding General Plan. These designations would allow for future development of parks and trails along Stillwater Creek and its floodplain.
There are no waterfowl or wildlife refuges in proximity to the airport. There is one open space conservation easement located in the Stillwater Business Center east of Stillwater Creek. Known as Stillwater Park Conservation Easement (#17-52), this 325-acre conservation easement was set aside by the City of Redding as an open area preserve to protect wildlife corridors, water quality, and natural resource

[4] http://www.reddingdragstrip.info/about_redding_dragstrip/, accessed April 2015.
[5] http://www.shastakartklub.com/, accessed April 2015.

values, and contains seasonal wetlands, vernal pools, riparian corridors, upland habitat, and buffer zones for these areas (**Exhibit B3**).

The closest known historic sites listed on the National Register of Historic Places (NRHP) are located approximately six to seven miles from the airport in downtown Redding and include the Cascade Theatre and Old City Hall. An Airport Road corridor study done in 2007, which included a windshield survey, cultural resources records search and Native American consultation for the road corridor plus a 0.25-mile buffer, found that there were no cultural sites or resources in or near the study area.

Farmland

The *Farmland Protection Policy Act* (FPPA) is intended to minimize the impact Federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can also be forest land, pastureland, or other land, but not water or urban built-up land.

Exhibit B4 shows the airport's soil ratings, according to the U.S. Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS) Web Soil Survey. Many of the airport soils are rated as "Prime agriculture if irrigated" (**Table B1**). The majority of the airport is comprised of Red Bluff loam. Other prime agricultural soils at the airport are Churn, Honcut, or Perkins gravelly loams. A smaller percentage of on-airport soils are rated as "Not prime farmland." These soils are located near the airport's eastern border between the airfield and Stillwater Creek (Cobbly alluvial land, Newtown gravelly soils, or in onsite gravel pits) or in the southern part of the airport (Moda loams).

TABLE B1
Farmland Soil Classification
Redding Municipal Airport

Map Unit Symbol[1]	Map Unit Name
Rated Prime Farmland if Irrigated:	
CeA	Churn gravelly loam, 0 to 3 percent slopes
CfA	Churn gravelly loam, deep, 0 to 3 percent slopes
He	Honcut gravelly loam
PmA	Perkins gravelly loam, gravelly loam substratum, 0 to 3 percent, MLRA 17
RbA	Red Bluff loam, 0 to 3 percent slopes, MLRA 17, moist
RbB	Red Bluff loam, 3 to 8 percent slopes
Rated Not Prime Farmland:	
Ck	Cobbly alluvial land, frequently flooded
Gp	Gravel pits
MhA	Moda loam, seeped, 0 to 3 percent slopes
MkB	Moda loam, shallow, 0 to 5 percent slopes
NeD	Newtown gravelly loam, 15 to 30 percent slopes
NeE2	Newtown gravelly loam, 30 to 50 percent slopes, eroded

Source: USDA-NRCS, Web Soil Survey, http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx, accessed April 2015.
[1] Refer to **Exhibit B4** for location of soil types.

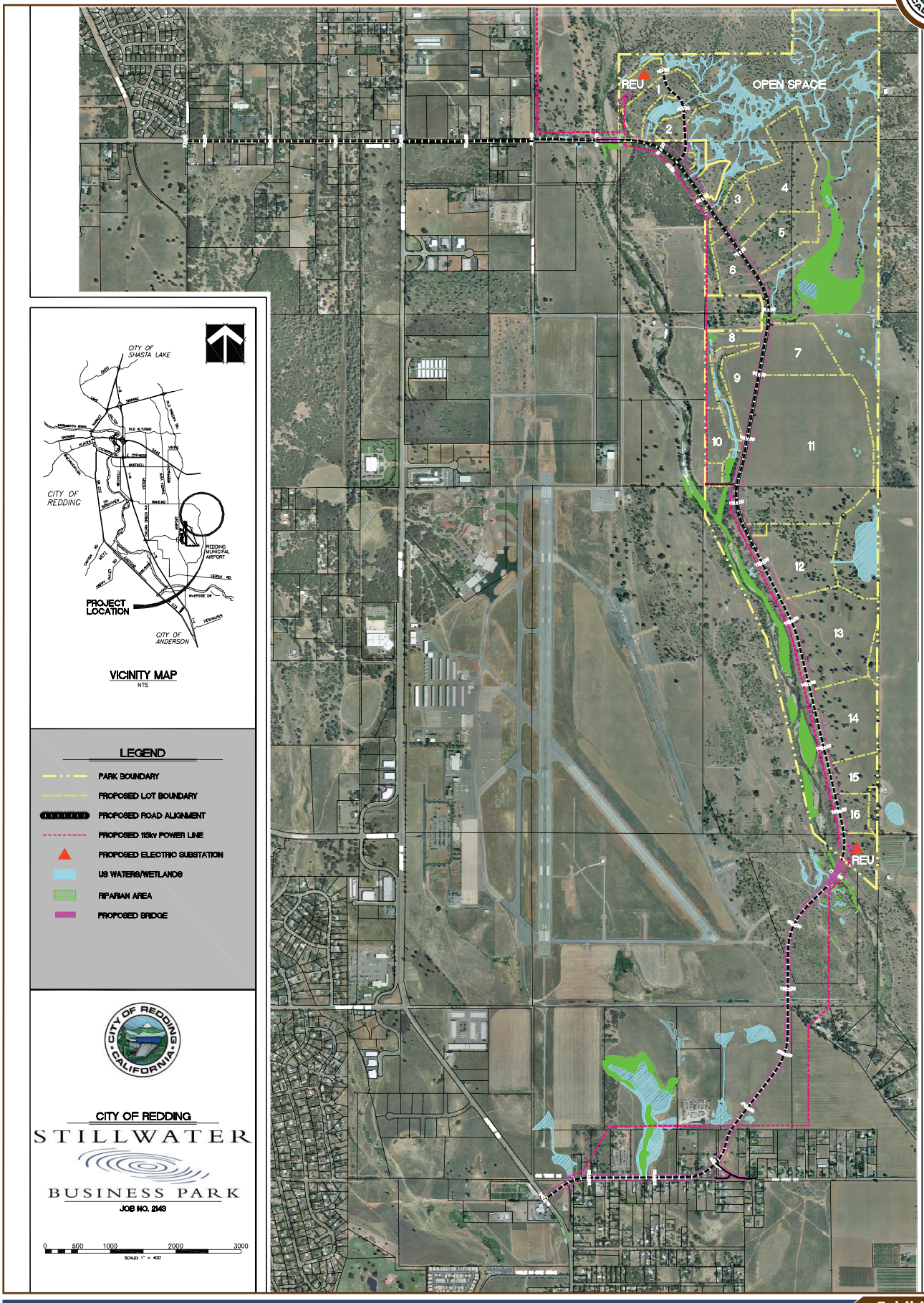


Exhibit B3
STILLWATER BUSINESS CENTER SITE PLAN

Source: City of Redding

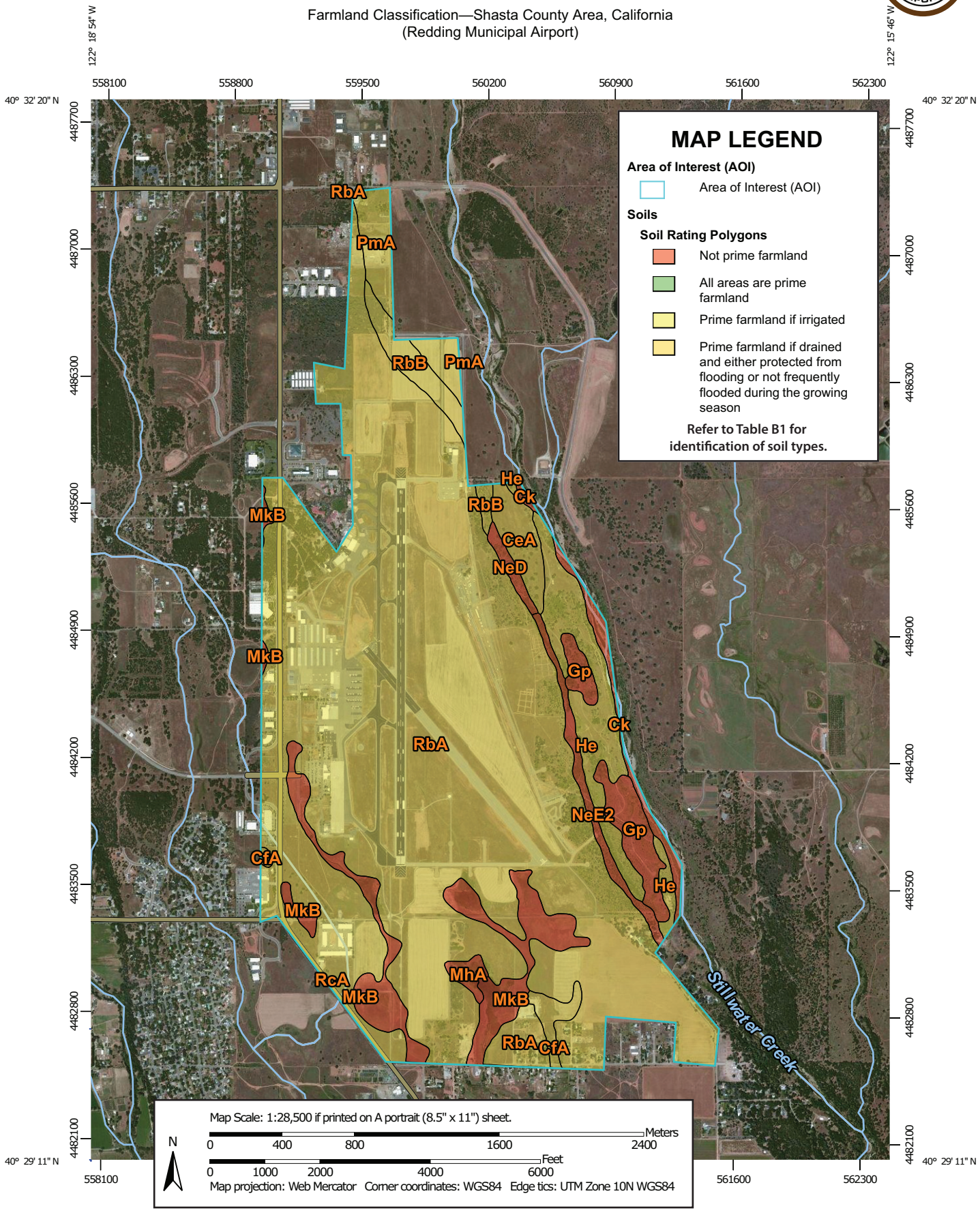


Exhibit B4
FARMLAND SOILS ON AIRPORT

Source: USDA-NRCS, Web Soil Survey

As discussed previously, portions of the airport are currently leased for agricultural production; the airport is not irrigated. The California Department of Conservation (CDC), Division of Land Resource Protection's Shasta County Important Farmland 2010, shows the airport primarily as Urban and Built-Up Land, Other Land, or Farmland of Local Importance.[6]

Fish, Wildlife, and Plants

U.S. Fish and Wildlife Service (USFWS) is charged with overseeing the requirements of the *Endangered Species Act* (ESA), specifically Section 7, which sets forth requirements for consultation to determine if a proposed action "may affect" a federally endangered or threatened species. If an agency determines that an action "may affect" a federally protected species, then Section 7(a)(2) requires the agency to consult with USFWS to ensure that any action the agency authorizes, funds, or carries out is not likely to jeopardize the continued existence of any federally-listed endangered or threatened species, or result in the destruction or adverse modification of critical habitat. If a species has been listed as a candidate species, Section 7(a)(4) states that each agency must confer with USFWS.

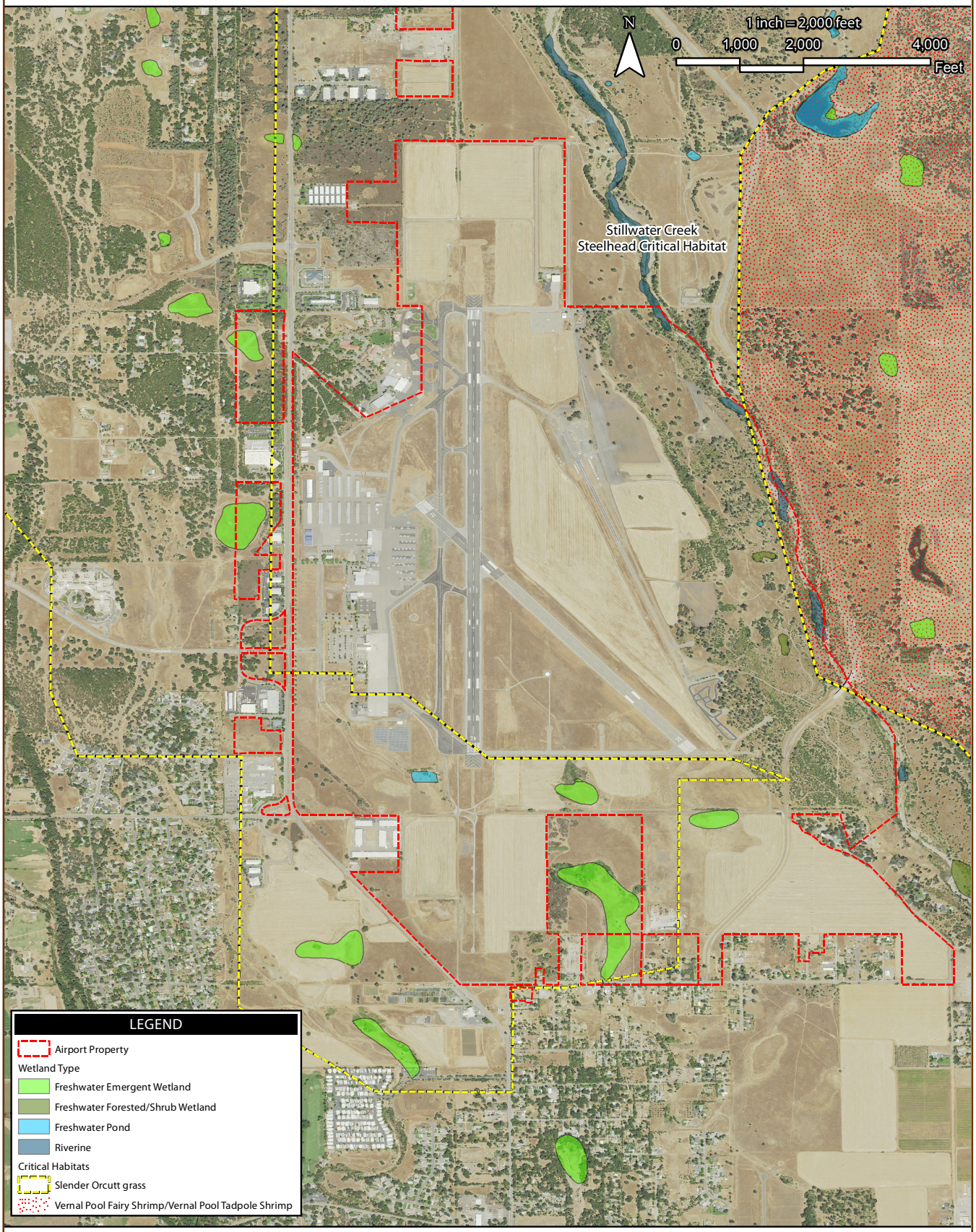
Additional Federal laws protecting fish, wildlife, and plants include: the *Migratory Bird Treaty Act,* which prohibits activities that would harm migratory birds, their eggs or nests; Executive Order (E.O.) 13312, *Invasive Species,* which aims to prevent the introduction of invasive species as a result of a proposed action; and the *Bald and Golden Eagle Protection Act*. E.O. 11990, *Protection of Wetlands* is discussed under the Wetland subsection.

There are ten federally-listed species that should be considered for the airport, as well as several designated critical habitats, based on the USFWS's ESA Species lists. These species and critical habitats are identified in **Table B2**. Several of the species are also protected by State law.

Vernal pools, which are classified by the National Wetland Inventory as freshwater emergent wetlands, are also present on airport property south of Taxiway E and north of Meadow View Drive. **Exhibit B5** shows the location of these and other on-airport wetlands, including Stillwater Creek. Critical Habitat for Slender Orcutt grass and other species associated with the vernal pools located in proximity to the airport are also shown on the exhibit. Stillwater Creek itself supports Critical Habitat for the California Central Valley distinct population segment (DPS) of steelhead.

Other natural features at or near the airport include riparian and grassland habitats. These habitats may provide suitable breeding and foraging habitat for a number of other special-status species, such as migratory birds, western spadefoot toad, western pond turtle, Bogg's Lake hedge-hyssop, and Red Bluff dwarf rush (City of Redding, 2006). As previously discussed, a 325-acre conservation easement has been set aside by the City of Redding in conjunction with its approval of the Stillwater Business Center project as an open space preserve. The Western Shasta Resource Conservation District is tasked with maintaining the preserve's natural features and ecosystems.[7] This easement is located

[6] ftp://ftp.consrv.ca.gov/pub/dlrp/FMMP/pdf/2010/sha10.pdf, accessed April 2015.
[7] http://www.westernshastarcd.org/projects.html, accessed December 2014.



SOURCE: FEMA 100 Year Floodplain 2011, ESRI Basemap Imagery, Fish and Wildlife Service Critical Habitat and Watershed Data

Exhibit B5
SENSITIVE HABITAT IN PROJECT VICINITY

east of the airport and is a conservation area that protects a significant portion of vernal pool/vernal pool grassland habitat in Shasta County (refer to **Exhibit B3**).

TABLE B2
***Endangered Species Act* Species and Critical Habitat List**
Redding Municipal Airport

Species Name	Federal ESA Status	State ESA Status	Habitat Requirements	Critical Habitat in Proximity?
Amphibians				
California Red-legged Frog	Threatened	None	Ponds in humid forests, woodlands, grasslands, coastal scrub, and stream sides with plant cover.	No
Birds				
Northern spotted owl	Threatened	Candidate	Forests characterized by dense canopy closure of mature and old-growth trees, abundant logs, standing snags, and live trees with broken tops. Prefers older forest stands with variety.	No
Yellow-billed cuckoo	Threatened	Endangered	Large blocks of riparian woodlands (cottonwood, willow, or tamarisk galleries).	No
Crustaceans				
Conservancy fairy shrimp	Endangered	None	Small, clear-water, sandstone-depression pools and grassed swale, earth slump, or basalt-flow depression pools.	No
Vernal pool fairy shrimp	Threatened	None	Small, clear-water, sandstone-depression pools and grassed swale, earth slump, or basalt-flow depression pools.	Yes
Vernal pool tadpole shrimp	Endangered	None	Vernal pools, seasonal wetlands that fill with water during fall and winter rains and dry up in spring and summer.	Yes
Fishes				
Delta smelt	Threatened	Endangered	Sacramento-San Joaquin Delta and upper San Francisco Bay.	No
Steelhead – California Central Valley DPS	Threatened	None	Swift streams slowing out of the mountains. Cool, well-oxygenated water. Shallow riffles and calm pools at a stream's edge.	Yes
Flowering Plants				
Slender Orcutt grass	Threatened	Endangered	Vernal pools habitat in the western and northern foothills surrounding the Sacramento Valley.	Yes
Insects				
Valley Elderberry Longhorn beetle	Threatened	None	Riparian forests which occur along rivers and streams.	No

Source: USFWS, IPAC Trust Resource List, http://ecos.fws.gov/ipac/; http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/TEAnimals.pdf, accessed April 2015
DPS = Distinct Population Segment

Table B3 lists bird species identified by USFWS as migratory bird species of concern for projects at the airport. Habitat requirements are taken from Audubon's *Guide to North American Birds*.

TABLE B3
Migratory Birds of Concern
Redding Municipal Airport

Species Name	Habitat Requirements	Occurrence in Project Area
Bald eagle	Coasts, rivers, large lakes; in migration, also mountains, open country. Typically close to water, also locally in open dry country. Occurs in a variety of waterside settings where prey is abundant. Also winters in some very dry western valleys.	Year-round
Brewer's sparrow	Sagebrush, brushy plains; also near treeline in Rockies; in winter, also weedy fields. In summer typically in open flats covered with sagebrush; sometimes in stands of saltbush, on open prairie, or in pinyon-juniper woodland. Northern race (sometimes considered a separate species, called "Timberline Sparrow") summers at and above treeline in Canadian Rockies, in stunted thickets of willow, birch, and fir. In winter, found in open country, especially desert dominated by creosote bush.	Breeding
Burrowing owl	Open grassland, prairies, farmland, airfields. Favors areas of flat open ground with very short grass or bare soil. Prairie-dog towns once furnished much ideal habitat in west, but these are now scarce, and the owls are found on airports, golf courses, vacant lots, industrial parks, other open areas.	Year-round
Calliope hummingbird	Forest glades, canyons, usually in mountains. Breeds mostly from 4,000 feet up to near treeline. Favors open shrubby areas, especially near streams, and may be most common in second growth several years after fire or logging. Winters mostly in pine-oak woods of mountains in Mexico, and migrants occur both in mountains and lowlands.	Breeding
Cassin's finch	Conifers in high mountains; lower levels in winter. Breeds mostly in mountain forests of conifers, especially spruce and fir, also in pine and Douglas-fir in some areas and sometimes in pinyon-juniper woods. Often at very high elevations, near treeline in mountains. Winters in mountain forests of conifers, sometimes in open woods of lower valleys.	Year-round
Flammulated owl	Open pine forests in mountains. Nests in relatively open forest, typically of ponderosa pine, in cool and fairly dry zones such as mountains of the interior. In some areas, favors groves of aspen. Upper level of forest usually quite open, but may be brushy understory of oaks and other plants. In migration, sometimes found in dense thickets at lower elevations.	Breeding
Fox sparrow	Wooded areas, undergrowth, brush. Breeds in brushy areas including woodland edges and clearings, streamside thickets, scrubby second growth, stunted coastal forest. Winters in similar habitats, also in brushy fields, chaparral, well-vegetated suburbs and parks.	Breeding
Lewis's woodpecker	Scattered or logged forest, river groves, burns, foothills. Because of aerial foraging, needs open country in summer, with large trees for nest sites and foraging perches. Often in cottonwood groves, open pine-oak woods, burned or cut-over woods. Winter habitat chosen in autumn for food supply, usually groves of oaks, sometimes date palms, orchards of pecans, walnuts, almonds, fruit.	Wintering
Loggerhead shrike	Semi-open country with lookout posts; wires, trees, scrub. Breeds in any kind of semi-open terrain, from large clearings in wooded regions to open grassland or desert with a few scattered trees or large shrubs. In winter, may be in totally treeless country if fences or wires provide hunting perches.	Year-round

TABLE B3 (Continued)
Migratory Birds of Concern
Redding Municipal Airport

Species Name	Habitat Requirements	Occurrence in Project Area
Nuttall's woodpecker	Wooded canyons and foothills, river woods. In much of range almost always around oaks, especially where oaks meet other trees along rivers, also in pine-oak woods in foothills. In southern California also in riverside cottonwoods, sycamores, willows, even if no oaks present. At eastern edge of range may venture out into mesquite or other dry woods.	Year-round
Oak titmouse	Oak woods, pinyon-juniper; locally river woods, shade trees. Along Pacific seaboard, occurs most commonly in oak woodland, including areas where oaks meet streamside trees or pines; also in well-wooded suburbs, rarely in coniferous forest in mountains. In the interior, also occurs in some woodlands dominated by pine or juniper.	Year-round
Olive-sided flycatcher	Conifer forests, burns, clearings. Breeds mostly in coniferous forest of the north and the higher mountains, especially around the edges of open areas including bogs, ponds, clearings. Also nests near the coast in California, in tall trees (including eucalyptus) in foothill canyons.	Breeding
Peregrine falcon	Open country, cliffs (mountains to coast); sometimes cities. Over its wide range, found in wide variety of open habitats, from tundra to desert mountains. Often near water, especially along coast, and migrants may fly far out to sea. Limited by availability of nest sites and prey; thus, it often moves into cities, nesting on building ledges and feeding on pigeons.	Year-round
Short-eared owl	Prairies, marshes, dunes, tundra. Found in open country supporting high numbers of small rodents. Nests most commonly on tundra, inland and coastal prairies, extensive marshes, farmland. In winter also found in stubble fields, small meadows, coastal dunes, shrubby areas.	Wintering
Swainson's hawk	Plains, dry grassland, farmland, ranch country. Breeds most commonly on northern Great Plains, in prairie regions with scattered groves of trees for nest sites. Less common in dry grassland farther west and in heavily farmed country. In migration, often pauses in fields where insect larvae may have been turned up by the plow.	Breeding
Tricolored blackbird	Cattail or tule marshes; forages in fields, farms. Breeds in large freshwater marshes, in dense stands of cattails or bulrushes. At all seasons (including when breeding), does most of its foraging in open habitats such as farm fields, pastures, cattle pens, large lawns.	Breeding
Williamson's sapsucker	Higher conifer forests, burns. In summer found in mountains in conifer forests including spruce, fir, and lodgepole pine; also in aspen groves near conifers. Winters mostly in pine and pine-oak woodland in mountains. Even those few that wander to lowlands in winter are likely to be found in conifers.	Year-round
Yellow-billed magpie	Stream groves, scattered oaks, ranches, farms. Most numerous in open oak savanna and where riverside groves of oaks, cottonwoods, and sycamores border on open country such as pastures or farmland.	Year-round

Source: USFWS, IPAC Trust Resource List, http://ecos.fws.gov/ipac/, accessed April 2015; Audubon's *Guide to North American Birds*, http://www.audubon.org/field-guide, accessed April 2015.

Floodplains

E.O. 11988, *Floodplain Management* directs Federal agencies to take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and pre-

serve the natural and beneficial values served by the floodplains. As defined in FAA Order 1050.1E, agencies are required to "make a finding that there is no practicable alternative before taking action that would encroach on a base floodplain based on a 100-year flood." FAA Order 1050.1E (9.2b) also clarifies that "if the proposed action and reasonable alternatives are not within the limits of, or if applicable, the buffers of a base floodplain, a statement to that effect should be made," no further analysis is necessary. The limits of base floodplains are determined by Flood Insurance Rate Maps (FIRMs) prepared by Federal Emergency Management Agency (FEMA).

Exhibit B6 shows the 100-year floodplains on or near the airport. According to the most recent floodplain map for the airport (Panel No. 06089C1570G, dated March 17, 2011), the only 100-year floodplain on the airport is associated with Stillwater Creek on the far eastern side of the airport property.[8] Stillwater Creek and its floodplain are designated as Zone AE, a 100-year floodplain with its base flood elevations determined.

Hazardous Materials, Pollution Prevention, and Solid Waste

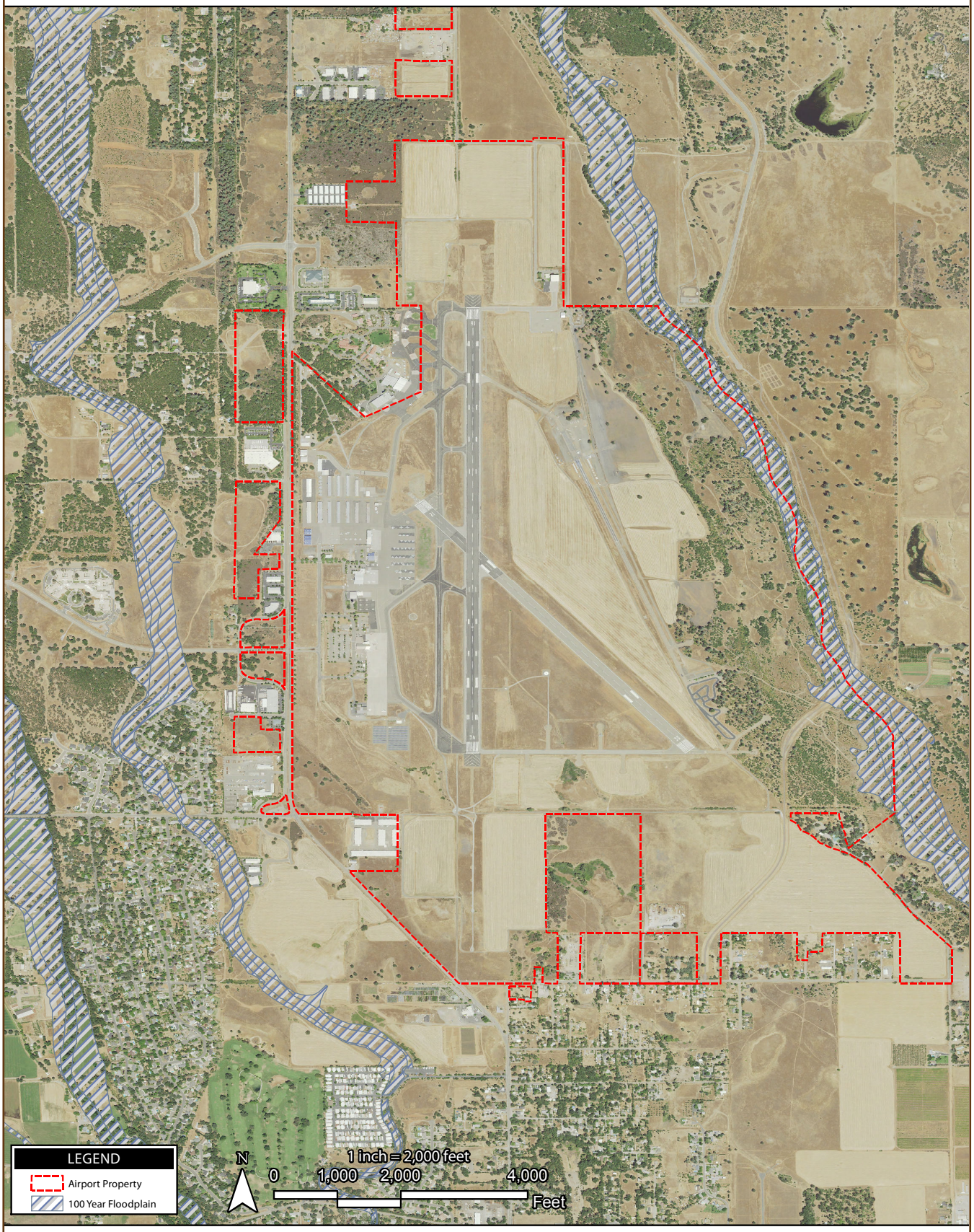
Federal, State, and local laws, including the *Resource Conservation Recovery Act* (RCRA) and the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA), as amended (also known as the Superfund), regulate hazardous materials use, storage, transport, and disposal. These laws may extend to past and future landowners of properties containing these materials. Disturbing areas that contain hazardous materials or contaminates can cause significant impacts to soil, surface water, groundwater, air quality, and the organisms using these resources.

According to EPA's EJ View EnviroMapper website, there are no Superfund or Brownfield sites in proximity to the airport.[9] Fuel storage facilities and businesses at the airport reporting to EPA under RCRA are required to comply with all applicable regulations. The airport also maintains a Spill Prevention Containment and Countermeasure (SPCC) plan, which is imposed on any lessees with fuel operations in their lease agreements.

The airport is on California's Department of Toxic Substances Control (DTSC) list of cleanup sites (Cortese list) as a Formerly Used Defense Site (FUDS). Potential contamination is related to the airport's past use as the Redding Army Airfield, which served as an auxiliary to Chico Army Airfield. Potential hazards exist in the form of several underground storage tanks (USTs) scattered around the property, locations of contaminated soil such as the aircraft maintenance areas, and abandoned weapons bunkers.

Some of the USTs have been filled or removed. For example, three USTs located on the west side of the runway have been abandoned or removed; however, an additional UST is located on the west side of Runway 34 south of the Northstar hangar. In addition, a former Motor Pool area remains in an abandoned area on the northeast side where limited detections above screening criteria of lead and

[8] http://msc.fema.gov/portal, accessed December 2014.
[9] http://epamap14.epa.gov/ejmap/entry.html, accessed December 2014.



SOURCE: FEMA 100 Year Floodplain 2011, ESRI Basemap Imagery,

Exhibit B6
100 YEAR FLOODPLAIN IN PROJECT VICINITY

other byproducts of petroleum processing were identified in shallow surface soil.[10] The Redding Army Airfield cleanup is not on the National Priority List and is identified as "inactive, needs investigation" on the State Cortese list.

Solid waste from the airport is taken to County's West Central Landfill, located approximately 20 miles to the west.

Historical, Architectural, Archaeological, and Cultural Resources

Determination of a project's environmental impact to historic and cultural resources is made under guidance in the *National Historic Preservation Act* (NHPA) *of 1966*, as amended, the *Archaeological and Historic Preservation Act* (AHPA) *of 1974*, the *Archaeological Resources Protection Act* (ARPA), and the *Native American Graves Protection and Repatriation Act* (NAGPRA) *of 1990*, among others. Impacts can occur when a proposed project causes an adverse effect on a property which has been identified (or is unearthed during construction) as having historical, architectural, archaeological, or cultural significance.

As previously discussed under the section on DOT Act, Section 4(f) resources, the closest known NRHP sites are located six to seven miles from the airport in downtown Redding and include the Cascade Theatre and Old City Hall. An Airport Road corridor study done in 2007 for the road corridor plus a 0.25-mile buffer found that there were no cultural sites or resources in or near the study area.

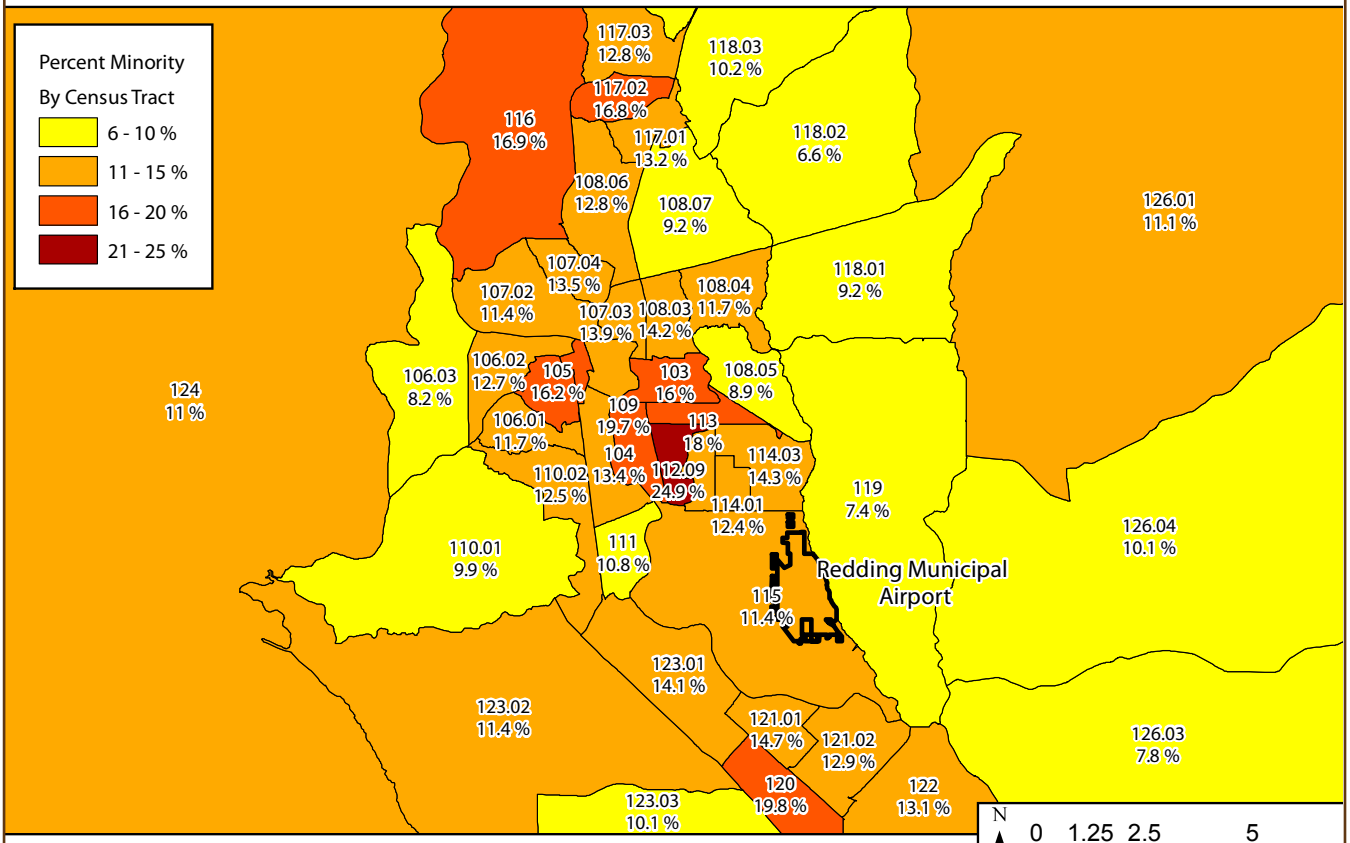
Sixteen cultural resources studies have been conducted within the vicinity of the airport; however, there has not been an airport-wide cultural survey done. Therefore, unknown cultural resources may be present that have not yet been recorded. In addition, because the dragstrip was constructed in the late 1940s and is the oldest continuous NHRA racing strip in the country, it may have potential value to history under Federal and State regulations.

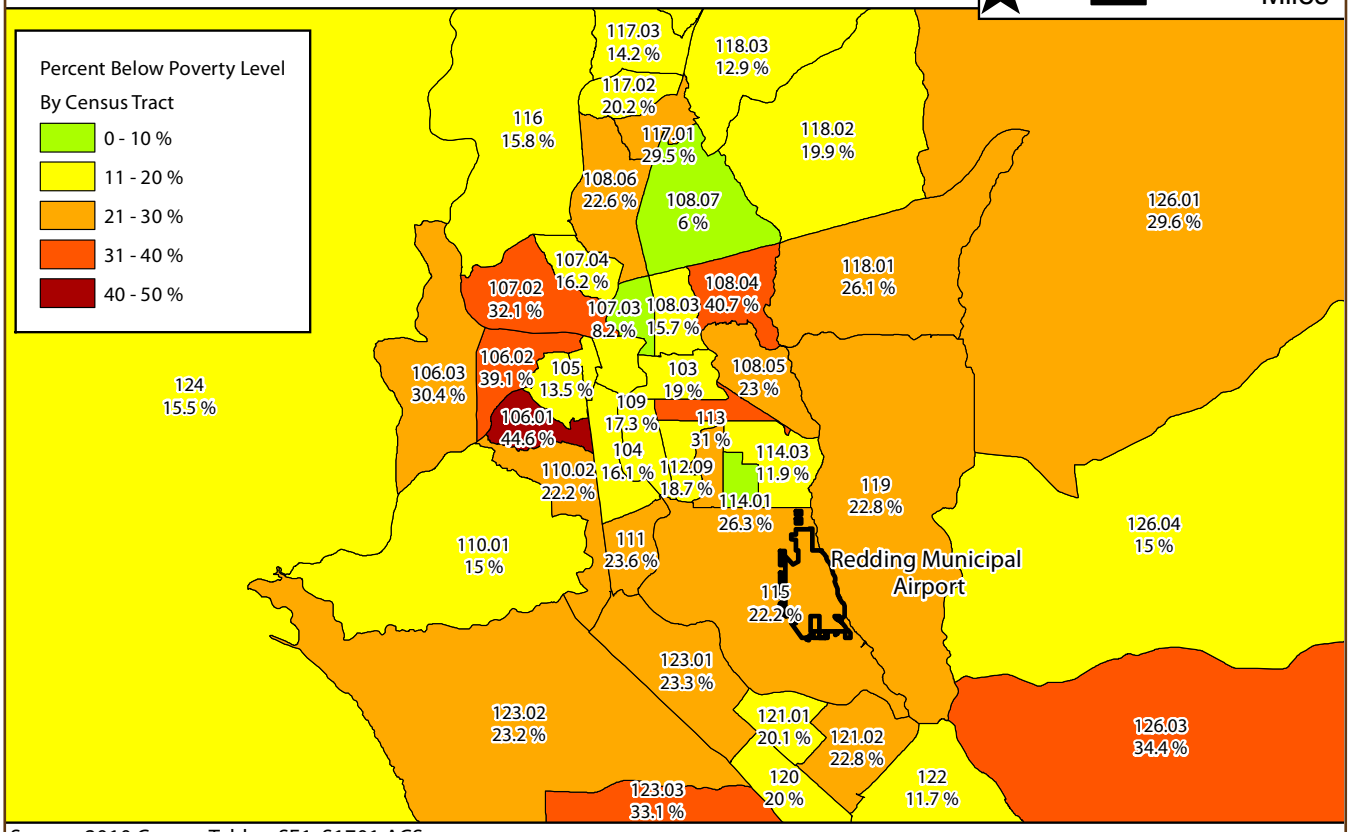
Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks

The airport is located in Census Tract (C.T.) 115, based on the 2010 U.S. census. The minority population within C.T. 115 is 11.4 percent (2010 census). The American Community Service estimates of the 2010 Census indicate that 22.2 percent of the households in C.T. 115 are below the poverty rate (**Exhibit B7**). Residential areas in the vicinity of the airport include scattered single family located immediately south of the airport along Fig Tree Lane and southeast of the airport along Lotus Road. In addition, the Wooded Acres and Wooded Acres North residential subdivisions are located approximately 0.15 mile west of the airport off Meadow View Drive. Scattered large-lot residences are also located west of the airport on Kisling Road, Devere Drive, and Lyal and Sylvian Lanes.

The closest schools to the airport are Prairie Elementary School, located approximately one mile south of the airport on Churn Creek Road, and Pacheco Elementary School located approximately 1.5 miles

[10] http://www.envirostor.dtsc.ca.gov/public/profile_report.asp?global_id=80000698, accessed April 2015.





Source: 2010 Census Tables: SF1, S1701 ACS
For Shasta County, CA

west of the airport on Knighton Road. The only recreational facility in proximity to the airport that is likely to be used by children is the Shasta Kart Klub.

Water Quality

The airport is located within the Stillwater-Churn Creek Watershed. Stillwater Creek is located immediately adjacent to, and within, the airport's eastern property line. It is classified as a rainfall-driven, intermittent stream that is typically low-flow or dry from late spring through fall. Available data indicate that water quality is generally good; however, there have been concerns with turbidity and suspended solids from local construction and from channel erosion sources. There is also potential for elevated bacteria concentrations from urban runoff, failing septic systems, and domestic livestock.[11] The creek has a high degree of seasonal variability in surface flow with rapid response to storm events; during storm events it can contain high sediment loads to the Sacramento River.

The watershed area is within the Redding Groundwater Basin, which has an approximate storage capacity of 5.5 million acre-feet. Groundwater is used for municipal, industrial, and agricultural purposes. Studies have shown no increasing or decreasing trends in groundwater levels, and groundwater monitoring indicates that the Redding Groundwater Basin is of excellent quality with some minor impairment from natural sources (dissolved salts, chlorides, metals).[12]

The closest impaired water to the airport is the Sacramento River, located downstream approximately 1.25 mile.[13] The airport implements a Stormwater Pollution Prevention Plan (SWPPP), approved in 2007, to ensure that downstream impacts to the Stillwater Creek corridor and the Sacramento River do not occur as a result of airport operations.

Wetlands

Certain drainages (both natural and human-made) come under the purview of U.S. Army Corps of Engineers (USACE) under Section 404 of the *Clean Water Act* (CWA); wetlands are also protected. In addition, E.O. 11990, *Protection of Wetlands* provides definitions and protection of wetlands. Wetlands typically exhibit three characteristics: hydrology, hydropytes (plants able to tolerate various degrees of flooding or frequent saturation), and poorly drained or "hydric" soils.

As shown on **Exhibit B5** and discussed under the Fish, Wildlife and Plants section, the airport contains wetlands, including vernal pools, that support habitat for species protected under the Federal ESA and/or various State regulations. In addition, the airport contains drainages that would be considered "Other Waters of the U.S." due to their connectivity to navigable waters, (i.e., the Sacramento River via Stillwater Creek). These occur primarily in the eastern part of the airport.

[11] http://www.sacriver.org/aboutwatershed/roadmap/watersheds/eastside/stillwater-churn-creek-watersh, accessed December 2014.
[12] Ibid.
[13] http://watersgeo.epa.gov/mwm/, accessed April 2015.

Wild and Scenic Rivers

Wild and scenic rivers refer to designations within U.S. Department of the Interior, National Park Service's *Nationwide Rivers Inventory*. Public Law 90-542 states that such rivers are free flowing and possess "outstanding remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or other similar values."

The closest designated Wild or Scenic River segments are two segments of the Trinity River, both of which are located 40 -50 miles west of the airport. There are other creek or river segments within Shasta County that are listed on the Nationwide Rivers Inventory for potential designation. None of these are located near the airport.[14]

ENVIRONMENTAL EVALUATION

The recommended development plan for the airport is shown in Exhibit 5A of the AMP. It depicts additional hangar development along Airport Road and reserves space for additional terminal parking, commercial and general aviation services, and air cargo facilities. Additional apron area and reconfigured taxiway connectors are also recommended for the west side of Runway 16-34. An all-weather perimeter service road is proposed around the south end of the runway, but outside of the runway safety area (RSA). East of Runway 16-34, a new parallel taxiway is proposed.

Based on the runway analysis completed in Chapter Three of the AMP, the airport also has a potential need for a parallel runway configuration in lieu of the airport's existing intersecting configuration. Thus, the closure of Runway 12-30 is recommended and the construction of a new parallel runway to the east of existing Runway 16-34 is proposed. Both aviation and non-aviation development areas would be reserved for between the two parallel runway systems north of the existing Runway 12-30. Runway 12-30 would be used as a taxiway connecting the new runway to the western apron and hangar areas.

Analysis of the potential environmental impacts of proposed airport development projects, as discussed in Chapter Five and depicted on Exhibit 5A, is an important component of the AMP process. The following table (**Table B4**) summarizes potential environmental concerns associated with build-out of the proposed AMP. In some cases, these concerns are related to the future construction of specific projects that could be built under the AMP; in other cases, the concerns are related to the overall projected future increase in airport operations (i.e., the aviation forecasts). Construction-related impacts are temporary and are addressed separately as their own impact category.

[14] http://www.nps.gov/ncrc/programs/rtca/nri/states/ca.html, accessed April 2015.

TABLE B4
Summary of Potential Environmental Concerns
Redding Municipal Airport Master Plan

FAA Resource Category	Threshold of Significance	Potential Concern
Air Quality, including Greenhouse Gases (GHGs) and Climate	**For air quality:** Potentially significant air quality impacts associated with an FAA project or action would be demonstrated by the project or action exceeding one or more of the NAAQS for any of the time periods analyzed. **For GHGs and climate:** There are no Federal standards for aviation-related GHG emissions developed at this time.	**For air quality:** Various levels of project-specific review would apply to the airport under NEPA, the CEQA, and local permitting requirements for airport development projects. The area meets all Federal NAAQS, but not all of the State standards. **For GHGs and climate:** An increase in GHG emissions would occur over the 20-year planning horizon of the AMP. Although there are no Federal GHG emissions standards that can be applied to this growth at this time, consistency with regional and local GHG programs should be assessed.
Coastal Resources	No specific thresholds have been established; however, if a local Coastal Development Permit cannot be issued due to a lack of consistency with a local coastal program, the FAA typically will not make a Federal coastal consistency determination either.	None. The airport is not located within a Coastal Zone and is located more than 95 miles from the Pacific Ocean, the nearest protected coastal area.
Compatible Land Use/Noise	Compatible land use evaluations for airports must consider the land uses in the vicinity of an airport to ensure those uses do not adversely affect safe aircraft operations. In addition, if an airport action would result in impacts exceeding FAA thresholds of significance which have land use ramifications, such as disruption of communities, relocation of businesses or residences, and induced socioeconomic impacts, the effects of the land use impacts shall be discussed. See also significance threshold for noise.	Potential. The AMP-recommended development is planned for west of Stillwater Creek, on either side of the airfield. Surrounding land uses are primarily open space or similar light industrial or office uses. However, the recommended development plan includes the construction of an additional runway (Runway 16L-34R) between the existing Runway 16R-34L and Stillwater Creek. Since the airport is located near Stillwater Creek, wildlife hazards for the new runway could be a concern and should be addressed further during its site-specific review. In addition, the airport currently allows the Redding Dragstrip and a go-cart track to operate in the vicinity of the new runway. This recommended project would require that these land uses be relocated to a different location. See also discussion on noise.

TABLE B4 (Continued)
Summary of Potential Environmental Concerns
Redding Municipal Airport Master Plan

FAA Resource Category	Threshold of Significance	Potential Concern
Construction Impacts	Construction impacts alone are rarely significant pursuant to NEPA. See significance threshold(s) for the resource(s) that construction could affect.	None. FAA's Advisory Circular (AC) 150/5370-10G, *Standards for Specifying Construction of Airports, Item P-156, Temporary Air and Water Pollution, Soil Erosion and Siltation Control* would be implemented during construction projects at the airport. This AC and other best management practices (BMPs) that may be required by the California Regional Water Quality Control Board or the Shasta County AQMD as part of their implementation of the *Clean Water Act,* the *Clean Air Act*, and State regulations would be incorporated into future airport development to minimize dust, emissions, and water quality concerns. The closest residential or other noise-sensitive land uses are at least 0.4 mile from the proposed new runway. Recommended airport development along Airport Road would be approximately 0.15 mile from the nearest residences, but would be buffered by intervening development along the west side of Airport Road as well as existing trees and other vegetation.
Department of Transportation (DOT) *Act*: Section 4(f)	When the action's physical use would be more than minimal or its constructive use substantially impairs the Section 4(f) property. In either case, mitigation is not enough to sustain the resource's designated use.	None. No direct impacts or substantial impairment (constructive use) of Section 4(f) resources would occur. The closest such resources are more than 0.75 mile away.
Farmland	When the combined score on Form AD-1006 ranges between 200 and 260. Impact severity increases as the total score approaches 260.	Potential. Much of the airport is classified as Prime Farmland if irrigated by the USDA-NRCS, and some of the airport is currently leased for agricultural production. Depending on the project, Form AD-1006 may be required.
Fish, Wildlife, and Plants	**For federally-listed species:** When the USFWS or the National Marine Fisheries Service determines a proposed action would likely jeopardize a species' continued existence or destroy or adversely affect a species' critical habitat. **For non-listed species:** Consider scientific literature on, and information from, agencies having expertise in addressing the affected species. Consider information on: project effects on population dynamics; sustainability; reproduction rates; natural and artificial mortality (aircraft strikes); and the minimum population size needed to maintain the affected population.	**For federally-listed species:** Potential. Care has been taken within the proposed AMP to avoid known areas of wetlands, including vernal pools. However, Critical Habitat for the Slender Orcutt grass includes portions of the developed areas of the airport. As such, any development project proposed for within this area would be subject to Section 7 of the *Endangered Species Act* and is likely to require informal consultation with the USFWS, at a minimum. **For non-listed species:** Potential. Any construction occurring during nesting season for migratory birds should be evaluated for potential impact under the *Migratory Bird Treaty Act*. This is especially a concern near the wooded area along Stillwater Creek and along Airport Road. Burrowing owl may occur throughout the airport. Pre-construction surveys for the owl would be required using approved survey protocols. The potential for the presence of migratory birds should be evaluated on a project-specific basis.

TABLE B4 (Continued)
Summary of Potential Environmental Concerns
Redding Municipal Airport Master Plan

FAA Resource Category	Threshold of Significance	Potential Concern
Floodplains	When notable adverse impacts on natural and beneficial floodplain values would occur.	None. No development is proposed for the on-airport 100-year floodplain, which only occurs along the airport's eastern property line.
Hazardous Materials, Pollution Prevention, and Solid Waste	**For hazardous materials:** When an action involves a property on or eligible for the National Priority List (NPL). Uncontaminated properties within an NPL site's boundary do not always trigger this significance threshold. **For pollution prevention:** See significance thresholds for water quality. **For solid waste:** There are no solid waste thresholds of significance established.	**For hazardous materials:** Potential. The Redding Army Airfield, a prior land use at the airport, is listed on the State's Cortese List as a hazardous materials clean-up site. Contamination and/or USTs associated with this past historic land use may still be present. **For pollution prevention:** None. The airport imposes an SPCC Plan on all lessees with fuel operations in their lease agreements. In addition, water quality at the airport is protected through implementation of the airport's SWPPP. This document and associated RWQCB permit will need to be updated to include additional impervious surfaces at the airport as such projects occur. **For solid waste:** None. Existing and future solid waste is, or would be, collected and taken to the County's West Central Landfill.
Historic, Architectural, Archaeological, and Cultural Resources	When an action adversely affects a protected property and the responsible FAA official determines that information from the State and/or tribal Historic Preservation Officer addressing alternatives to avoid adverse effects and mitigation warrants further study.	Potential. Unsurveyed areas of the airport have the potential to contain historical, architectural, archaeological, or cultural resources. Thus, any areas at the airport that would be disturbed by new development should be surveyed for cultural resources prior to ground disturbance unless previously disturbed to the point that artifacts could no longer be intact. In the event that unknown resources are found during construction, all applicable State and Federal laws regarding such finds must be followed. In addition, because the dragstrip was constructed in the late 1940s and is the oldest continuous NHRA racing strip in the country, it should be evaluated for its potential value to history under Federal and State regulations.
Light Emissions and Visual Effects	**For light emissions:** When an action's light emissions create annoyance to interfere with normal activities. **For visual effects:** When consultation with Federal, State, or local agencies, tribes, or the public shows these effects contrast with existing environments and the agencies state the effect is objectionable.	**For light emissions:** None. All new lighting associated with the proposed AMP would remain on the airfield and other developed portions of the airport. Although the AMP does recommend the construction of a new 4,000-foot runway, the closest homes to the new runway would be located approximately 0.4 mile away and screened by trees and other vegetation. **For visual effects:** None. All new development associated with the proposed AMP would remain on the airfield and other developed portions of the airport. From off-site areas, the property would continue to look like a developed airport with no noticeable change in its overall appearance.

TABLE B4 (Continued)
Summary of Potential Environmental Concerns
Redding Municipal Airport Master Plan

FAA Resource Category	Threshold of Significance	Potential Concern
Natural Resources and Energy	When an action's construction, operation, or maintenance would cause demands that would exceed available or future (project year) natural resource or energy supplies.	None. Planned development projects at the airport are not anticipated to result in a demand for natural resources or energy consumption beyond what is available by service providers.
Noise	**For most areas:** When an action, compared to the No Action alternative for the same timeframe, would cause noise-sensitive areas located at or above the 65 dB DNL to experience a noise increase of at least DNL 1.5 dB. An increase from DNL 63.5 dB to DNL 65 dB is a significant impact. **For national parks, national wildlife refuges and historic sites, including traditional cultural properties:** FAA must give special consideration to these areas. The 65 dB DNL threshold may not adequately address noise effects on visitors to these areas. Consult the jurisdictional agency for more information to determine a significant noise impact.	**For most areas: Exhibit B8** depicts the projected future noise contours for the airport in the build out year 2034. As shown, future noise contours, even those associated with a new parallel runway, remain almost entirely on airport property. No noise-sensitive land uses would be adversely affected by the 65 dB or higher CNL noise exposure contours. **For national parks, national wildlife refuges and historic sites, including traditional cultural properties:** None. There are no sensitive national parks, wildlife refuges, historic sites, or known traditional cultural properties within proximity to the airport's noise contours.
Secondary (Induced) Impacts	Induced impacts will not normally be significant except where there are also significant impacts in other categories, especially noise, land use, or direct social impacts.	None. The proposed actions are not expected to create significant adverse noise, land use, or social impacts. See also discussion under those sections.
Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks	**For socioeconomic issues:** When an action would cause: • Extensive relocation, but sufficient replacement housing is unavailable; • Extensive relocation of community businesses that would cause severe economic hardship for affected communities; • Disruption of local traffic patterns that substantially reduce the Levels of Service of roads serving the airport and its surrounding communities; • A substantial loss in community tax base. **For environmental justice issues:** When an action would cause disproportionately high and adverse human health or environmental effects on minority and low-income populations, a significant impact may occur. **For children's health & safety risks:** An action causing disproportionate health and safety risks to children may indicate a significant impact.	**For socioeconomic issues:** Potential. The airport currently allows the Redding Dragstrip and a go-cart track to operate in the vicinity of the proposed new runway. This recommended project would require that these land uses be relocated. **For environmental justice issues:** None. Proposed development projects would occur on the airport property itself and are not expected to adversely affect residential areas in the general vicinity. **For children's health & safety risks:** None. Proposed development projects would occur on the airport property itself and are not expected to adversely affect residential areas in the general vicinity. The closest schools are more than one mile from any areas proposed for development.

TABLE B4 (Continued)
Summary of Potential Environmental Concerns
Redding Municipal Airport Master Plan

FAA Resource Category	Threshold of Significance	Potential Concern
Water Quality	When an action would not meet water quality standards. Potential difficulty in obtaining a permit or authorization may indicate a significant impact.	None. The airport implements an approved SWPPP pursuant to the Industrial General Permit.
Wetlands, jurisdictional or non-jurisdictional	When an action would: • Adversely affect a wetland's function to protect the quality or quantity of a municipal water supply, including sole source aquifers and a potable water aquifer. • Substantially alter the hydrology needed to sustain the affected wetland's values and functions or those of a wetland to which it is connected. • Substantially reduce the affected wetland's ability to retain floodwaters or storm runoff, thereby threatening public health, safety, or welfare. The last term includes cultural, recreational, and scientific public resources or property. • Adversely affect the maintenance of natural systems supporting wildlife and fish habitat or economically-important timber, food, or fiber resources of the affected or surrounding wetlands. • Promote development that causes any of the above impacts. • Be inconsistent with applicable State wetland strategies.	Potential. Care has been taken within the proposed AMP to avoid known areas of wetlands, including vernal pools. Nonetheless, the potential for wetlands should be evaluated on a project-specific basis.
Wild and Scenic Rivers	No specific thresholds have been established.	None. The closest designated Wild and Scenic river segments are more than 40 miles from the airport and are located in a separate drainage basin.

ENVIRONMENTAL ACTION SUMMARY

Prior to the issuance of Federal funding and/or construction, AMP-recommended projects would require NEPA environmental consideration and analysis. As discussed previously, the three types of environmental documentation under NEPA are the documented CatEx, EA, or EIS. To use a categorical exclusion, the project must meet the criteria in 40 CFR 1508.4 and are defined as "a category of actions that do not normally require an EA or EIS because they do not individually or cumulatively have a significant effect on the human environment, with the exception of extraordinary circumstances." It is the duty of the responsible FAA official to determine whether extraordinary circumstances exist (as defined in Order 1050.1, Section 304) and, if so, deem the action appropriate for an EA.

An EA, at a minimum, must be prepared for a proposed action when the initial review of the proposed action indicates that it is not categorically excluded, involves at least one extraordinary circumstance,

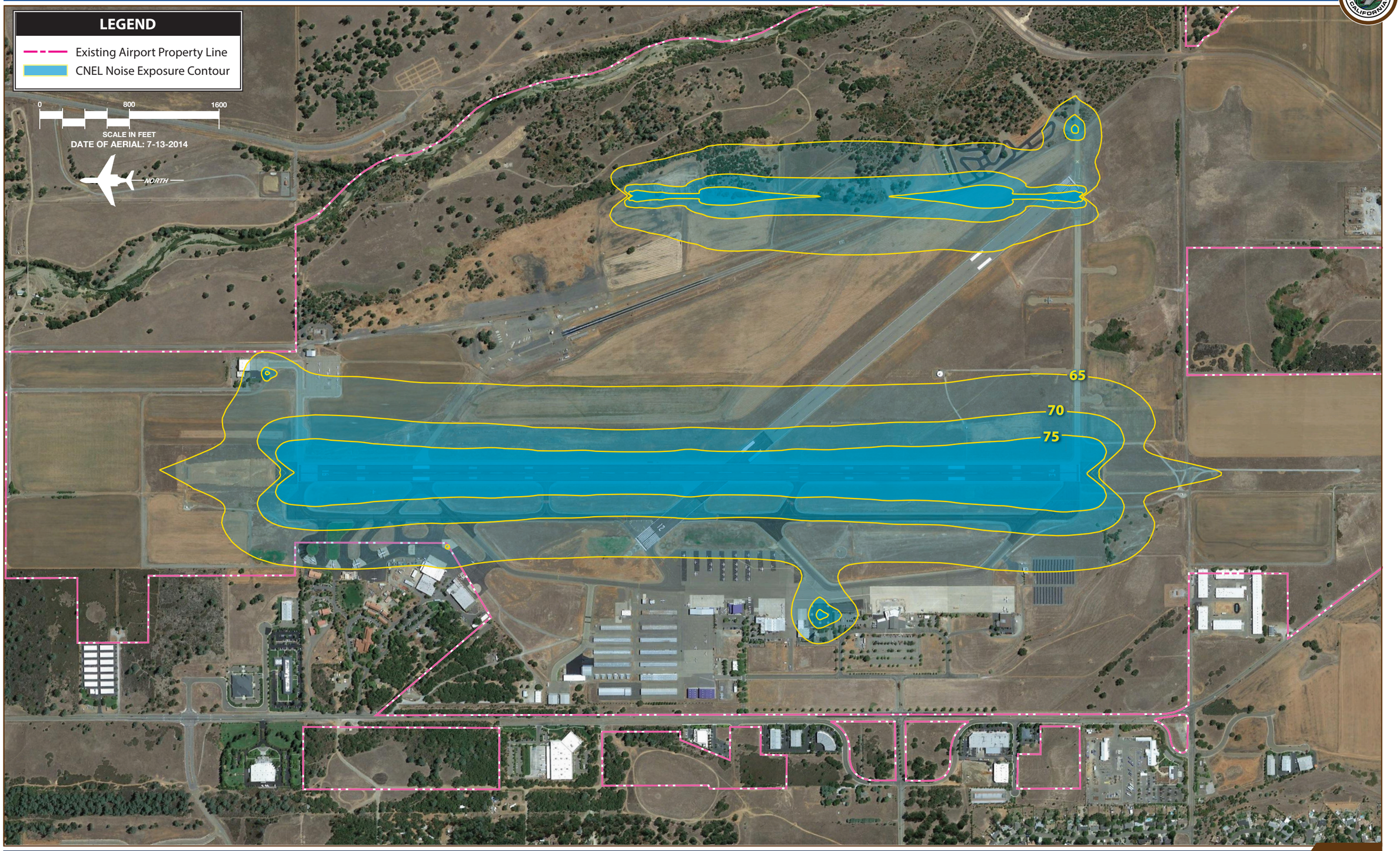


Exhibit B8
FUTURE 2034 NOISE CONTOURS

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and the action is not one known normally to require an EIS. The purpose of an EA is to document the FAA determination as to whether or not a proposed action has the potential for significant environmental impacts. If none of the potential impacts are likely to be significant, then the responsible FAA official shall prepare a Finding of No Significant Impact (FONSI), which briefly presents, in writing, the reasons why an action, not otherwise categorically excluded, will not have a significant impact on the human environment and the approving official may approve it. Issuance of a FONSI signifies that the FAA will not prepare an EIS and has completed the NEPA process for the proposed action. Some of the actions normally requiring an EA, according to FAA Order 1050.1E, Change 1, are recommended projects within the proposed AMP, such as the construction of a new runway.

If the responsible FAA official determines that the proposed action may significantly affect the quality of the human environment, an EIS shall be prepared. An EIS is a clear, concise, and appropriately detailed document that provides agency decision-makers and the public with a full and fair discussion of significant environmental impacts of the proposed action and reasonable alternatives, and implements the requirement in NEPA §102(2)(C) for a detailed written statement.

Table B5 contains a list of the projects proposed in the short term and the anticipated level of NEPA documentation that might be required. Several projects in the first few years of the plan deal with pavement preservation on the west tiedown (local) apron, in the T-hangar area and the primary runway. In 2019/2020, an EA for the parallel runway/taxiway project is programmed. Following the environmental processing, the design work for this project can be undertaken, followed by actual construction beginning in 2021. Following the completion and opening of the new runway, Runway 12-30 will be closed and the pavement will be remarked and lighted as a connecting taxiway. One terminal area project included in the short term is the extension of a dedicated access road into the air cargo area, segregating this traffic from the passenger traffic on the terminal curb. This project will also require the re-marking of Municipal Boulevard for two-way traffic.

TABLE B5
Anticipated Environmental Review For Future Short Term Projects
Redding Municipal Airport Master Plan

Fiscal Year	Recommended Project	Anticipated NEPA Action
2016	West Tie-Down Apron Reconstruction	CatEx (310e)*
2016	T-Hangar Taxilanes Reconstruction – Phase 1	CatEx (310e)*
2017	T-Hangar Taxilanes Reconstruction – Phase 2	CatEx (310e)*
2018	Runway Rehabilitation (16-34)	CatEx (310e)
2019	Extend New Air Cargo Access Road	CatEx (310a)
2021	Construct Parallel Runway/Taxiway	EA**
2021	Close Runway 12-30; Remark/Resign	EA**

NEPA – *National Environmental Policy Act*
CatEx – Categorical Exclusion
EA – Environmental Assessment
* CatEx has already been approved by FAA.
** One EA covering both projects.

REDDING
Municipal Airport

Appendix C

AIRPORT LAYOUT PLAN DRAWINGS

AIRPORT LAYOUT PLAN REDDING, CALIFORNIA

REDDING

MUNICIPAL AIRPORT

AIRPORT LAYOUT PLANS INDEX OF DRAWINGS

1. COVER SHEET
2. DATA SHEET
3. AIRPORT LAYOUT PLAN
4. TERMINAL AREA PLAN
5a. INNER PORTION OF THE PART "77" AIRSPACE DRAWING
5b. RUNWAY 34L APPROACH TAIL OF THE PART "77" AIRSPACE DRAWING
6. INNER PORTION OF THE RUNWAY 16R-34L APPROACH SURFACE DRAWING
7. INNER PORTION OF THE RUNWAY 12-30 APPROACH SURFACE DRAWING
8. INNER PORTION OF THE RUNWAY 16L-34R APPROACH SURFACE DRAWING
9. RUNWAY 16R-34L APPROACH SURFACE PROFILE DRAWINGS
10. RUNWAYS 16L-34R & 12-30 APPROACH SURFACE PROFILE DRAWING
11. RUNWAY 16R DEPARTURE SURFACE DRAWING
12. RUNWAY 34L DEPARTURE SURFACE DRAWING
13. RUNWAY 12 DEPARTURE SURFACE DRAWING
14. RUNWAY 30 DEPARTURE SURFACE DRAWING
15. ON-AIRPORT LAND USE DRAWING
16. AIRPORT PROPERTY MAP (EXHIBIT "A")
17. INNER APPROACH OFZ FOR RUNWAY 16R-34L

No.	REVISIONS	DATE	BY	APPD.
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-

THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT OF THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH THE APPROPRIATE PUBLIC LAWS.

REDDING MUNICIPAL AIRPORT

COVER SHEET

DRAFT

REDDING, CALIFORNIA

PLANNED BY: Steve Wagner
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris

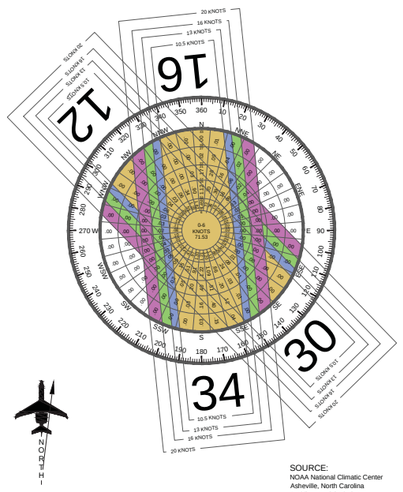
November, 2015 *SHEET* 1 *OF* 17

Coffman Associates
Airport Consultants
www.coffmanassociates.com

Coffman Associates E:\3 drive 12 2B 2010\Cad\CAD\REDDING\2015\01 RDD cov 10 2015.dwg Printed Date: 11-17-15 07:46:02 AM Maggie Beaver

ALL WEATHER WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 16-34	99.52%	99.82%	99.98%	100%
Runway 12-30	95.19%	97.74%	99.28%	99.86%
All Runways	99.73%	99.91%	99.99%	100%



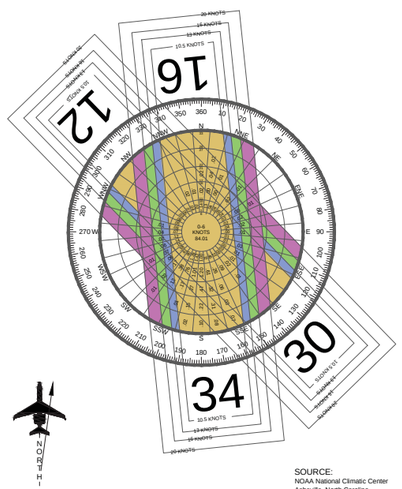
NORTH

Magnetic Declination
14° 22' East (June 2015)
Annual Rate of Change
00° 6.0' West (June 2015)

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Redding Municipal Airport
Redding California
OBSERVATIONS:
109,685 All Weather Observations
2005-2014

IFR WIND COVERAGE

Runways	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 16-34	99.56%	99.81%	99.97%	100%
Runway 12-30	95.86%	97.85%	99.22%	99.85%
All Runways	99.66%	99.89%	99.98%	100%



NORTH

Magnetic Declination
14° 22' East (June 2015)
Annual Rate of Change
00° 6.0' West (June 2015)

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Redding Municipal Airport
Redding California
OBSERVATIONS:
9,865 IFR Observations
2005-2014

RUNWAY DATA

RUNWAY DATA	Runway 16-34				Runway 12-30 (To Be Removed)		Runway 16L-34R	
	EXISTING		ULTIMATE		EXISTING		ULTIMATE	
RUNWAY IDENTIFICATION	Primary / Commercial		SAME		Crosswind/ GA		Parallel / GA	
CRITICAL DESIGN AIRCRAFT	D-IV		SAME		C-III		B-II	
CRITICAL DESIGN AIRCRAFT TYPE	737/MD-80		SAME		Q-400		KING AIR	
APPROACH REFERENCE CODE (APRC)	C-III-2400		SAME		B/II/5000		B/II/VIS	
DEPARTURE REFERENCE CODE (DPRC)	D-IV		SAME		C-III		B/II	
RUNWAY DESIGN CODE (RDC)	C-III-2400		SAME		B-II-5000		B/II/VIS	
WINGSPAN OF DESIGN AIRCRAFT	127.50'		SAME		93.30'		50.20'	
MAX. CERTIFIED TAKEOFF WEIGHT OF DESIGN A/C	143,500 lbs		SAME		62,500 lbs		9650 lbs	
UNDERCARRIAGE WIDTH OF CRITICAL AIRCRAFT	24.92'		SAME		12.6'		12.6'	
CRITICAL AIRCRAFT APPROACH SPEED IN KNOTS	141 knots		SAME		121 knots		103 knots	
RUNWAY WIND COVERAGE (16 KNOTS/18 MPH)	99.97%		SAME		99.97%		99.97%	
RUNWAY DIMENSIONS (L x W)	7003' x 150'		SAME		5067' x 150'		4000' x 75'	
RUNWAY TRUE BEARING (NGS SURVEY 11/04/92)	N 0° 04' 48" W		SAME		N 39° 54' 36" W		N 0° 4' 48" W	
RUNWAY SHOULDER WIDTH (STANDARD)	25'		SAME		25'		NONE	
RUNWAY LIGHTING (PCL)	HIRL		SAME		MIRL		MIRL	
RUNWAY EFFECTIVE GRADIENT / MAXIMUM GRADIENT	0.2% / 2%		SAME		0.2% / 2%		0.09%/2%	
RUNWAY MAXIMUM ELEVATION / HIGH POINT (NAVD-88)	504.8' MSL		SAME		500.1' MSL		489.9' MSL	
RUNWAY LOW POINT ELEVATION (NAVD-88)	496.1' MSL		SAME		492.3' MSL		489.3' MSL	
RUNWAY SURFACE MATERIAL / SURFACE TREATMENT	Asphalt , Grooved		SAME		Asphalt , Grooved		Asphalt	
RUNWAY PAVEMENT STRENGTH (IN THOUSAND LBS. #1)	90(S),140(D), 195(DT)		SAME		60(S)/72(D)/110(DT)		12.5(S)	
RUNWAY CENTERLINE TO PARALLEL RUNWAY CENTERLINE	NONE		2,500' CL-CL		N/A		2500' CL-CL	
RUNWAY CENTERLINE TO PARALLEL TAXIWAY CENTERLINE	400' CL-CL		SAME		N/A		240' CL-CL	
RUNWAY LINE OF SIGHT REQUIREMENT MET	YES		SAME		YES		YES	
FAR PART-77 APPROACH SURFACES	1000' x 10,000' x 3500' (16) 1000' x 50,000' x 16,000' (34)		1000' x 10,000' x 4000' (16R) 1000' x 50,000' x 16,000' (34L)		500' x 5000' x 1500' (12) 500' x 5000' x 1500' (30)		500' x 5000' x 1500' (16L) 500' x 5000' x 1500' (34R)	
RUNWAY PROTECTION ZONES	500' x 1700' x 1010' (16) 1000' x 2500' x 1750' (34)		1000' x 1700' x 1510' (16R) 1000' x 2500' x 1750' (34L)		500' x 1700' x 1010' (12) 500' x 1700' x 1010' (30)		250' x 1000' x 450' (16L) 250' x 1000' x 450' (34R)	
TAXIWAY LIGHTING	MITL		SAME		MITL		MITL	
TAXIWAY MARKING	Centerline/Signage/Edge		SAME		Centerline/Signage		Centerline	
TAXIWAY WIDTH (TDG) #4 AND TAXILANE WIDTH	50'		SAME		50'		35' (TDG 2)	
TAXIWAY SHOULDER WIDTH	25'		SAME		25'		N/A	
TAXIWAY EDGE SAFETY MARGIN (TESM)	15'		SAME		15'		7.5' TESM	
TAXIWAY SURFACE MATERIAL	Asphalt		SAME		Asphalt		Asphalt	
TAXIWAY (TSA) / TAXILANE SAFETY AREA WIDTH	171' TSA		SAME		118' TSA		79' TSA	
TAXIWAY (TOFA) AND TAXILANE OBJECT FREE AREA WIDTH	259' TOFA, TL-OFA 225'		SAME		186' TOFA, TL-OFA 162'		131' TOFA, TL-OFA 115'	
TAXIWAY HOLDING POSITION MARKING/HOLDSIGN	250'		SAME		250'		125'	
TAXIWAY CENTERLINE TO FIXED OR MOVABLE OBJECT	129.5'		SAME		81'		57.5'	
TAXIWAY WINGTIP CLEARANCE	34'		SAME		34'		26'	
RUNWAY ENDS DATA	RUNWAY 16	RUNWAY 34	RUNWAY 16R	RUNWAY 34L	RUNWAY 12	RUNWAY 30	RUNWAY 16L	RUNWAY 34R
14 CFR PART 77 APPROACH CATEGORY (Type Used)	NP-C	PIR	SAME	SAME	B (V)	B (V)	B (V)	B (V)
14 CFR PART 77 APPROACH SLOPE	34:1	50:1/40:1	SAME	SAME	20:1	20:1	20:1	20:1
14 CFR PART 77 APPROACH / RUNWAY INSTRUMENTATION	Nonprecision	Precision	SAME	SAME	Visual	Visual	Visual	Visual
RUNWAY DEPARTURE SURFACE (Yes / No)	Yes	Yes	SAME	SAME	No	No	No	No
RUNWAY MARKING	Precision	Precision	SAME	SAME	Basic (Visual)	Basic (Visual)	Basic	Basic
RUNWAY BLAST PAD	None	None	None	None	None	None	None	None
RUNWAY STOPWAY	None	None	None	None	None	None	None	None
RUNWAY APPROACH VISIBILITY MINIMUMS (Lowest)	1 mile	< 3/4 mile	SAME	SAME	Visual	Visual	1 mile	1 mile
RUNWAY APPROACH LIGHTING	None	MALSR	SAME	SAME	None	None	None	None
PRECISION OBSTACLE FREE ZONE (800' x 200')	N/A	POFZ	SAME	SAME	N/A	N/A	N/A	N/A
TYPE OF AERONAUTICAL SURVEY REQUIRED FOR APPROACH	VGS	VGS	SAME	SAME	NVGS	NVGS	NVGS	NVGS
THRESHOLD SITING REQUIREMENTS (Runway Type)	Rwy Type 5	Rwy Type 7	SAME	SAME	Rwy Type 3	Rwy Type 3	Rwy Type 2	Rwy Type 2
THRESHOLD SITING SURFACE OBJECT PENETRATIONS	No	No	SAME	SAME	No	No	No	No
THRESHOLD SITING REQUIREMENTS (AC 150/5300-13A TSS)	20:1 (TSS)	34:1 (TSS)	SAME	SAME	20:1 (TSS)	20:1 (TSS)	20:1 (TSS)	20:1 (TSS)
RUNWAY THRESHOLD DISPLACEMENT	N/A	N/A	SAME	SAME	N/A	N/A	N/A	N/A
RUNWAY DISPLACED THRESHOLD ELEVATION (NAVD88)	N/A	N/A	SAME	SAME	N/A	N/A	N/A	N/A
RUNWAY END ELEVATION (NAVD88)	504.8 MSL	490.7' MSL	SAME	SAME	500.1' MSL	492.3' MSL	489.0' MSL	488.5' MSL
RUNWAY TOUCHDOWN ZONE ELEVATION (TDZE / NAVD 88)	504.8' MSL	496.1' MSL	SAME	SAME	500.1' MSL	497.6' MSL	489.9' MSL	489.3' MSL
RUNWAY OBJECT FREE AREA (OFA Beyond Stop End)	1000' x 800'	1000' x 800'	SAME	SAME	1,000' x 400'	1,000' x 400'	300' x 500'	300' x 500'
OFA (Non-Standard, Distance Beyond Stop End)	N/A	N/A	SAME	SAME	N/A	N/A	N/A	N/A
RUNWAY SAFETY AREA (RSA Beyond Stop End)	1000' x 500'	1000' x 500'	SAME	SAME	1,000' x 400'	1,000' x 400'	300' x 150'	300' x 150'
RSA (Non-Standard, Distance Beyond Stop End)	N/A	N/A	SAME	SAME	N/A	N/A	N/A	N/A
RUNWAY OBSTACLE FREE ZONE (OFZ Beyond Stop End)	200' x 400'	200' x 400'	SAME	SAME	200' x 400'	200' x 400'	200' x 250	200' x 250
OFZ (Non-Standard, Distance Beyond Stop End)	N/A	N/A	SAME	SAME	N/A	N/A	N/A	N/A
AIRPORT INSTRUMENT APPROACH PROCEDURES	LOC (BK CRS)	ILS GPS	SAME GPS	SAME	NONE	NONE	NONE	NONE
RUNWAY VISUAL NAVIGATIONAL AIDS	VASI-4 REILs MALSR	PAPI-4 MALSR	PAPI-4 SAME SAME	SAME SAME	NONE	PAPI-2	PAPI-2	PAPI-2

1. Pavement strengths are expressed in Single (S), Dual (D), Dual Tandem (DT), and/or Double Dual Tandem (DDT) wheel loading capacities.
2. NVGS (Non-Vertically Guided Survey), VGS (Vertically Guided Survey).
3. AAC, ADG, and approach visibility minimums are combined to form the RDC.

RUNWAY END COORDINATES (NAD 83)

		EXISTING	ULTIMATE
RUNWAY 16R	Latitude	40°31'13.2064"N	40°30'32.953"N
	Longitude	122°17'41.4746"W	122°17'41.529"
RUNWAY 34L	Latitude	40°30'04.0044"N	SAME
	Longitude	122°17'41.5903"W	SAME
RUNWAY 12	Latitude	40°30'42.8961"N	NONE
	Longitude	122°17'49.8393"W	NONE
RUNWAY 30	Latitude	40°30'04.4910"N	NONE
	Longitude	122°17'07.7599"W	NONE
RUNWAY 16L	Latitude	--	40°30'04.10"N
	Longitude	--	122°17'09.47"W
RUNWAY 34R	Latitude	--	40°30'43.63"N
	Longitude	--	122°17'09.37"W

NON-STANDARD TABLE

DEVIATION DESCRIPTION	EFFECTED DESIGN STANDARD	STANDARD	EXISTING	PROPOSED DISPOSITION	APPROVAL DATE
BUILDINGS WITHIN OFA OF RUNWAY 12	AC 150/5300-13: RWY. 12 OFA WIDTH (RWY. C TO EDGE OF OFA)	400' (1/2 OF 800' STANDARD)	320'	RUNWAY 12-30 TO BE CLOSED	--
BUILDINGS WITHIN BRL/APL OF RUNWAY 12	AC 150/5300-13: RWY. 12 C TO EDGE OF AIRCRAFT PARKING	500'	320'	RUNWAY 12-30 TO BE CLOSED	--
HOLD POSITION MARKINGS AND SIGNS OF RUNWAY 16R-34L	LOCATION DISTANCES FOR HOLD MARKING AND SIGNS FOR APPROACH CATEGORY "D"	256'	250'	RELOCATE MARKINGS AND SIGNS	--

AIRPORT DATA

REDDING MUNICIPAL AIRPORT (RDD)

TOWN: REDDING, CALIFORNIA | COUNTY: SHASTA, CALIFORNIA
RANGE: 4W | TOWNSHIP: 31N | CIVIL TOWNSHIP: NA | ACREAGE: 1,806

		EXISTING	ULTIMATE
NATIONAL PLAN of INTEGRATED AIRPORT SYSTEMS (NPIAS) SERVICE LEVEL		PRIMARY	SAME
DESIGN AIRCRAFT		VARIES*	SAME
AIRPORT REFERENCE CODE (ARC): RUNWAY CATEGORY/DESIGN GROUP		D-IV	SAME
AIRPORT ELEVATION (ABOVE MEAN SEA LEVEL)		504.8' MSL	SAME
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		97°F (July)	SAME
AIRPORT REFERENCE POINT	Latitude	40°30'32.4000"N	40°30'31.190"N
(ARP) COORDINATES (NAD 83)	Longitude	122°17'36.2000"W	122°17'30.784"W
AIRPORT and TERMINAL NAVIGATIONAL AIDS		TVOR --	SAME --
GPS APPROACH		YES(RWY.34L)	YES(RWY.34L/16R/30)

*USFS/California Department of Forestry operates a varity of aircraft in ADG-IV

No.	REVISIONS	DATE	BY	APPD.
5	-	--	--	--
4	-	--	--	--
3	-	--	--	--
2	-	--	--	--
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THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT OF THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH THE APPROPRIATE PUBLIC LAWS.

REDDING MUNICIPAL AIRPORT

DATA SHEET

DRAFT

REDDING, CALIFORNIA

PLANNED BY: Steve Wagner
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris

November, 2015 | SHEET 2 OF 17

Coffman Associates
Airport Consultants
www.coffmanassociates.com

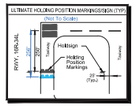
Coffman Associates D:\D drive 12 2a 2010\Cad\CAD\REDDING\2015\02 Rdd Data 10 2015.dwg Printed Date 11-17-15 07:44:46 AM Maggie Beaver

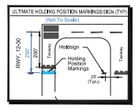
EXISTING BUILDINGS/FACILITIES

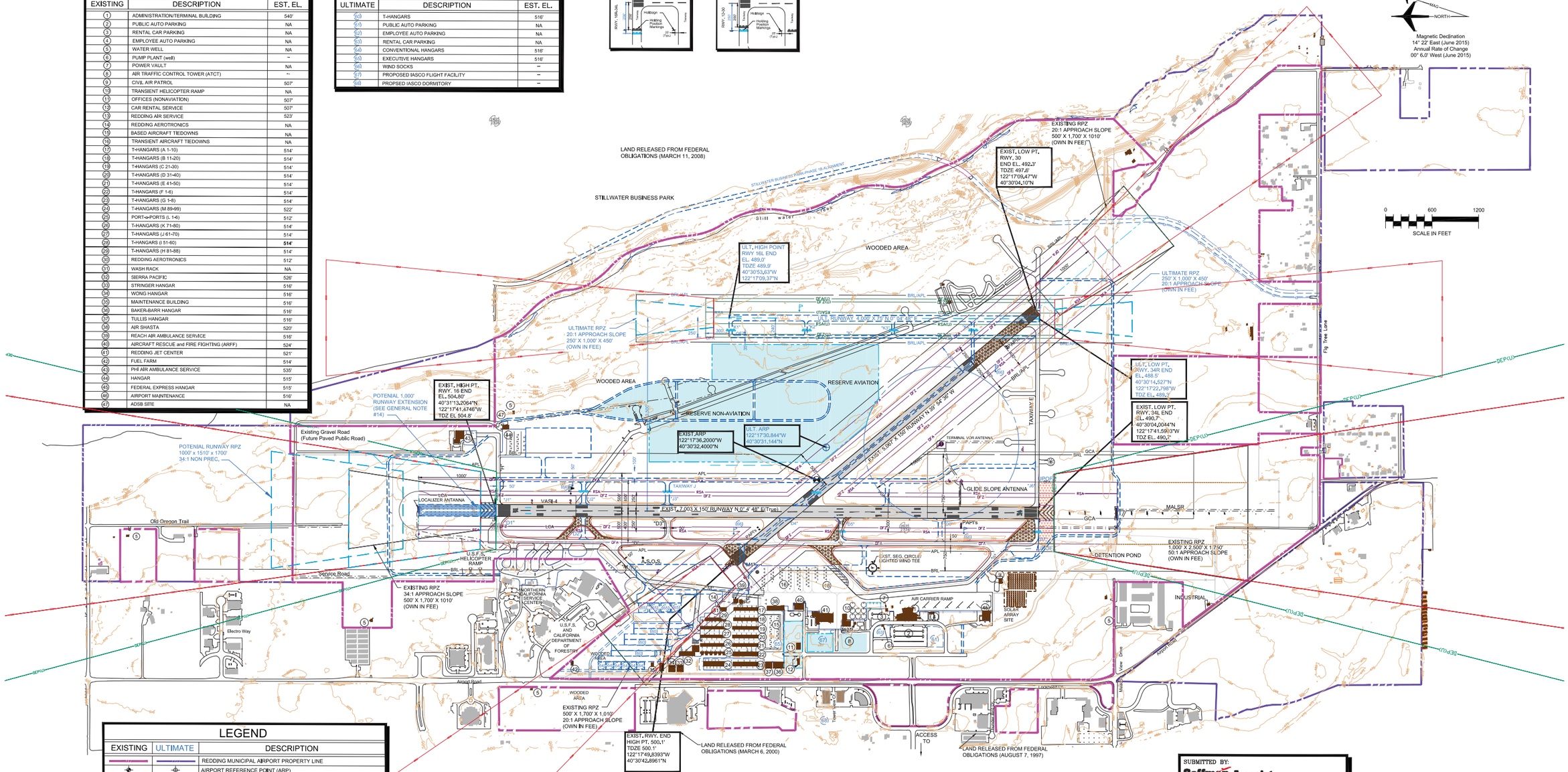
EXISTING	DESCRIPTION	EST. EL.
1	ADMINISTRATION/TERMINAL BUILDING	540'
2	PUBLIC AUTO PARKING	NA
3	RENTAL CAR PARKING	NA
4	EMPLOYEE AUTO PARKING	NA
5	WATER WELL	NA
6	PUMP PLANT (well)	–
7	POWER VAULT	NA
8	AIR TRAFFIC CONTROL TOWER (ATCT)	–
9	CIVIL AIR PATROL	507'
10	TRANSIENT HELICOPTER RAMP	NA
11	OFFICES (NONAVIATION)	507'
12	CAR RENTAL SERVICE	507'
13	REDDING AIR SERVICE	523'
14	REDDING AEROTRONICS	NA
15	BASED AIRCRAFT TIEDOWNS	NA
16	TRANSIENT AIRCRAFT TIEDOWNS	NA
17	T-HANGARS (A 1-10)	514'
18	T-HANGARS (B 11-20)	514'
19	T-HANGARS (C 21-30)	514'
20	T-HANGARS (D 31-40)	514'
21	T-HANGARS (E 41-50)	514'
22	T-HANGARS (F 1-6)	514'
23	T-HANGARS (G 1-8)	514'
24	T-HANGARS (M 89-99)	522'
25	PORT-a-PORTS (L 1-6)	512'
26	T-HANGARS (K 71-80)	514'
27	T-HANGARS (J 61-70)	514'
28	T-HANGARS (I 51-60)	514'
29	T-HANGARS (H 81-88)	514'
30	REDDING AEROTRONICS	512'
31	WASH RACK	NA
32	SIERRA PACIFIC	526'
33	STRINGER HANGAR	516'
34	WONG HANGAR	516'
35	MAINTENANCE BUILDING	516'
36	BAKER-BARR HANGAR	516'
37	TULLIS HANGAR	516'
38	AIR SHASTA	520'
39	REACH AIR AMBULANCE SERVICE	516'
40	AIRCRAFT RESCUE and FIRE FIGHTING (ARFF)	524'
41	REDDING JET CENTER	521'
42	FUEL FARM	514'
43	PHI AIR AMBULANCE SERVICE	535'
44	HANGAR	515'
45	FEDERAL EXPRESS HANGAR	515'
46	AIRPORT MAINTENANCE	516'
47	ADSB SITE	NA

ULTIMATE BUILDINGS/FACILITIES

ULTIMATE	DESCRIPTION	EST. EL.
(50)	T-HANGARS	516'
(51)	PUBLIC AUTO PARKING	NA
(52)	EMPLOYEE AUTO PARKING	NA
(53)	RENTAL CAR PARKING	NA
(54)	CONVENTIONAL HANGARS	516'
(55)	EXECUTIVE HANGARS	516'
(56)	WIND SOCKS	–
(57)	PROPOSED IASCO FLIGHT FACILITY	–
(58)	PROPSED IASCO DORMITORY	–







LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		REDDING MUNICIPAL AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		PAVEMENT TO BE REMOVED
		BUILDING CONSTRUCTION
		BUILDINGS TO BE REMOVED
BRL	BRL	BUILDING RESTRICTION LINE (BRL)
		DRAINAGE
		FACILITY CONSTRUCTION
		FENCING
VASI	PAPI-4	NAVIGATIONAL AID INSTALLATION
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
		SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
1080	1080	TOPOGRAPHIC CONTOURS (See Note 5)
		WIND INDICATOR
RSA	RSA(U)	RUNWAY SAFETY AREA (RSA)
OFA	OFA(U)	OBJECT FREE AREA (OFA)
OFZ	OFZ(U)	OBSTACLE FREE ZONE (OFZ)
		HOLD POSITION MARKINGS
	SAME	THRESHOLD SITING SURFACE
N/A		PARCELS
	SAME	DEPARTURE SURFACE
	SAME	APPROACH SURFACE

GENERAL NOTES:

1. Depiction of features and objects, including related elevations within the runway protection zones are depicted in the INNER PORTION OF THE APPROACH SURFACE DRAWINGS.
2. Details concerning terminal improvements are depicted on the TERMINAL AREA DRAWING.
3. Recommended land uses within the airport environs are depicted on the AIRPORT LAND USE DRAWING.
4. Detail concerning airport property are depicted on the AIRPORT PROPERTY MAP.
5. The Building Restriction Lines (BRL) are set for the ultimate runway condition. The BRL's encompass the runway protection zones, the runway object free area, the runway visibility zone, navaid critical areas and areas required for terminal instrument procedures. The established BRL is an estimate of the minimum distance to the runway for an object 35 feet in height. Prior to constructing any building or object on the airport, a F.A.R. Part 77 obstruction analysis should be conducted.
6. Ultimate fence line extends around Existing/Ultimate Property Line except where shown.
7. Base Map AGIS project #160334, Martinez Geospacial 7-12-2014.
8. Source for runway elevations, Aerial Survey, Airport Facility Directory.
9. No "OFZ" object penetration.
10. No threshold siting surface penetration.
11. No published Primary Airport Control points (PAC) or Secondary Airport Control (SAC) points for RDD.
12. This Airport Layout Plan (ALP) is based upon the 2015 Airport Master Plan.
13. Multiple "Through the Fence" access exists on the United States Forest Service (USFS) ramp.
14. The potential 1,000' runway extension identified herein is for the City's longterm planning purposes only. The extension is beyond the 20-year planning horizon identified in the Airport's current Master Plan. The runway extension project shall not be undertaken without prior written FAA approval and NEPA environmental processing. Preconditions will include adequate project justification, FAA forecast approval, and FAA approval of the airfield design standards.

FAA APPROVAL STAMP

SUBMITTED BY:
Coffman Associates
FOR APPROVAL BY:
APPROVED BY: ON THE DATE OF:

Rod A. Dinger
Airports Director
Support Services Department
Airports Division, City of Redding, California

No.	REVISIONS	DATE	BY	APP'D
5	-	-	-	-
4	-	-	-	-
3	-	-	-	-
2	-	-	-	-
1	-	-	-	-

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REDDING MUNICIPAL AIRPORT

AIRPORT LAYOUT DRAWING

DRAFT

REDDING, CALIFORNIA

PLANNED BY: Steve Wagner
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris

November, 2015 | SHEET 3 OF 17

Coffman Associates
Airport Consultants
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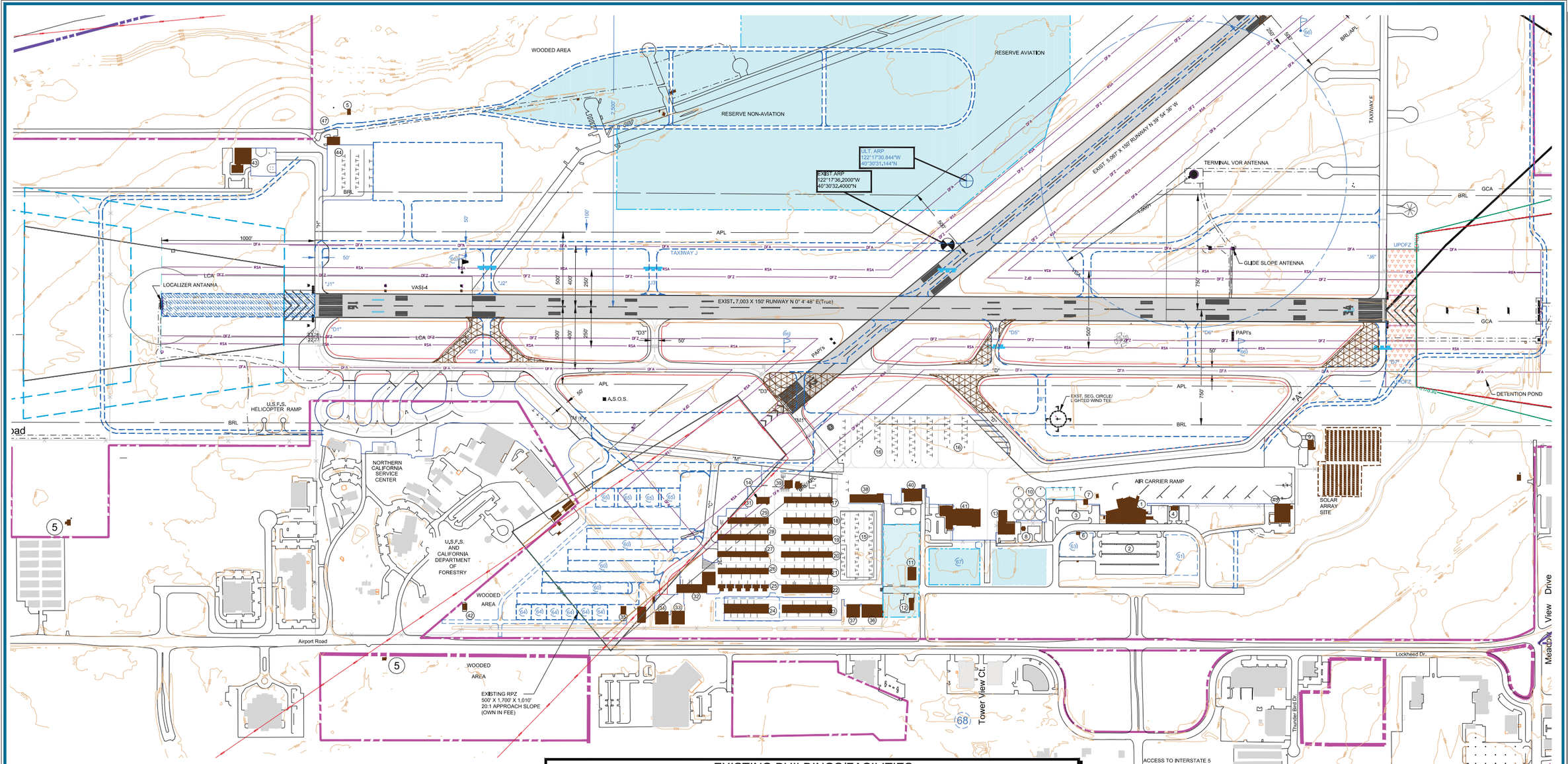
Coffman Associates E:\3 drive 12 28 2010\Cad\CAD\REDDING\2015\03 RDD ALP 10 2015.dwg Printed Date: 11-17-15 07:43:00 AM Maggie Beaver



LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		REDDING MUNICIPAL AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		PAVEMENT TO BE REMOVED
		BUILDING CONSTRUCTION
		BUILDINGS TO BE REMOVED
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		DRAINAGE
		FACILITY CONSTRUCTION
		FENCING
VASI	PAPI-4	NAVIGATIONAL AID INSTALLATION
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
		SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
1080	1080	TOPOGRAPHIC CONTOURS (See Note 5)
		WIND INDICATOR
RSA	RSA	RUNWAY SAFETY AREA (RSA)
OFA	OFA	OBJECT FREE AREA (OFA)
OFZ	OFZ	OBSTACLE FREE ZONE (OFZ)
		HOLD POSITION MARKINGS
	SAME	THRESHOLD SITING SURFACE
N/A		PARCELS
	SAME	DEPARTURE SURFACE
	SAME	APPROACH SURFACE

GENERAL NOTES:

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EXISTING BUILDINGS/FACILITIES

EXISTING	DESCRIPTION	EST. EL.	EXISTING	DESCRIPTION	EST. EL.
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5	WATER WELL	NA	29	T-HANGARS (H 81-88)	514'
6	PUMP PLANT (well)	--	30	REDDING AEROTRONICS	512'
7	POWER VAULT	NA	31	WASH RACK	NA
8	AIR TRAFFIC CONTROL TOWER (ATCT)	--	32	SIERRA PACIFIC	526'
9	CIVIL AIR PATROL	507'	33	STRINGER HANGAR	516'
10	TRANSIENT HELICOPTER RAMP	NA	34	WONG HANGAR	516'
11	OFFICES (NONAVIATION)	507'	35	MAINTENANCE BUILDING	516'
12	CAR RENTAL SERVICE	507'	36	BAKER-BARR HANGAR	516'
13	REDDING AIR SERVICE	523'	37	TULLIS HANGAR	516'
14	REDDING AEROTRONICS	NA	38	AIR SHASTA	520'
15	BASED AIRCRAFT TIEDOWNS	NA	39	REACH AIR AMBULANCE SERVICE	516'
16	TRANSIENT AIRCRAFT TIEDOWNS	NA	40	AIRCRAFT RESCUE and FIRE FIGHTING (ARFF)	524'
17	T-HANGARS (A 1-10)	514'	41	REDDING JET CENTER	521'
18	T-HANGARS (B 11-20)	514'	42	FUEL FARM	514'
19	T-HANGARS (C 21-30)	514'	43	PHI AIR AMBULANCE SERVICE	535'
20	T-HANGARS (D 31-40)	514'	44	HANGAR	515'
21	T-HANGARS (E 41-50)	514'	45	FEDERAL EXPRESS HANGAR	515'
22	T-HANGARS (F 1-6)	514'	46	AIRPORT MAINTENANCE	516'
23	T-HANGARS (G 1-8)	514'	47	ADSB SITE	NA
24	T-HANGARS (M 89-99)	522'			

ULTIMATE BUILDINGS/FACILITIES

ULTIMATE	DESCRIPTION	EST. EL.
60	T-HANGARS	516'
61	PUBLIC AUTO PARKING	NA
62	EMPLOYEE AUTO PARKING	NA
63	RENTAL CAR PARKING	NA
64	CONVENTIONAL HANGARS	516'
65	EXECUTIVE HANGARS	516'
66	WIND SOCKS	--
67	PROPOSED IASCO FLIGHT FACILITY	--
68	PROPSED IASCO DORMITORY	--

MAG NORTH

Magnetic Declination
14° 22' East (June 2015)
Annual Rate of Change
00° 6.0' West (June 2015)

0 300 600
SCALE IN FEET

No.	REVISIONS	DATE	BY	APPD
6	-	-	-	-
5	-	-	-	-
4	-	-	-	-
3	-	-	-	-
2	-	-	-	-
1	-	-	-	-

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REDDING MUNICIPAL AIRPORT

TERMINAL AREA DRAWING

DRAFT

REDDING, CALIFORNIA

PLANNED BY: Steve Wagner
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris

November, 2015 | SHEET 4 OF 17

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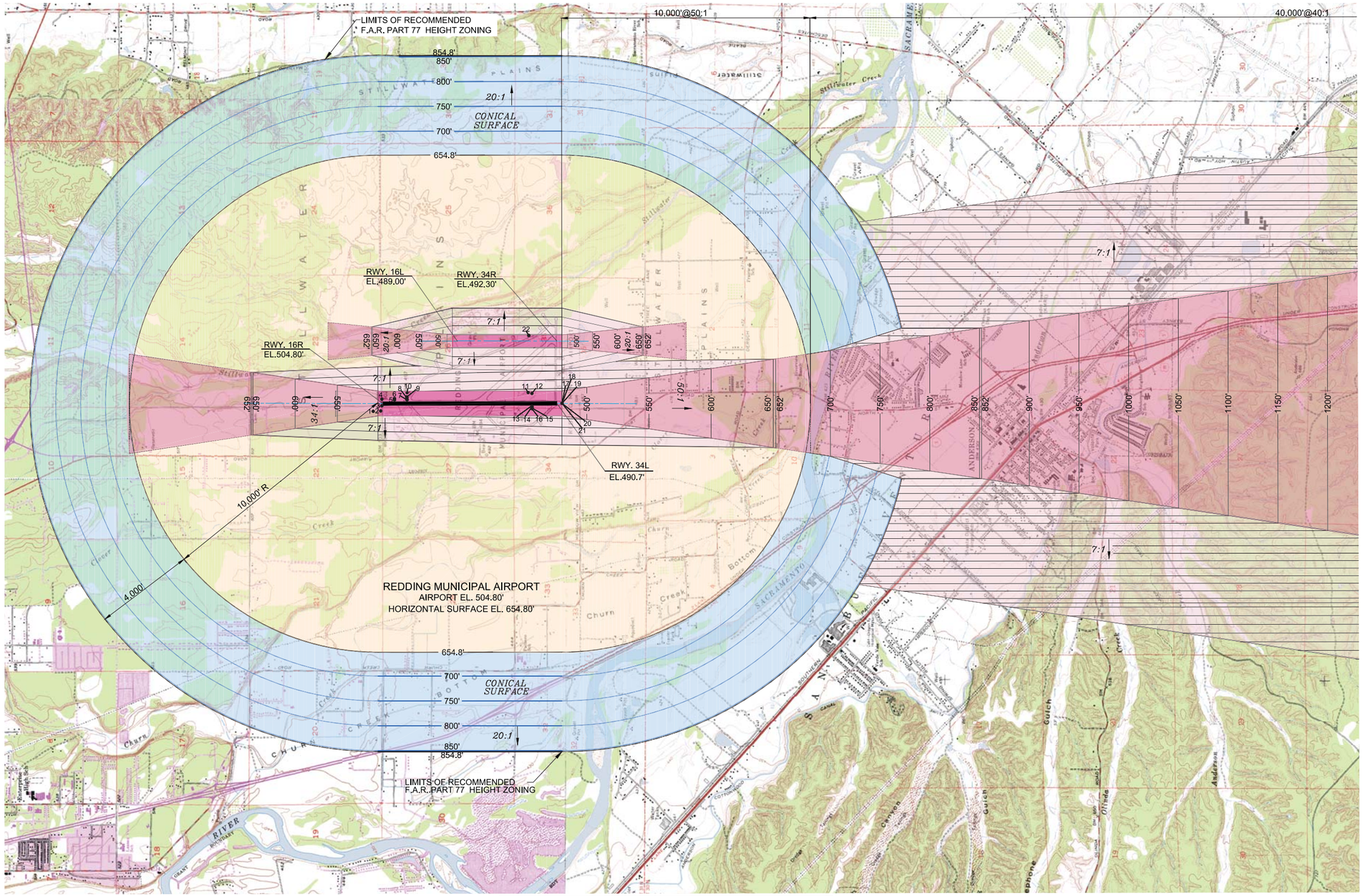
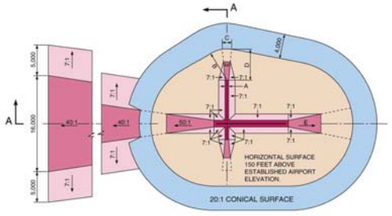
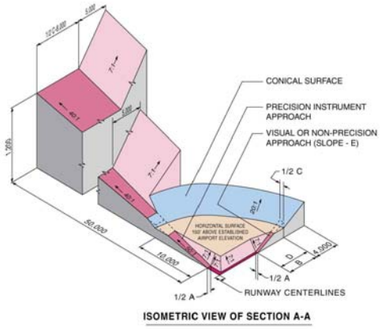




DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B		
					C	D	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
		A	B	A	B		
					C	D	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

A - UTILITY RUNWAYS
B - RUNWAYS LARGER THAN UTILITY
C - VISIBILITY MINIMUMS GREATER THAN 3/4 MILE
D - VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
* - PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET



ISOMETRIC VIEW OF SECTION A-A

SOURCE: 14 CFR Part 77, Section 77.25, Civil Airport Imaginary Surfaces.

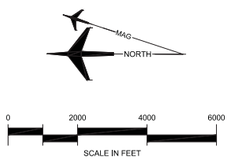
GENERAL NOTES:
1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Depiction of features and objects within the outer portion of the approach surfaces, is illustrated on the APPROACH ZONES PROFILES, Sheet 9 and 10 of these plans.
3. Depiction of features and objects within the inner portion of the approach surfaces, is illustrated on the PROTECTION ZONES PLAN, Sheet 6, 7 and 8 of these plans.
4. Existing and future height and hazard ordinances are to be amended and/or referenced upon approval of updated PART 77 AIRSPACE PLAN.
5. Base map USGS Quadrangle maps Enterprise, CA., Palo Cedro, CA., Cottonwood, CA., Balls Ferry, CA., Hooker, CA., and Bend, CA.

OBSTRUCTION TABLE

	Object Description	Top Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1	SIGN	512.00' MSL	34:1 Approach Rwy. 16R	510.14' MSL	1.86'	To Be Determined by FAA
2	SIGN	510.20' MSL	Rwy. 16R-34L Primary	504.80' MSL	5.20'	To Be Determined by FAA
3	LIGHT (Rwy. End)	507.59' MSL	Rwy. 16R-34L Primary	504.80' MSL	2.79'	Fixed By Function
4	LIGHT (Rwy. End)	507.04' MSL	Rwy. 16R-34L Primary	504.80' MSL	2.25'	Fixed By Function
5	LIGHT (VASI)	505.54' MSL	Rwy. 16R-34L Primary	503.88' MSL	1.67'	Fixed By Function
6	LIGHT (VASI)	505.52' MSL	Rwy. 16R-34L Primary	503.88' MSL	1.88'	Fixed By Function
7	LIGHT (VASI)	504.74' MSL	Rwy. 16R-34L Primary	502.87' MSL	1.88'	Fixed By Function
8	LIGHT (VASI)	504.71' MSL	Rwy. 16R-34L Primary	502.87' MSL	1.85'	Fixed By Function
9	POLE	517.00' MSL	Rwy. 16R-34L Primary	502.88' MSL	14.12'	Fixed By Function
10	NAVAGATIONAL AIDE	511.09' MSL	Rwy. 16R-34L Primary	502.87' MSL	8.23'	Fixed By Function
11	GUIDE SLOPE ANT.	527.01' MSL	Rwy. 16R-34L Primary	493.06' MSL	33.96'	Fixed By Function
12	ANTANA	520.09' MSL	Rwy. 16R-34L Primary	492.71' MSL	27.38'	Fixed By Function
13	LIGHT (PAPIs)	492.95' MSL	Rwy. 16R-34L Primary	492.71' MSL	0.25'	Fixed By Function
14	LIGHT (PAPIs)	493.01' MSL	Rwy. 16R-34L Primary	492.71' MSL	0.31'	Fixed By Function
15	LIGHT (PAPIs)	493.14' MSL	Rwy. 16R-34L Primary	492.71' MSL	0.44'	Fixed By Function
16	LIGHT (PAPIs)	493.15' MSL	Rwy. 16R-34L Primary	492.71' MSL	0.44'	Fixed By Function
17	APPROACH LIGHT	492.04' MSL	50:1 Approach Rwy. 34L	490.70' MSL	1.35'	Fixed By Function
18	APPROACH LIGHT	492.05' MSL	50:1 Approach Rwy. 34L	490.70' MSL	1.36'	Fixed By Function
19	APPROACH LIGHT	492.06' MSL	50:1 Approach Rwy. 34L	490.70' MSL	1.37'	Fixed By Function
20	APPROACH LIGHT	492.07' MSL	50:1 Approach Rwy. 34L	490.70' MSL	1.38'	Fixed By Function
21	APPROACH LIGHT	492.08' MSL	50:1 Approach Rwy. 34L	490.70' MSL	1.39'	Fixed By Function
22	BUILDING	511.81' MSL	Rwy. 16L-34R Primary	490.70' MSL	20.81'	To Be Removed

OBSTRUCTION LEGEND

- OBSTRUCTION HIGH POINT
- GROUP or MULTIPLE OBSTRUCTIONS



No.	REVISIONS	DATE	BY	APPD.
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REDDING MUNICIPAL AIRPORT

INNER PORTION OF THE PART "77" AIRSPACE DRAWING

REDDING, CALIFORNIA

DRAFT

PLANNED BY: Steve Wagner
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris

November, 2015

SHEET 5a OF 17

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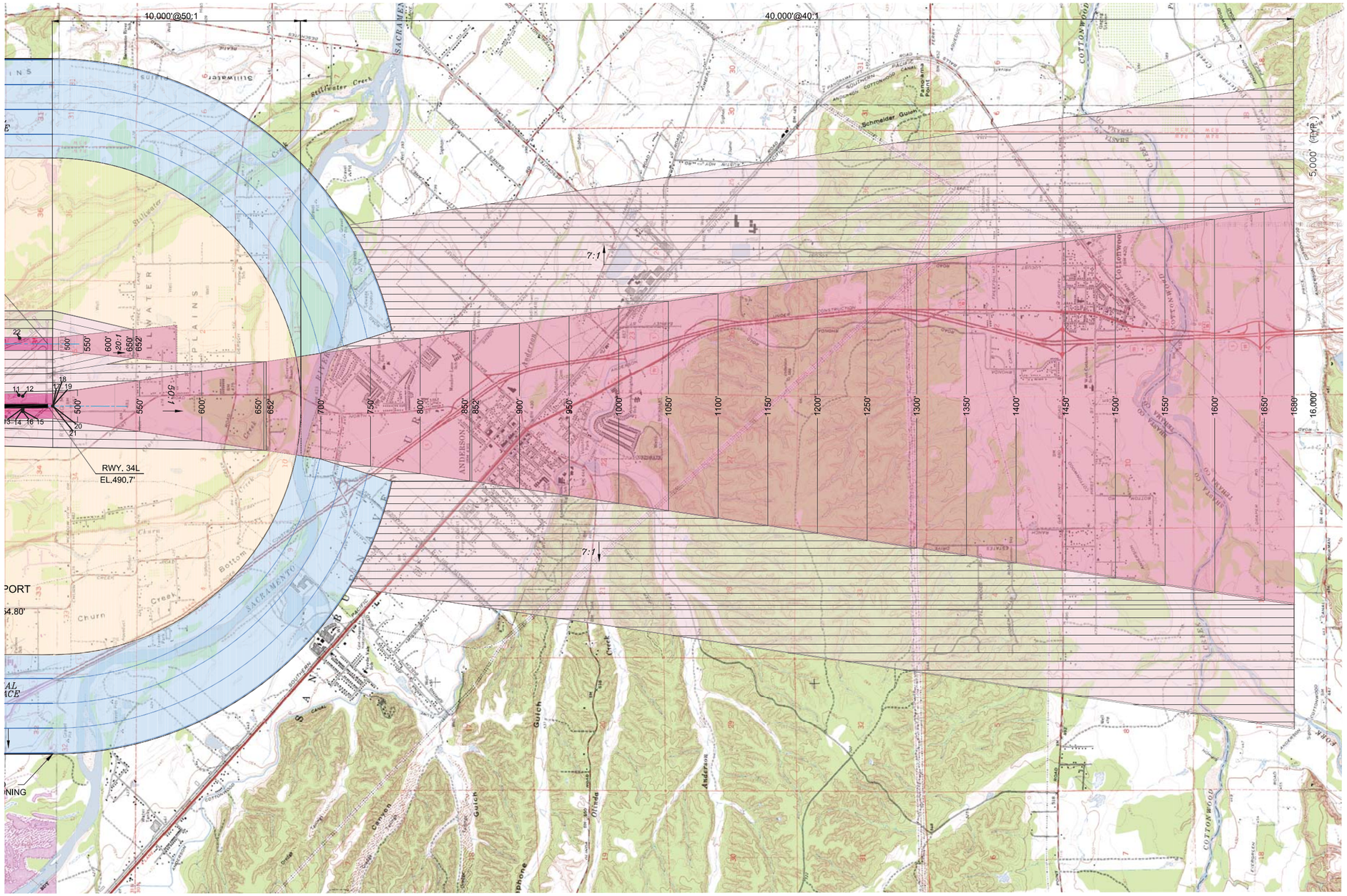
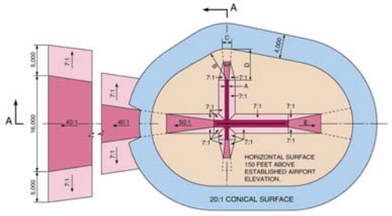
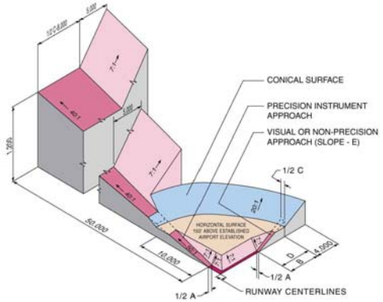




DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B		
					C	D	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
		A	B	A	B		
					C	D	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

A - UTILITY RUNWAYS
B - RUNWAYS LARGER THAN UTILITY
C - VISIBILITY MINIMUMS GREATER THAN 3/4 MILE
D - VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
* - PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET



ISOMETRIC VIEW OF SECTION A-A

SOURCE: 14 CFR Part 77, Section 77.25, Civil Airport Imaginary Surfaces.

GENERAL NOTES:
1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Depiction of features and objects within the outer portion of the approach surfaces, is illustrated on the APPROACH ZONES PROFILES, Sheet 9 and 10 of these plans.
3. Depiction of features and objects within the inner portion of the approach surfaces, is illustrated on the PROTECTION ZONES PLAN, Sheet 6, 7 and 8 of these plans.
4. Existing and future height and hazard ordinances are to be amended and/or referenced upon approval of updated PART 77 AIRSPACE PLAN.
5. Base map USGS Quadrangle maps Enterprise, CA., Palo Cedro, CA., Cottonwood, CA., Balls Ferry, CA., Hooker, CA., and Bend, CA.

OBSTRUCTION TABLE

	Object Description	Top Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1	SIGN	512.00' MSL	34:1 Approach Rwy. 16R	510.14' MSL	1.86'	To Be Determined by FAA
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3	LIGHT (Rwy. End)	507.59' MSL	Rwy. 16R-34L Primary	504.80' MSL	2.79'	Fixed By Function
4	LIGHT (Rwy. End)	507.04' MSL	Rwy. 16R-34L Primary	504.80' MSL	2.25'	Fixed By Function
5	LIGHT (VASI)	505.54' MSL	Rwy. 16R-34L Primary	503.88' MSL	1.67'	Fixed By Function
6	LIGHT (VASI)	505.52' MSL	Rwy. 16R-34L Primary	503.88' MSL	1.88'	Fixed By Function
7	LIGHT (VASI)	504.74' MSL	Rwy. 16R-34L Primary	502.87' MSL	1.88'	Fixed By Function
8	LIGHT (VASI)	504.71' MSL	Rwy. 16R-34L Primary	502.87' MSL	1.85'	Fixed By Function
9	POLE	517.00' MSL	Rwy. 16R-34L Primary	502.88' MSL	14.12'	Fixed By Function
10	NAVAGATIONAL AIDE	511.09' MSL	Rwy. 16R-34L Primary	502.87' MSL	8.23'	Fixed By Function
11	GUIDE SLOPE ANT.	527.01' MSL	Rwy. 16R-34L Primary	493.06' MSL	33.96'	Fixed By Function
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20	APPROACH LIGHT	492.07' MSL	50:1 Approach Rwy. 34L	490.70' MSL	1.38'	Fixed By Function
21	APPROACH LIGHT	492.08' MSL	50:1 Approach Rwy. 34L	490.70' MSL	1.39'	Fixed By Function
22	BUILDING	511.81' MSL	Rwy. 16L-34R Primary	490.70' MSL	20.81'	To Be Removed

OBSTRUCTION LEGEND

- OBSTRUCTION HIGH POINT
- GROUP or MULTIPLE OBSTRUCTIONS

MAG NORTH

0 2000 4000 6000
SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D
1	--	--	--	--
2	--	--	--	--
3	--	--	--	--
4	--	--	--	--
5	--	--	--	--

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REDDING MUNICIPAL AIRPORT

RUNWAY 34L APPROACH TAIL OF THE PART "77" AIRSPACE DRAWING

REDDING, CALIFORNIA

DRAFT

PLANNED BY: Steve Wagner
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris

November, 2015 SHEET 5b OF 17

Coffman Associates
Airport Consultants
www.coffmanassociates.com

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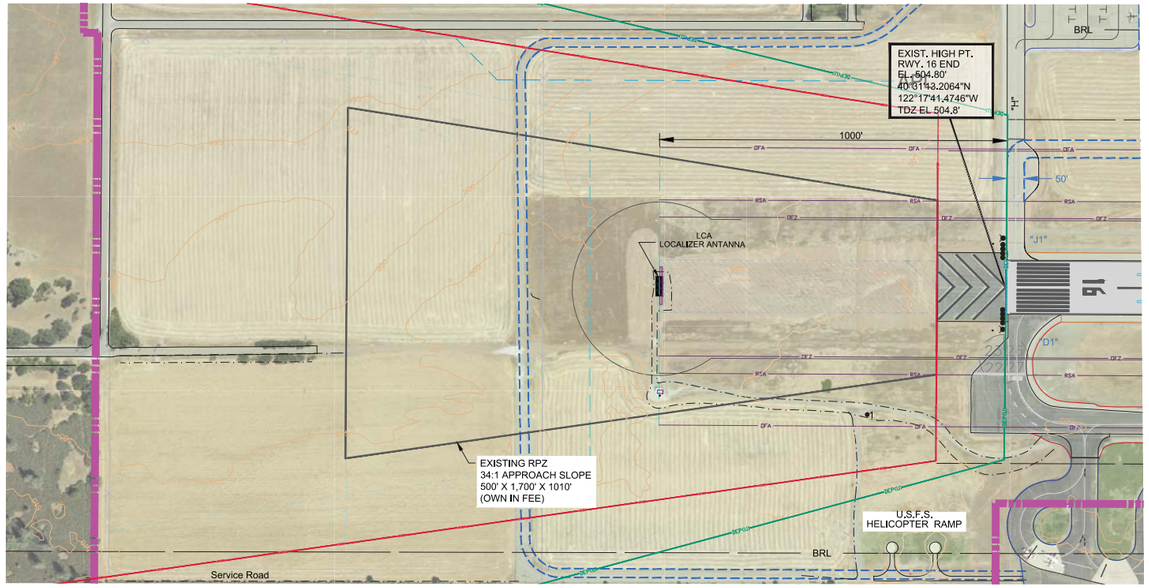

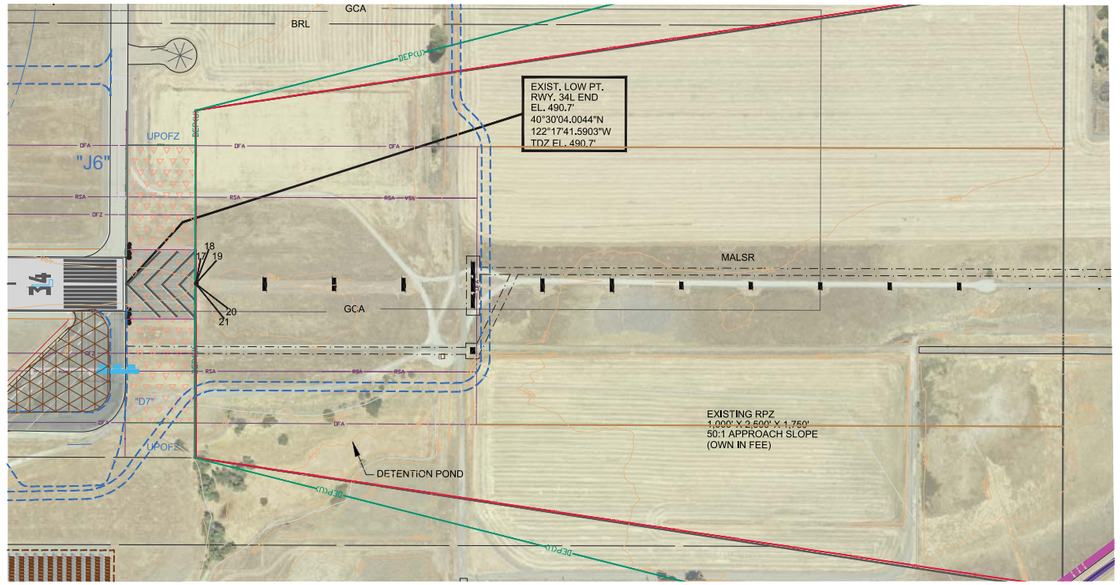

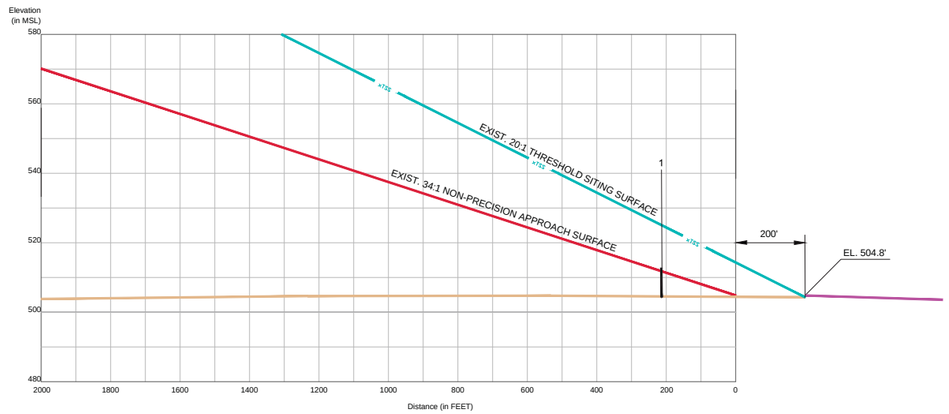

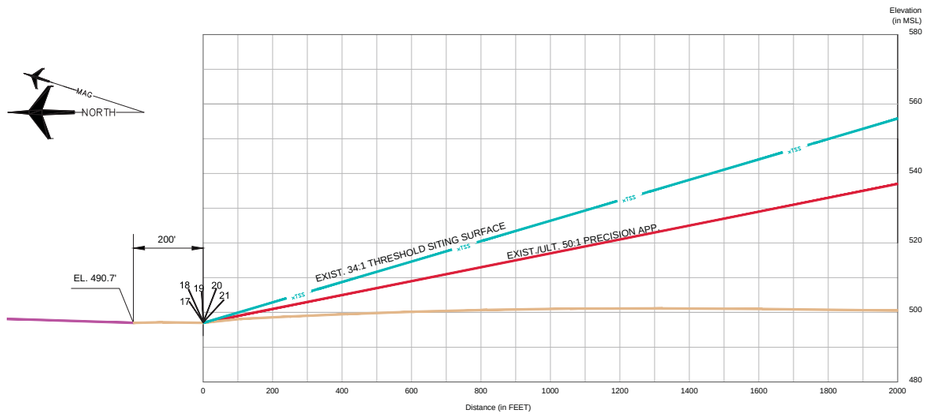

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OBSTRUCTION LEGEND

- OBSTRUCTION HIGH POINT
- GROUP or MULTIPLE OBSTRUCTIONS

VERTICAL SCALE

0 20 40 60

SCALE IN FEET

HORIZONTAL SCALE

0 200 400 600

SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
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REDDING MUNICIPAL AIRPORT

IINNER PORTION OF THE RUNWAY 16R-34L APPROACH SURFACE DRAWING

REDDING, CALIFORNIA

Draft

PLANNED BY: Steve Wagner

DETAILED BY: Maggie Beaver

APPROVED BY: Jim Harris

November, 2015

SHEET 6 OF 17

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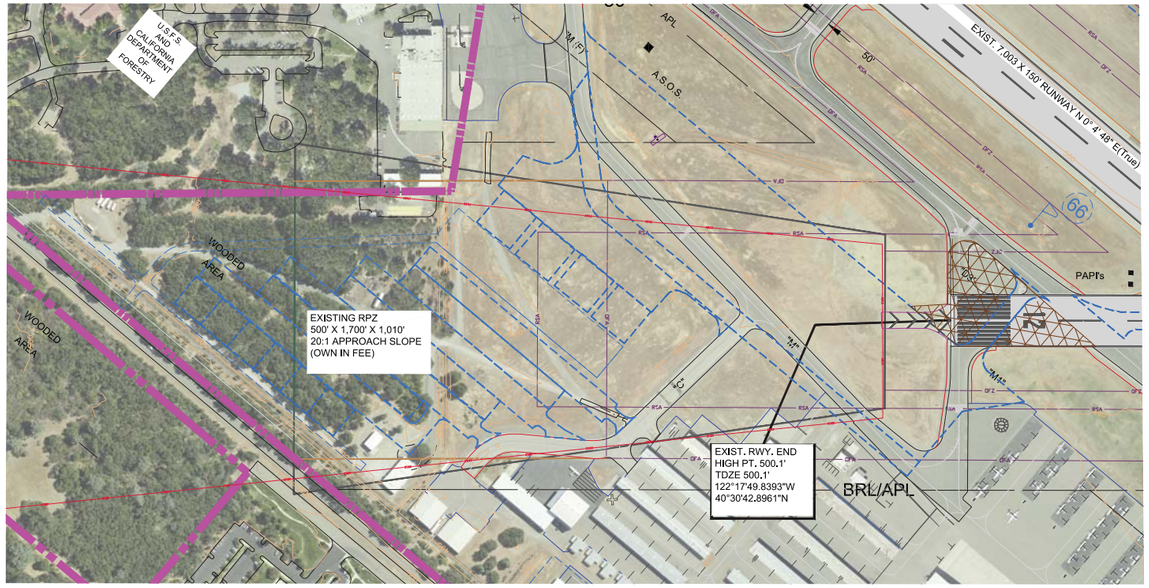

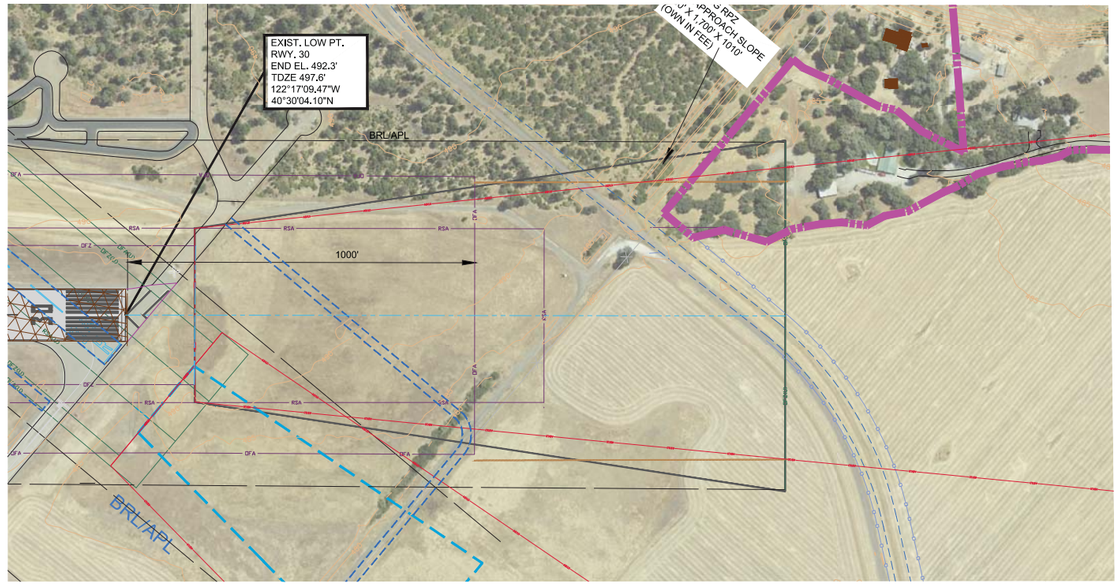

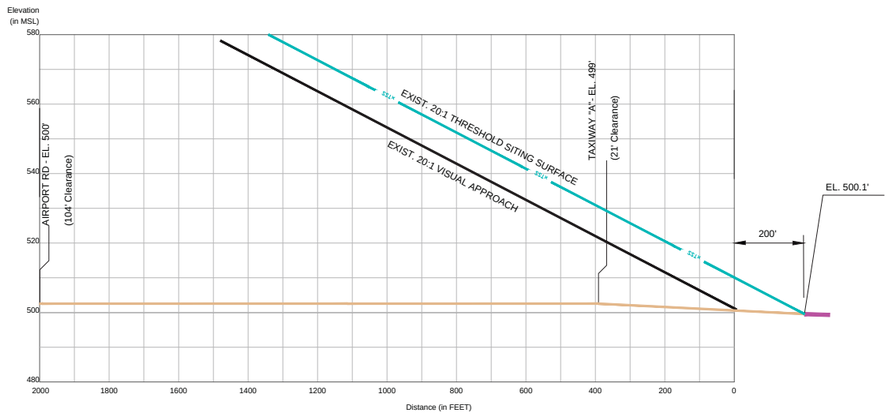

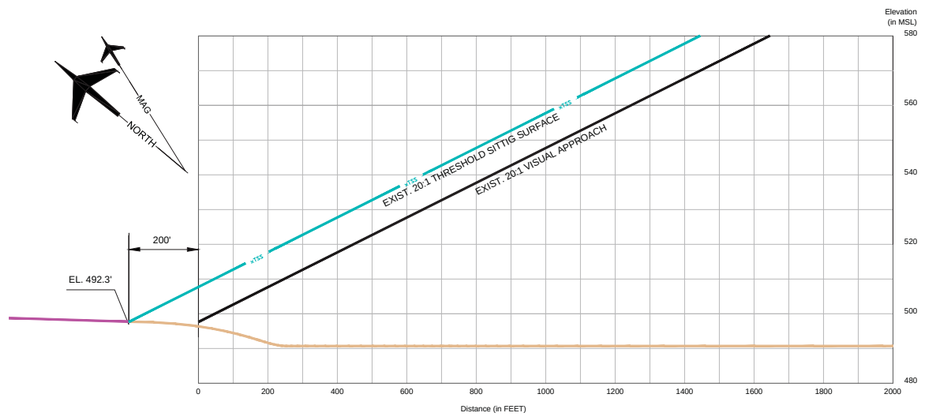

VERTICAL SCALE

0 20 40 60

SCALE IN FEET

HORIZONTAL SCALE

0 200 400 600

SCALE IN FEET

OBSTRUCTION LEGEND

- OBSTRUCTION HIGH POINT
- GROUP or MULTIPLE OBSTRUCTIONS

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
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No.	REVISIONS	DATE	BY	APP'D
1	-	-	-	-
2	-	-	-	-
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5	-	-	-	-
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REDDING MUNICIPAL AIRPORT

IINNER PORTION OF THE RUNWAY 12-30 APPROACH SURFACE DRAWING

DRAFT

REDDING, CALIFORNIA

PLANNED BY: Steve Wagner

DETAILED BY: Maggie Beaver

APPROVED BY: Jim Harris

November, 2015

SHEET 7 OF 17

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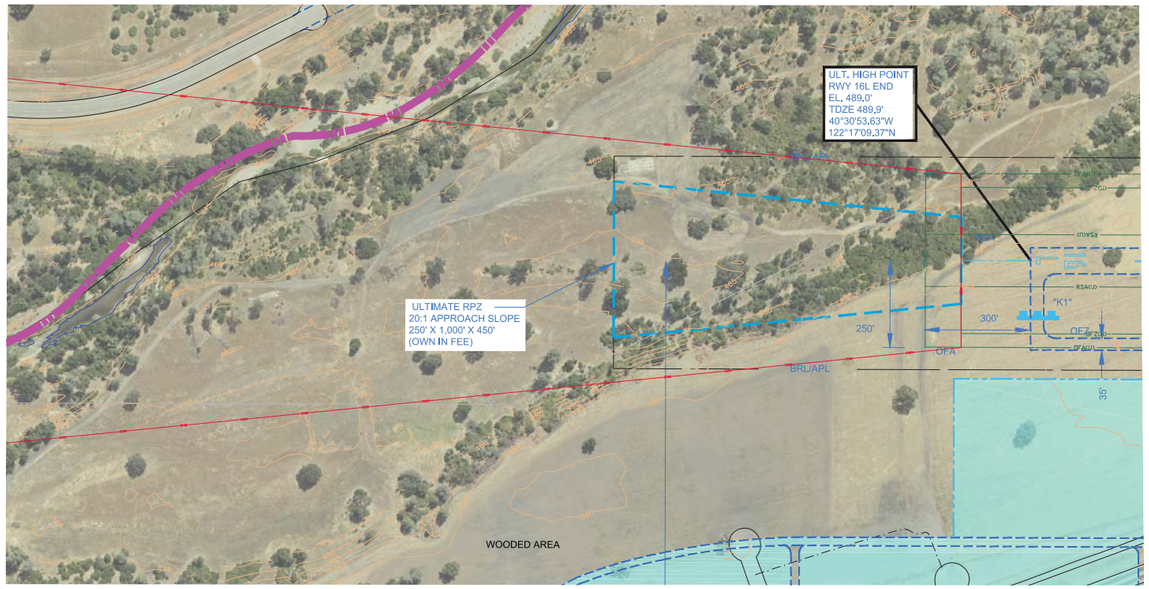

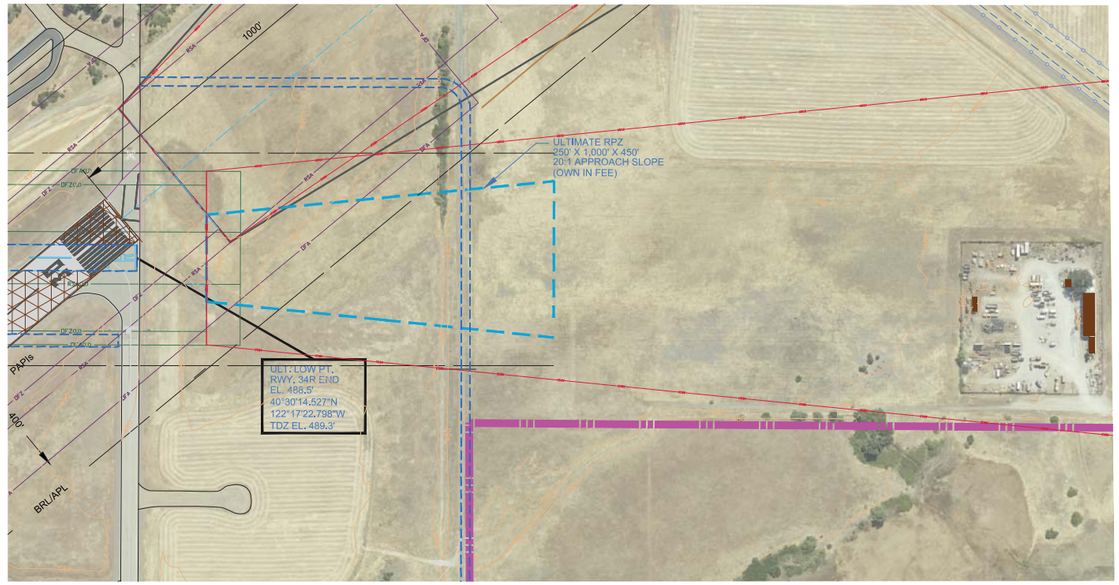

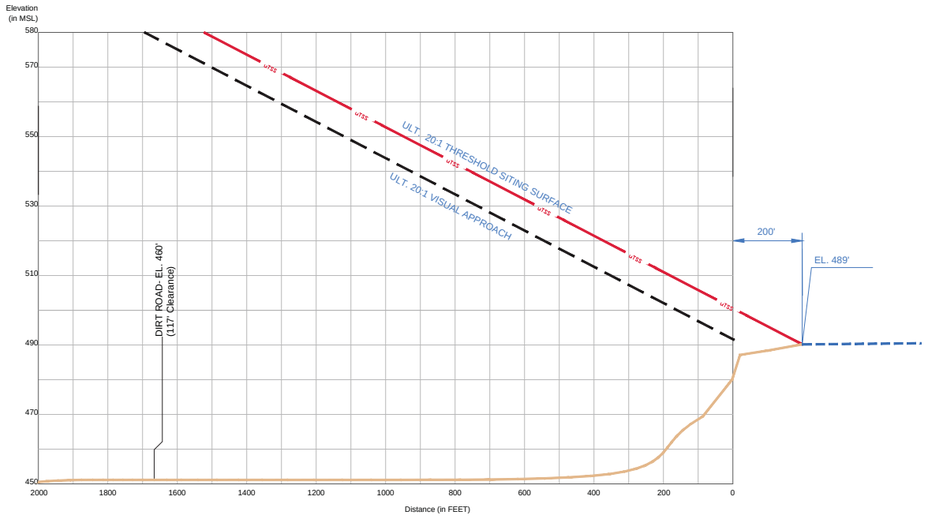

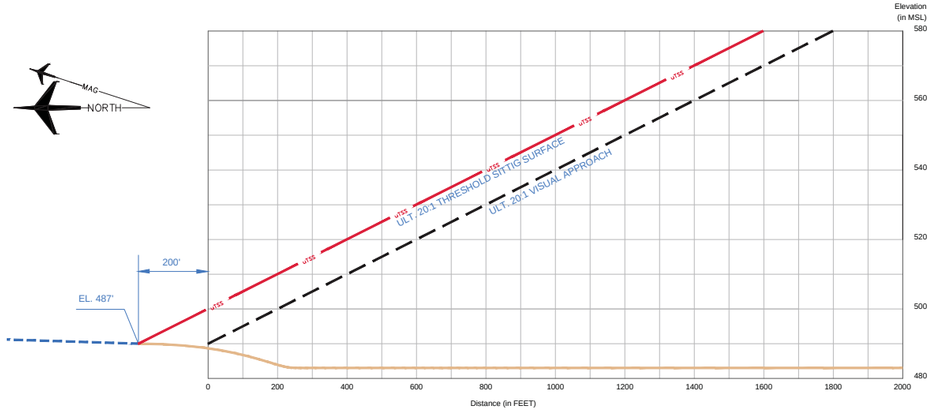

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VERTICAL SCALE
0 20 40 60
SCALE IN FEET

HORIZONTAL SCALE
0 200 400 600
SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-

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REDDING MUNICIPAL AIRPORT
IINNER PORTION OF THE RUNWAY
16L-34R APPROACH SURFACE
DRAWING
REDDING, CALIFORNIA

DRAFT

PLANNED BY: Steve Wagner
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris

November, 2015 | SHEET 8 OF 17

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Airport Consultants
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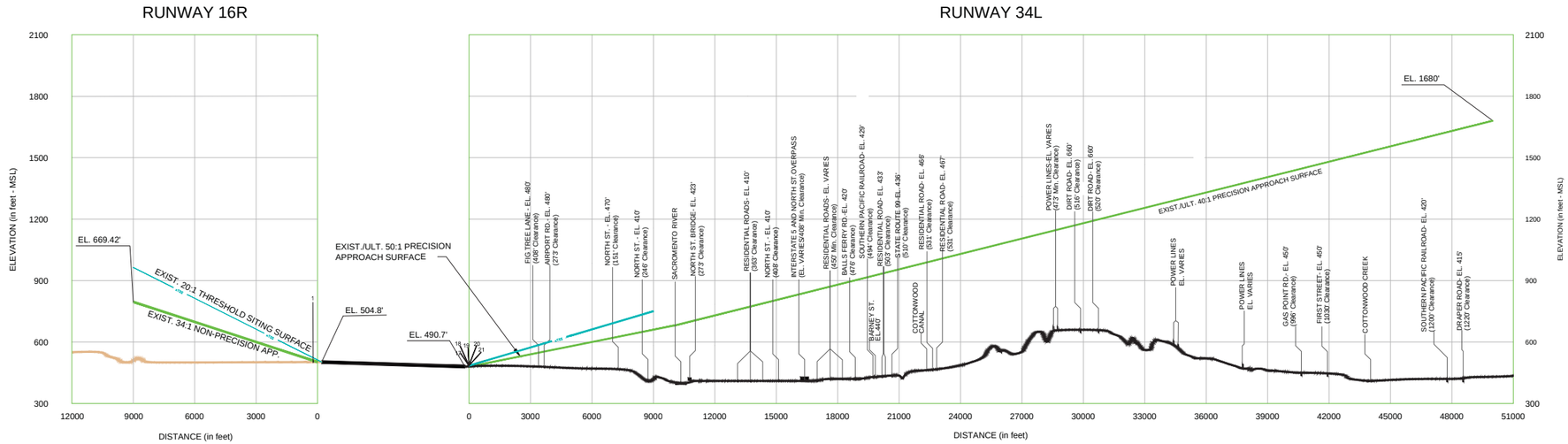

RUNWAY 16R-34L
APPROACH ZONES PROFILES

HORIZONTAL
0 3000 6000 9000
SCALE IN FEET

VERTICAL
0 300 600 900
SCALE IN FEET

MAG NORTH

OBSTRUCTION TABLE

	Object Description	Top Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1	SIGN	512.00' MSL	34:1 Approach Rwy. 16R	510.14' MSL	1.86'	To Be Determined by FAA
2	SIGN	510.00' MSL	Rwy. 16R-34L Primary	504.80' MSL	5.20'	To Be Determined by FAA
3	LIGHT (Rwy. End)	507.59' MSL	Rwy. 16R-34L Primary	504.80' MSL	2.79'	Fixed By Function
4	LIGHT (Rwy. End)	507.04' MSL	Rwy. 16R-34L Primary	504.80' MSL	2.25'	Fixed By Function
5	LIGHT (VASI)	505.54' MSL	Rwy. 16R-34L Primary	503.88' MSL	1.67'	Fixed By Function
6	LIGHT (VASI)	505.52' MSL	Rwy. 16R-34L Primary	503.88' MSL	1.88'	Fixed By Function
7	LIGHT (VASI)	504.74' MSL	Rwy. 16R-34L Primary	502.87' MSL	1.88'	Fixed By Function
8	LIGHT (VASI)	504.71' MSL	Rwy. 16R-34L Primary	502.87' MSL	1.85'	Fixed By Function
9	POLE	517.00' MSL	Rwy. 16R-34L Primary	502.88' MSL	14.12'	Fixed By Function
10	NAVAGATIONAL AIDE	511.09' MSL	Rwy. 16R-34L Primary	502.87' MSL	8.23'	Fixed By Function
11	GUIDE SLOPE ANT.	527.01' MSL	Rwy. 16R-34L Primary	493.06' MSL	33.96'	Fixed By Function
12	ANTANA	520.09' MSL	Rwy. 16R-34L Primary	492.71' MSL	27.38'	Fixed By Function
13	LIGHT (PAPIs)	492.95' MSL	Rwy. 16R-34L Primary	492.71' MSL	0.25'	Fixed By Function
14	LIGHT (PAPIs)	493.01' MSL	Rwy. 16R-34L Primary	492.71' MSL	0.31'	Fixed By Function
15	LIGHT (PAPIs)	493.14' MSL	Rwy. 16R-34L Primary	492.71' MSL	0.44'	Fixed By Function
16	LIGHT (PAPIs)	493.15' MSL	Rwy. 16R-34L Primary	492.71' MSL	0.44'	Fixed By Function
17	APPROACH LIGHT	492.04' MSL	50:1 Approach Rwy. 34L	490.70' MSL	1.35'	Fixed By Function
		492.04' MSL	34:1 TSS Rwy. 34L	490.70' MSL	1.35'	Fixed By Function
18	APPROACH LIGHT	492.05' MSL	50:1 Approach Rwy. 34L	490.70' MSL	1.36'	Fixed By Function
		492.05' MSL	34:1 TSS Rwy. 34L	490.70' MSL	1.36'	Fixed By Function
19	APPROACH LIGHT	492.06' MSL	50:1 Approach Rwy. 34L	490.70' MSL	1.37'	Fixed By Function
		492.06' MSL	34:1 TSS Rwy. 34L	490.70' MSL	1.37'	Fixed By Function
20	APPROACH LIGHT	492.07' MSL	50:1 Approach Rwy. 34L	490.70' MSL	1.38'	Fixed By Function
		492.07' MSL	34:1 TSS Rwy. 34L	490.70' MSL	1.38'	Fixed By Function
21	APPROACH LIGHT	492.08' MSL	50:1 Approach Rwy. 34L	490.70' MSL	1.39'	Fixed By Function
		492.08' MSL	50:1 Approach Rwy. 34L	490.70' MSL	1.39'	Fixed By Function
22	BUILDING	511.81' MSL	Rwy. 16L-34R Primary	490.70' MSL	20.81'	To Be Removed

OBSTRUCTION LEGEND

- OBSTRUCTION HIGH POINT
- GROUP or MULTIPLE OBSTRUCTIONS

No.	REVISIONS	DATE	BY	APPD.
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-

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REDDING MUNICIPAL AIRPORT
RUNWAY 16R-34L APPROACH
SURFACE PROFILE
DRAWING
REDDING, CALIFORNIA

PLANNED BY: Steve Wagner
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris

November, 2015 | SHEET 9 OF 17

Coffman Associates
Airport Consultants
www.coffmanassociates.com

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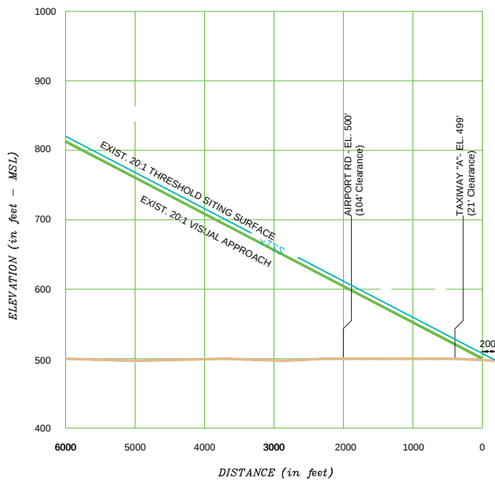
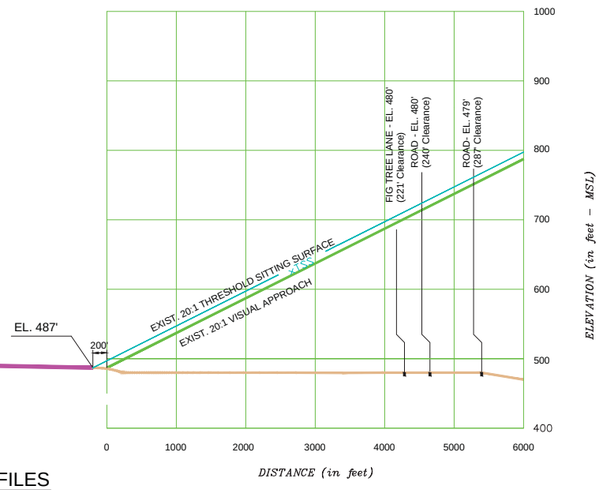
RUNWAY 12



RUNWAY 30



RUNWAY 12-30

APPROACH ZONES PROFILES

OBSTRUCTION TABLE

	Object Description	Top Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1	SIGN	512.00' MSL	34:1 Approach Rwy, 16R	510.14' MSL	1.86'	To Be Determined by FAA
2	SIGN	510.00' MSL	Rwy. 16R-34L Primary	504.80' MSL	5.20'	To Be Determined by FAA
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		492.06' MSL	34:1 TSS Rwy, 34L	490.70' MSL	1.37'	Fixed By Function
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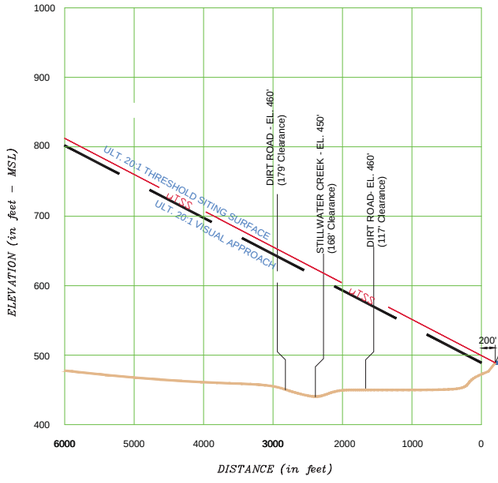
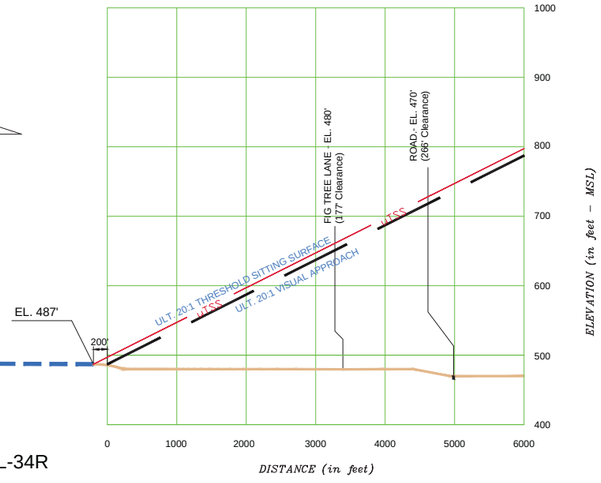
		492.08' MSL	50:1 Approach Rwy, 34L	490.70' MSL	1.39'	Fixed By Function
22	BUILDING	511.81' MSL	Rwy. 16L-34R Primary	490.70' MSL	20.81'	To Be Removed

RUNWAY 16L



RUNWAY 34R



RUNWAY 16L-34R

APPROACH ZONES PROFILES

HORIZONTAL

0 1000 2000 3000

SCALE IN FEET

VERTICAL

0 100 200 300

SCALE IN FEET

No.	REVISIONS	DATE	BY	APPD.
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-

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REDDING MUNICIPAL AIRPORT

RUNWAY 16L-34R & 12-30

APPROACH SURFACE PROFILE DRAWING

REDDING, CALIFORNIA

VERIFIED

PLANNED BY: Steve Wagner

DETAILED BY: Maggie Beaver

APPROVED BY: Jim Harris

November, 2015

SHEET 10 OF 17

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Airport Consultants
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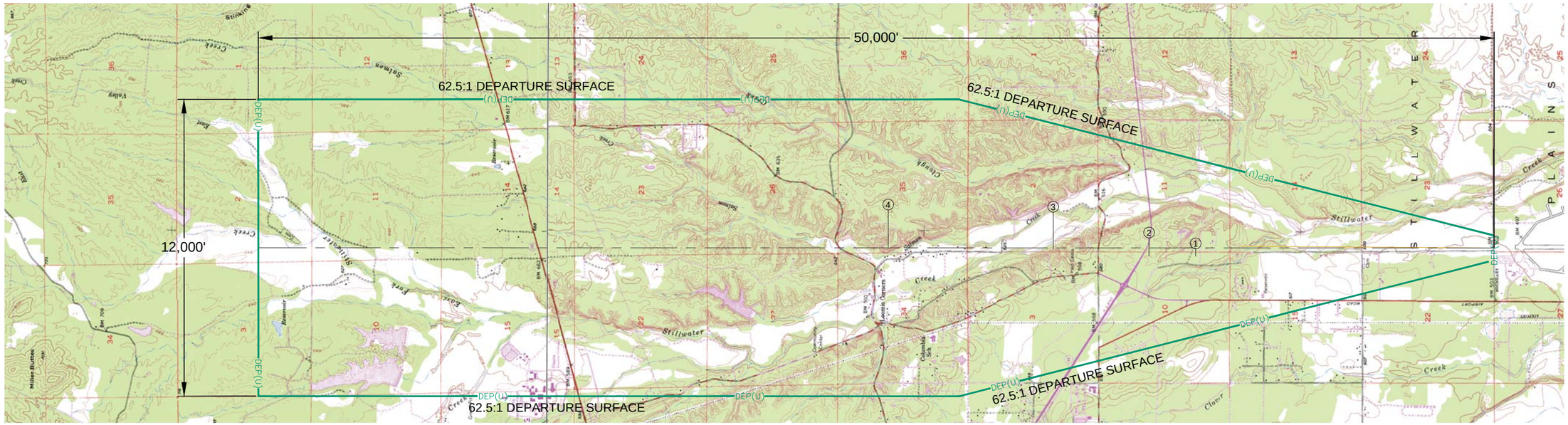
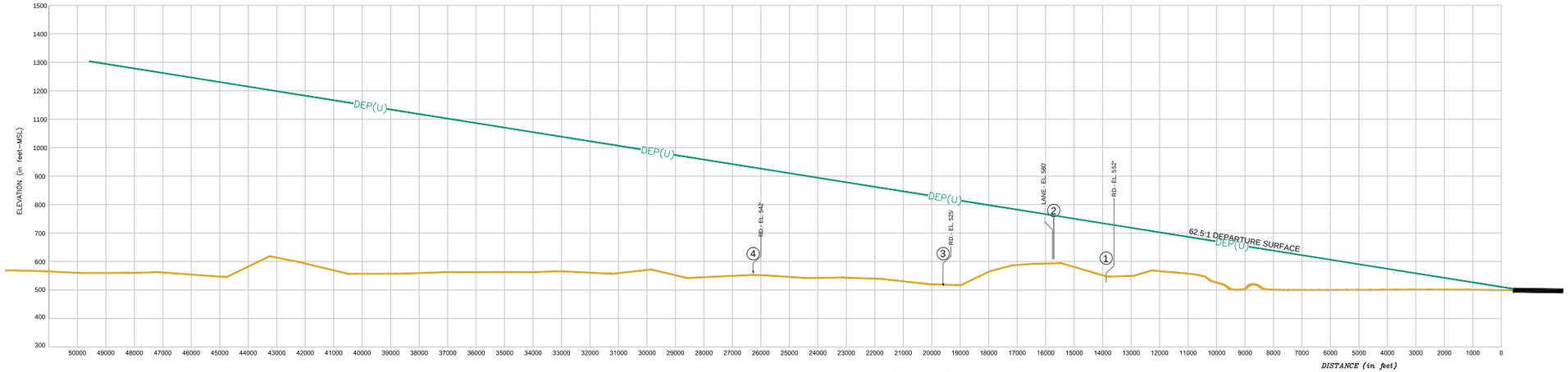
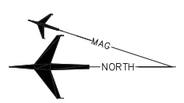


RUNWAY 16R





HORIZONTAL SCALE
0 2000 4000 6000
SCALE IN FEET

VERTICAL SCALE
0 200 400 600
SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-

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REDDING MUNICIPAL AIRPORT

RUNWAY 16R DEPARTURE SURFACE DRAWING

REDDING, CALIFORNIA

DRAFT

PLANNED BY: Steve Wagner
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris

November, 2015

SHEET 11 OF 17

Coffman Associates
Airport Consultants
www.coffmanassociates.com

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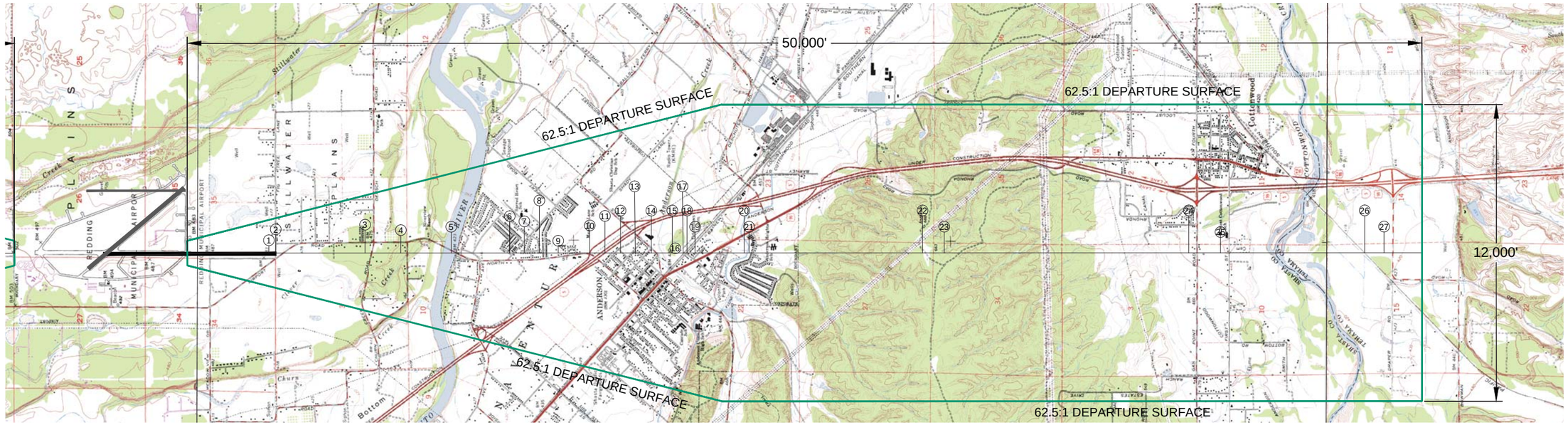
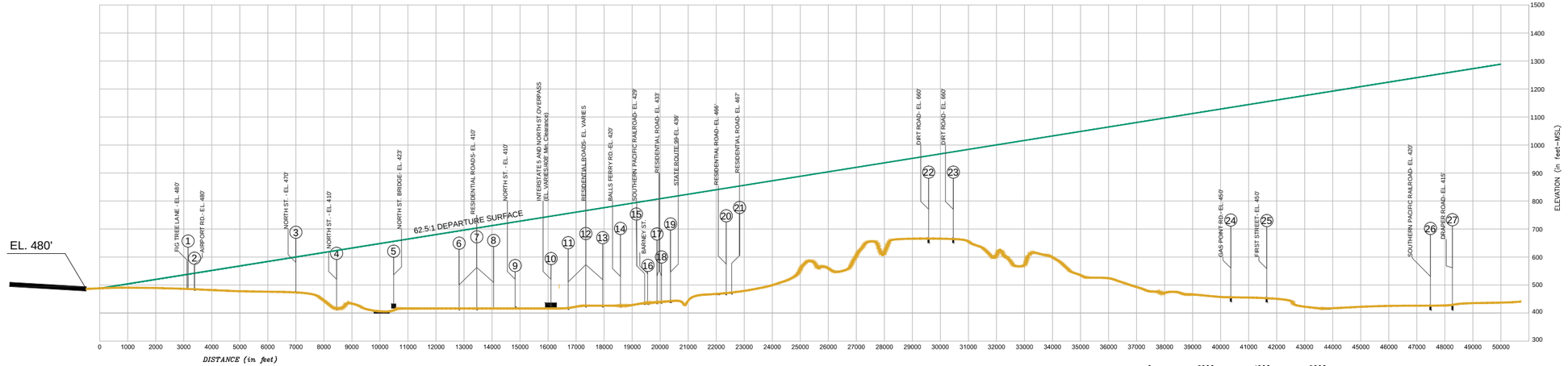


RUNWAY 34L



HORIZONTAL SCALE 0 2000 4000 6000 SCALE IN FEET

VERTICAL SCALE 0 200 400 600 SCALE IN FEET

No.	REVISIONS	DATE	BY	APPD.
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4	-	-	-	-
3	-	-	-	-
2	-	-	-	-
1	-	-	-	-

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REDDING MUNICIPAL AIRPORT

RUNWAY 34L DEPARTURE SURFACE DRAWING

DRAFT

REDDING, CALIFORNIA

PLANNED BY: Steve Wagner
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris

November, 2015

SHEET 12 OF 17

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Airport Consultants
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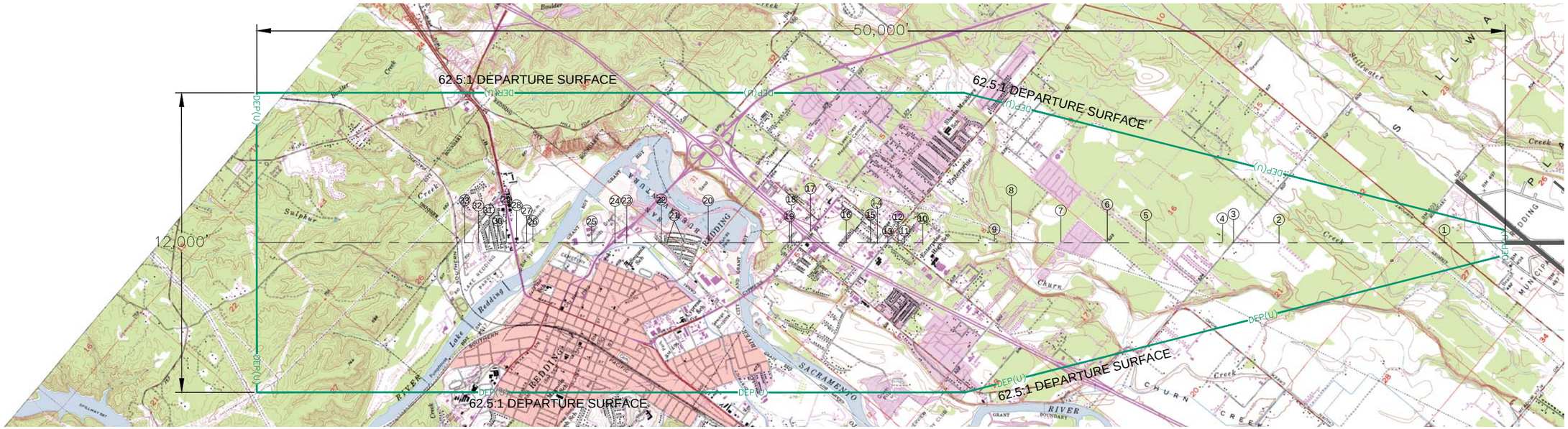
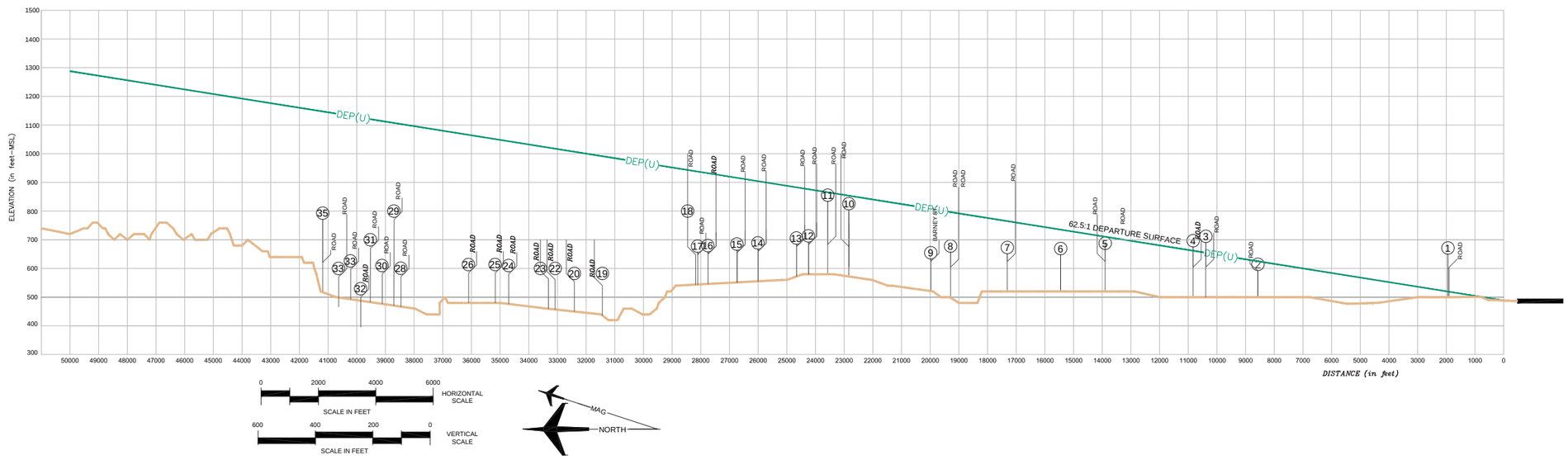


RUNWAY 34L



No.	REVISIONS	DATE	BY	APP'D
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-

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REDDING MUNICIPAL AIRPORT

RUNWAY 12 DEPARTURE SURFACE DRAWING

REDDING, CALIFORNIA

DRAFT

PLANNED BY: Steve Wagner
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris

November, 2015

SHEET 13 *OF* 17

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Airport Consultants
www.coffmanassociates.com

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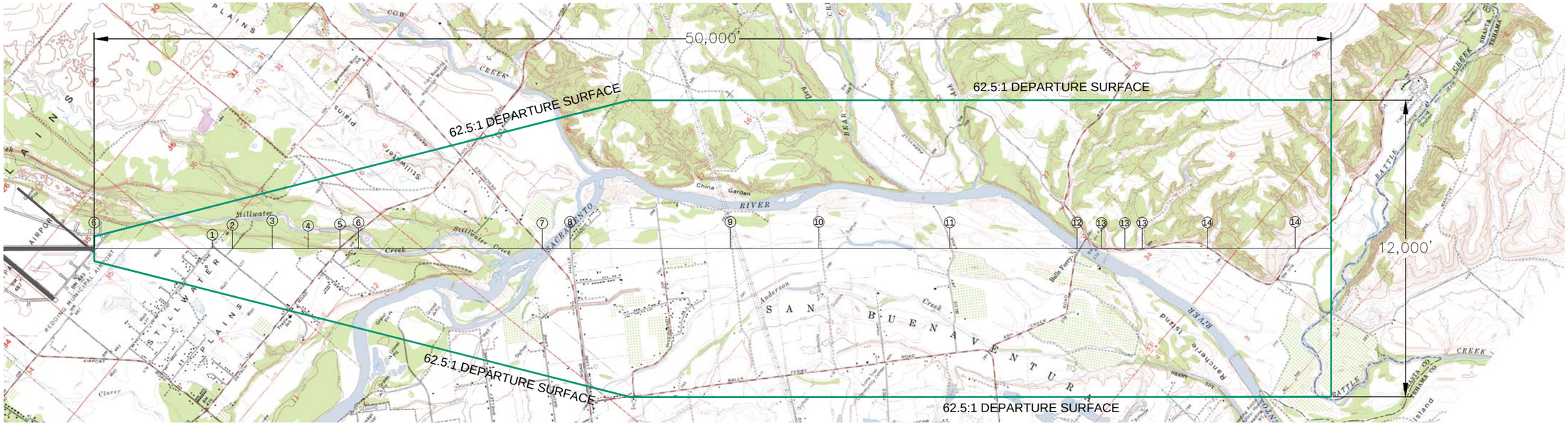
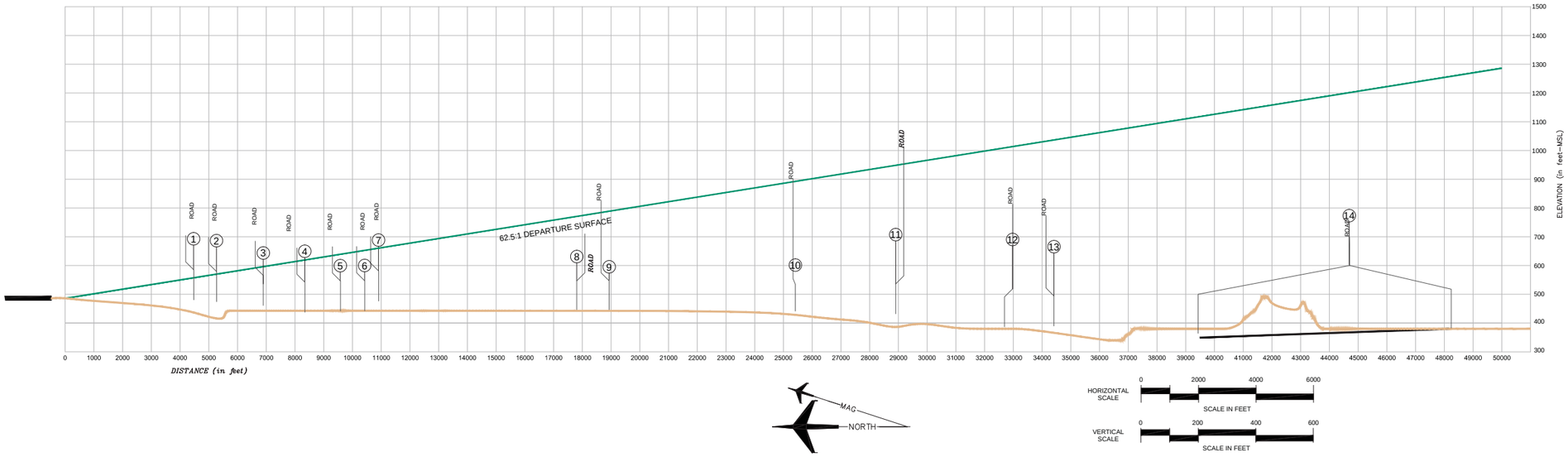


RUNWAY 34L



HORIZONTAL SCALE
0 2000 4000 6000
SCALE IN FEET

VERTICAL SCALE
0 200 400 600
SCALE IN FEET

No.	REVISIONS	DATE	BY	APP'D
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-

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REDDING MUNICIPAL AIRPORT

RUNWAY 30 DEPARTURE SURFACE DRAWING

REDDING, CALIFORNIA

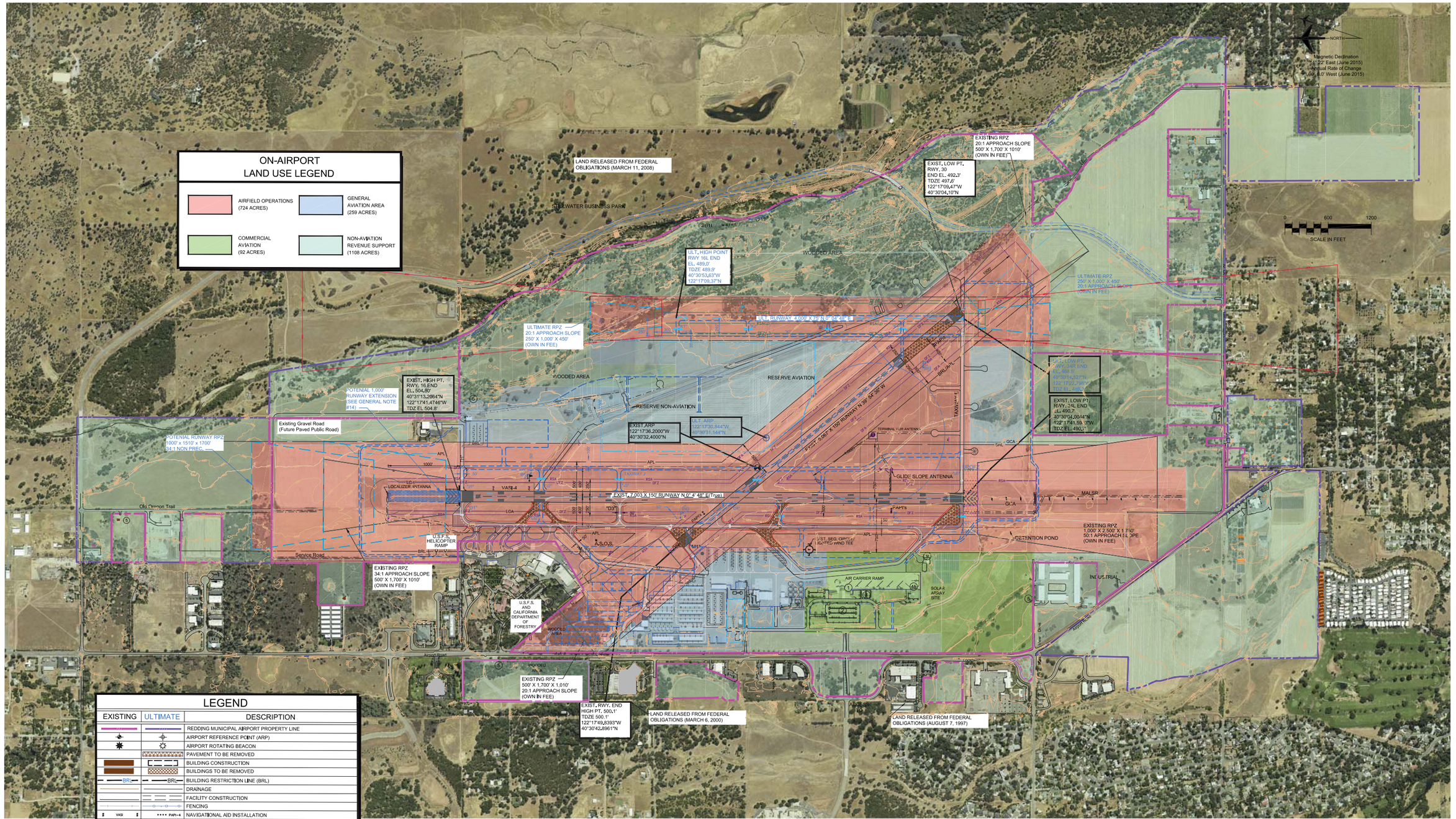
PLANNED BY: Steve Wagner
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris

November, 2015

Coffman Associates
Airport Consultants
www.coffmanassociates.com

DRAFT

Coffman Associates E:\2- drive 12 28 2010\Cad\CAD\REDDING\2015\13-14 Rdd 12-30 Dep 11 2015.dwg Printed Date: 11-17-15 10:20:52 AM Maggie Beaver



LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		REDDING MUNICIPAL AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		PAVEMENT TO BE REMOVED
		BUILDING CONSTRUCTION
		BUILDINGS TO BE REMOVED
BRL	BRL	BUILDING RESTRICTION LINE (BRL)
		DRAINAGE
		FACILITY CONSTRUCTION
		FENCING
VASI	PAPI-4	NAVIGATIONAL AID INSTALLATION
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
		SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
1080	1080	TOPOGRAPHIC CONTOURS (See Note 5)
		WIND INDICATOR
RSA	RSA	RUNWAY SAFETY AREA (RSA)
OFA	OFA	OBJECT FREE AREA (OFA)
OFZ	OFZ	OBSTACLE FREE ZONE (OFZ)
		HOLD POSITION MARKINGS
	SAME	THRESHOLD SITING SURFACE
N/A		PARCELS
	SAME	DEPARTURE SURFACE
	SAME	APPROACH SURFACE

No.	REVISIONS	DATE	BY	APP'D
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-
6	-	-	-	-

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REDDING MUNICIPAL AIRPORT

ON-AIRPORT LAND USE DRAWING

REDDING, CALIFORNIA

PLANNED BY: Steve Wagner
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris

October, 2015

SHEET 15 OF 17

Coffman Associates
Airport Consultants
www.coffmanassociates.com

Coffman Associates E:\3 drive 12 28 2010\Cad\CAD\REDDING\2015\15 REDD LUD 10 2015.dwg Printed Date: 11-06-15 04:58:45 PM Maggie Beaver

RECORDING INFORMATION [1]

Parcel	Owner:	Acreage	Date Recorded	Recording Information	Grantor/Method
1	City of Redding	108,13	06/06/1949	054-260-001-000	Quick Claim Dead D-339
2	City of Redding	320,00	12/08/1947	054-270-004-000	Instrument of Transfer
3	City of Redding	193,88	12/08/1947	054-280-005-000	Instrument of Transfer
4	City of Redding	60,37	06/06/1973	056-130-009-000	Fee Simple
5	City of Redding	256,55	12/08/1947	056-130-008-00	Instrument of Transfer
6	City of Redding	118,68	12/08/1947	056-010-025-000	Instrument of Transfer
7	City of Redding	2,87	12/08/1947	054-260-002-000	Instrument of Transfer
8	City of Redding	52,73	04/15/04	056-080-009-000	AIP# 03-06-0194-28 Fee Simple
9	City of Redding	47,25	04/15/2004	056-080-010-000	AIP# 03-06-0194-28 Fee Simple
10	City of Redding	9,93	08/23/2004	056-080-008-000	AIP# 03-06-0194-28 Fee Simple
11	City of Redding	18,89	08/23/2004	056-080-007-000	AIP# 03-06-0194-28 Fee Simple
12	City of Redding	12,00	08/27/2004	056-100-001-000	AIP# 03-06-0194-28 Fee Simple
13	City of Redding	4,62	10/08/1984	056-090-040-000	AIP# 03-06-0194-10 Fee Simple
14	City of Redding	0,86	08/04/1980	056-090-012-000	AIP# 03-06-0194-10 Condemnation
15	City of Redding	1,24	08/04/1980	056-090-016-000	AIP# 03-06-0194-10 Condemnation
16a	City of Redding	5,08	11/25/1970	056-090-015-000	ADAP# 8-06-0194-01 Fee Simple
16b	City of Redding	5,50	05/27/1971	056-090-015-000	ADAP# 8-06-0194-01 Fee Simple
16c	City of Redding	1,25	09/27/1972	056-090-015-000	Fee Simple
16d	City of Redding	1,60	09/27/1972	056-090-015-000	Fee Simple
17	City of Redding	46,87	04/04/1968	056-080-006-000	ADAP# 8-06-0194-01Fee Simple 9-04-062-C804
18	City of Redding	20,00	03/20/1975	056-590-014-000	ADAP# 8-06-0194-01/Condemnation 9-04-062-C804
19a	City of Redding	10,20	02/29/1968	056-580-021-000	ADAP# 8-06-0194-01 Fee Simple
19b	City of Redding	3,40	12/13/1999	056-580-021-000	AIP# 03-06-0194-21 Fee Simple
20	City of Redding	1,88	08/04/2003	056-590-012-000	AIP# 03-06-0194-22
21	City of Redding	1,6	08/04/2003	056-590-013-000	AIP# 03-06-0194-22
22	City of Redding	1,27	12/08/1947	056-610-017-000	Instrument of Transfer
23	City of Redding	4,34	12/08/1947	056-610-004-000	Instrument of Transfer
24	City of Redding	5,15	12/08/1947	056-610-008-000	Instrument of Transfer
25	City of Redding	5,12	12/08/1947	054-640-001-000	Instrument of Transfer
26	City of Redding	1,41	12/08/1947	054-640-019-000	Instrument of Transfer
27	City of Redding	1,55	12/08/1947	054-640-012-000	Instrument of Transfer
28	City of Redding	1,55	12/08/1947	056-640-013-000	Instrument of Transfer
29	City of Redding	1,38	12/08/1947	056-640-020-000	Instrument of Transfer
30	City of Redding	13,0	12/08/1947	056-640-006-000	Instrument of Transfer
31 [2]	City of Redding	2,24	12/08/1947	056-610-014-000	Instrument of Transfer
32	City of Redding	23,67	12/08/1947	054-280-006-00	Instrument of Transfer
33a	City of Redding	9,28	01/08/1970	054-210-052-000	ADAP# 08-06-0194-01/Fee Simple 09-04-062-C804
33b	City of Redding	9,42	04/15/1970	054-210-051-000	ADAP# 08-06-0194-01/Fee Simple 09-04-062-C804
33c	City of Redding	9,28	12/16/1968	054-210-052-000	ADAP# 08-06-0194-01/Fee Simple 09-04-062-C804
33d	City of Redding	9,42	10/13/1971	054-210-051-000	ADAP# 8-06-0194-01 Fee Simple
33e	City of Redding	25,70	07/12/1971	054-210-051-000	ADAP# 8-06-0194-01 Fee Simple
33f	City of Redding	9,42	03/12/1969	054-210-051-000	ADAP# 08-06-0194-01/Fee Simple 09-04-062-C804
33g	City of Redding	5,00	04/30/1968	054-210-052-000	ADAP# 8-06-0194-01 Fee Simple
33h	City of Redding	20,00	06/22/1972	054-210-051-000	ADAP# 8-06-0194-01 Fee Simple
33i	City of Redding	5,00	04/09/1973	054-210-051-000	ADAP# 8-06-0194-01 Fee Simple
33j	City of Redding	3,00	02/26/1971	054-210-051-000	ADAP# 8-06-0194-01 Fee Simple
33k	City of Redding	2,0	01/22/1971	054-210-051-000	ADAP# 8-06-0194-01 Fee Simple
34	City of Redding	4,71	02/28/1986	054-210-030-000	Fee Simple
35	City of Redding	4,78	08/28/1996	054-210-034-000	AIP# 03-06-0194-13 Condemnation
36	City of Redding	4,73	08/28/1996	054-210-033-000	AIP# 03-06-0194-13 Condemnation
37	City of Redding	4,9	08/28/1996	054-210-020-000	AIP# 03-06-0194-13 Condemnation
38	City of Redding	8,01	01/17/1986	054-200-034-000	AIP# 03-06-0194-10 Fee Simple
39	City of Redding	1,03	02/26/1993	054-200-016-000	AIP# 03-06-0194-13 Fee Simple
40	City of Redding	,51	02/17/1983	054-200-023-000	AIP# 03-06-0194-10 Fee Simple
41	City of Redding	,48	03/05/1984	054-200-024-000	AIP# 03-06-0194-10 Fee Simple
42	City of Redding	,72	08/29/1985	054-200-022-000	AIP# 03-06-0194-10 Fee Simple
43	City of Redding	,35	10/25/1984	054-200-025-000	AIP# 03-06-0194-10 Fee Simple
44	City of Redding	,53	03/20/1984	054-200-006-000	AIP# 03-06-0194-10 Fee Simple
45	City of Redding	2,31	02/26/1993	054-200-067-000	AIP# 03-06-0194-13 Fee Simple
46	City of Redding	,41	12/08/1983	054-200-026-000	AIP# 03-06-0194-28 Fee Simple
47	City of Redding	4,26	12/22/2004	056-080-012-000	Pending Grant/Fee Simple
48	City of Redding	,42	10/02/2001	056-120-007-000	AIP# 03-06-0194-22 Fee Simple
49	City of Redding	,42	09/08/2004	056-120-006-000	AIP# 03-06-0194-28 Fee Simple
50	City of Redding	,42	07/21/2004	056-120-018-000	AIP# 03-06-0194-28 Fee Simple
51	City of Redding	,42	07/21/2004	056-120-002-000	AIP# 03-06-0194-28 Fee Simple
52	City of Redding	,42	01/14/2003	056-120-001-000	AIP# 03-06-0194-22 Fee Simple
53	City of Redding	5,18	10/01/2004	056-110-001-000	AIP# 03-06-0194-28 Fee Simple
54	City of Redding	,50	10/12/1983	056-230-013-000	AIP# 03-06-0194-10 Fee Simple
55 [2]	City of Redding	76,88	01/27/2005	056-160-005-000	Pending Grant/Fee Simple
56	City of Redding	,50	02/01/1984	056-230-014-00	AIP# 03-06-0194-10
57	City of Redding	,70	10/02/2001	056-230-015-000	AIP# 03-06-0194-22
Total Acreage		±1,502,95			

NOTE:

1. All Property Recording Information was provided by the City of Redding.
2. Parcels have been sold.

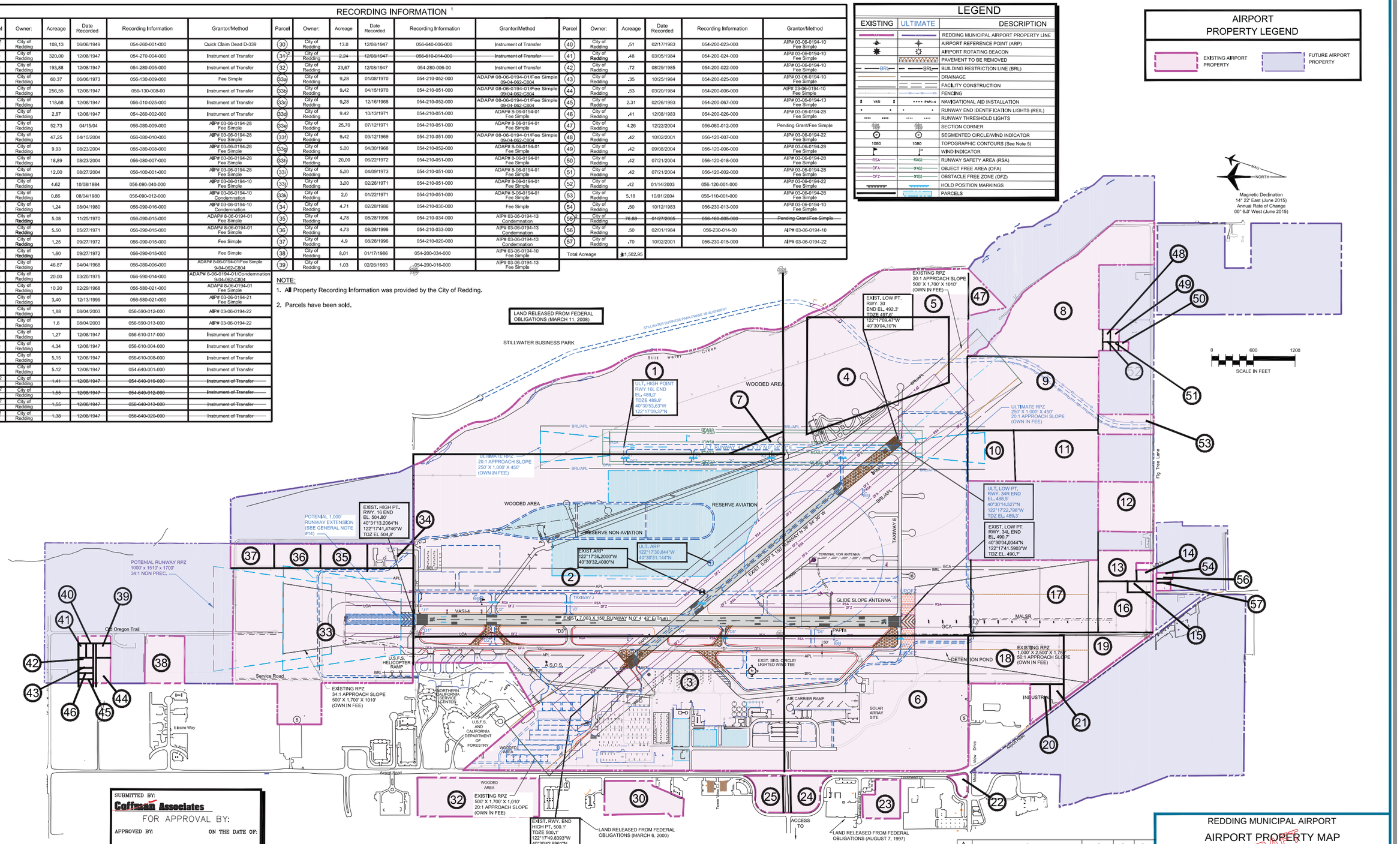
LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		REDDING MUNICIPAL AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		PAVEMENT TO BE REMOVED
BRL	BRL	BUILDING RESTRICTION LINE (BRL)
		DRAINAGE
		FACILITY CONSTRUCTION
		FENCING
VASI	PAPI-4	NAVIGATIONAL AID INSTALLATION
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
		SECTION CORNER
		SEGMENTED CIRCLE/WIND INDICATOR
1080	1080	TOPOGRAPHIC CONTOURS (See Note 5)
		WIND INDICATOR
RSA	RSA	RUNWAY SAFETY AREA (RSA)
OFA	OFA	OBJECT FREE AREA (OFA)
OFZ	OFZ	OBSTACLE FREE ZONE (OFZ)
		HOLD POSITION MARKINGS
		PARCELS

AIRPORT PROPERTY LEGEND

EXISTING AIRPORT PROPERTY

FUTURE AIRPORT PROPERTY



SUBMITTED BY:
Coffman Associates

FOR APPROVAL BY:

APPROVED BY: ON THE DATE OF:

Rod A. Dinger
Airports Director
Support Services Department
Airports Division, City of Redding, California

No.	REVISIONS	DATE	BY	APP'D
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-

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REDDING MUNICIPAL AIRPORT

AIRPORT PROPERTY MAP (EXHIBIT "A")

DRAFT

REDDING, CALIFORNIA

PLANNED BY: Steve Wagner
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris

October, 2015

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Ultimate Inner-Approach OFZ Drawing
Runway 16R-34L (Obstacle Free Zone)
Airport EL. 502.0 / Horizontal Surface EL. 652.0

ULTIMATE RPZ
20:1 APPROACH SLOPE
250' X 1,000' X 450'
(OWN IN FEE)

EXIST. HIGH PT.
RWY. 16 END
EL. 504.80'
40°31'13.2064"N
122°17'41.4746"W
TDZ EL 504.8'

WOODED AREA

RESERVE AVIATION

RESERVE NON-AVIATION

ULT. RUNWAY 4,000' X 75' N 0° 04' 48" E

EXIST. ARP
122°17'36.2000"W
40°30'32.4000"N

ULT. ARP
122°17'30.844"W
40°30'31.144"N

EXIST. 5,067' X 150' RUNWAY N 39° 54' 36" W

TERMINAL VOR ANTENNA

TAXIWAY E

Existing Gravel Road
(Future Paved Public Road)

INNER-TRANSITIONAL OFZ 6:1

INNER-TRANSITIONAL OFZ 6:1
INNER-APPROACH OFZ 34:1

INNER-APPROACH OFZ 34:1
INNER-TRANSITIONAL OFZ 6:1

Ultimate Runway 16L
End EL. 502.0

Existing/Ultimate 7,002' x 150' Runway

PAPI's = EL. 563.0

Old Oregon Trail

U.S.F.S. HELICOPTER RAMP

A.S.O.S.

Service Road

EXISTING RPZ
34:1 APPROACH SLOPE
500' X 1,700' X 1010'
(OWN IN FEE)

NORTHERN CALIFORNIA SERVICE CENTER

U.S.F.S. AND CALIFORNIA DEPARTMENT OF FORESTRY

Electro Way

WOODED AREA

Airport Road

EXISTING RPZ
500' X 1,700' X 1,010'
20:1 APPROACH SLOPE
(OWN IN FEE)

EXIST. RWY. END
HIGH PT. 500.1'
TDZE 500.1'
122°17'49.8393"W
40°30'42.8961"N

LAND RELEASED FROM FEDERAL OBLIGATIONS (MARCH 6, 2000)

ULT. LOW PT.
RWY. 34R END
EL. 488.5'
40°30'14.527"N
122°17'22.798"W
TDZ EL. 488.3'

EXIST. LOW PT.
RWY. 34L END
EL. 490.7'
40°30'04.0044"N
122° 17'41.5903"W
TDZ EL. 490.7'

GLIDE SLOPE ANTENNA

Ultimate Runway 34L
End EL. 487.7

PAPI's = EL. 548.7

INNER-TRANSITIONAL OFZ 6:1
INNER-APPROACH OFZ 50:1
MALSR

INNER-APPROACH OFZ 50:1

INNER-TRANSITIONAL OFZ 6:1

EXISTING RPZ
1,000' X 2,500' X 1,750'
50:1 APPROACH SLOPE
(OWN IN FEE)

DETENTION POND

INNER-TRANSITIONAL OFZ 6:1

AIR CARRIER RAMP

SOLAR ARRAY SITE

INDUSTRIAL

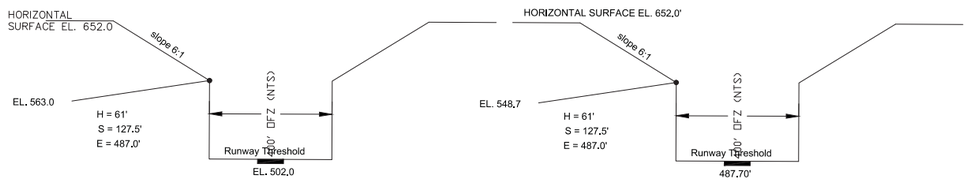
Runway
Inner-Approach OFZ

Airport Road

Locknood Dr

ACCESS TO

LAND RELEASED FROM FEDERAL OBLIGATIONS (AUGUST 7, 1997)



OBSTACLE FREE ZONE (OFZ) OBJECT PENETRATIONS

OBJECT	PENETRATION	DISPOSITION
None	-	-

MAG
NORTH

MAGNETIC VARIANCE - 16.2° E (2002)
ANNUAL RATE OF CHANGE 4.1' W
NAD 83

0 500 1000 1500
SCALE IN FEET

No.	REVISIONS	DATE	BY	APPD.
5	-	-	-	-
4	-	-	-	-
3	-	-	-	-
2	-	-	-	-
1	-	-	-	-

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REDDING MUNICIPAL AIRPORT

INNER APPROACH OFZ FOR
RUNWAY 16R-34L

DRAFT

REDDING, CALIFORNIA

PLANNED BY: Steve Wagner
DETAILED BY: Maggie Beaver
APPROVED BY: Jim Harris

November, 2015

SHEET 17 OF 17

Coffman Associates
Airport Consultants
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www.coffmanassociates.com

KANSAS CITY
(816) 524-3500

237 N.W. Blue Parkway
Suite 100
Lee's Summit, MO 64063

PHOENIX
(602) 993-6999

4835 E. Cactus Road
Suite 235
Scottsdale, AZ 85254