Final Noise Study
Environmental Impact Statement for Basing F-35A Lightning II Formal Training Unit at Kingsley Field Air National Guard Base, Klamath Falls, Oregon

173D FIGHTER WING

April 2026

This page intentionally left blank.

TABLE OF CONTENTS

List of Figures

List of Tables

ACRONYMS AND ABBREVIATIONS

%	percent
173 FW	173d Fighter Wing
A/B	Afterburner
AAD	Average Annual Day
AAM	Advanced Acoustic Model
ACM	Air Combat Maneuvering
ADAIR	Adversary Air
AEDT	Aviation Environmental Design Tool
AGL	Above Ground Level
ANG	Air National Guard
ANGB	Air National Guard Base
ANSI	American National Standards Institute
ASA	Acoustical Society of America
ATCAA	Air Traffic Control Assigned Airspace
ATCT	Air Traffic Control Tower
BAA	Backup Aerospace Vehicle Authorized
BFM	Basic Fighter Maneuver
CDNL	C-weighted Day-Night Average Sound Level
DAF	Department of the Air Force
dB	Decibel
dBA	A-weighted decibel
dBC	C-weighted decibel
DNL	Day-Night Average Sound Level
DNWG	Department of Defense Noise Working Group
DoD	Department of Defense
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
FAA	Federal Aviation Administration
FTU	Formal Training Unit
Hz	Hertz
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IP	Instructor Pilot
IPUG	Instructor Pilot Upgrade
kPa-s/m^2	kilopascal-seconds per square meter
L_{dnmr}	Onset-Rate Adjusted Monthly Day-Night Average A-weighted Sound Level
L_{eq}	Equivalent Sound Level
L_{max}	Maximum Sound Level
LMT	Crater Lake-Klamath Regional Airport
MOA	Military Operation Area
MRNmap	Military Operating Area and Range Noise Model
MSL	mean sea level
NA	Number of Events Above
NED	National Elevation Dataset
NEPA	National Environmental Policy Act
NGB	National Guard Bureau
NIPTS	Noise Induced Permanent Threshold Shift
PA	Probability of Awakening
PAA	Primary Aerospace Vehicle Authorized
PDARS	Performance Data Analysis and Reporting System
PFO	Precautionary Flameout
PHL	Potential for Hearing Loss
POI	Point of Interest
SEL	Sound Exposure Level
TA	Time Above
TACAN	Tactical Air Navigation System
TAF	Terminal Area Forecast
TRACON	Terminal Radar Approach Control
U.S.	United States
USFS	United States Forest Service
USGS	United States Geological Survey
VFR	Visual Flight Rules
W-	Warning Area

This page intentionally left blank.

1.0 INTRODUCTION

1.1 BACKGROUND

This Noise Study supports the Environmental Impact Statement (EIS) evaluating the potential effects associated with the Department of the Air Force (DAF) and National Guard Bureau (NGB) proposal to replace aging F-15C/D aircraft and maintain combat capability within Air National Guard (ANG) fighter wings operating the F-15C/D. The F-15C/D fleet has reached the end of its service life and is being phased out due to increasing maintenance requirements and diminishing parts availability.

For Kingsley Field Air National Guard Base (ANGB) at Crater Lake-Klamath Regional Airport (LMT), Oregon, the Proposed Action is the beddown, operation, and associated infrastructure construction of one formal training unit (FTU) squadron of F-35A Lightning II (F-35A) aircraft at the 173d Fighter Wing (173 FW). The Proposed Action includes replacement of the aging F-15C/D aircraft at Kingsley Field ANGB, continued training from LMT/Kingsley Field ANGB and within existing military training airspace used by the 173 FW, and associated infrastructure improvements to support F-35A operations. Figure 1-1 depicts the vicinity of the airport and Figure 1-2 presents the 173 FW-associated military training airspace.

Military aircraft noise modeling was accomplished using the Department of Defense's (DoD) NOISEMAP software while civilian aircraft were modeled using the Federal Aviation Administration's (FAA) Aviation Environmental Design Tool (AEDT) Version 3f software program. The data used in support of the study (i.e., numbers and types of aircraft, time of day, runway assignments, type of operation) were obtained from recent noise studies and coordination with representatives from the FAA, air traffic controllers, and the NGB. Standardized flight profile data (power settings, airspeeds, etc.) available with AEDT were used for civilian aircraft operations.

For analyses prepared in accordance with FAA Order 1050.1G, forecast information is an important input to the noise analysis under the National Environmental Policy Act (NEPA). Airports can rely on a forecast they prepare, and is approved by the FAA, or they can seek approval from the FAA to use the Terminal Area Forecast (TAF), which is issued annually and projects civilian and commercial operations into the near future, and these projections are utilized to determine operational levels associated with the noise impact analysis. This study utilizes the FAA's 2023 TAF for annual civil operational and Performance Data Analysis and Reporting System (PDARS) for flight track analysis and development (FAA 2024a; LMT 2024).

Military flight operations were based on interviews with members of the 173 FW and updated as needed to reflect Existing Conditions (2023) dataset and planning-scenario assumptions used for comparative modeling, which were determined to provide a reasonable basis for estimating future operations for NEPA analysis. Transient military operations were based upon prior studies, such as the Environmental

Assessment (EA) Combat Air Forces: Adversary Air, Kingsley Field Air National Guard Base, Oregon (DAF 2020), with updates for changes in the fleet mix.

This analysis includes multiple F-35A departure afterburner usage scenarios (5 percent, 50 percent, and 95 percent) for sensitivity analysis. The 95 percent afterburner departure assumption is used for the primary Proposed Action analysis because it reflects the expected FTU training departure profile. Unless otherwise noted, values in this Noise Study reflect the Existing Conditions (2023) and planning-scenario datasets used for comparative modeling in the EIS and are not intended to represent current-day operations.

The EIS Proposed Action includes up to 24 Primary Aerospace Vehicles Authorized (PAA) and 2 Backup Aerospace Vehicles Authorized (BAA) assigned to the FTU squadron; noise modeling reflects the operational assumptions used for comparative analysis and therefore models the F-35A flight activity associated with the Proposed Action training profile.

Accordingly, the following aircraft alternatives and afterburner usage scenarios were modeled for the 173 FW:

- F-15C/D – 26 PAA (Existing Conditions [2023] and No Action Alternative)
- F-35A – 24 PAA (Proposed Action)
    - 5 percent afterburner usage
    - 50 percent afterburner usage
    - 95 percent afterburner usage

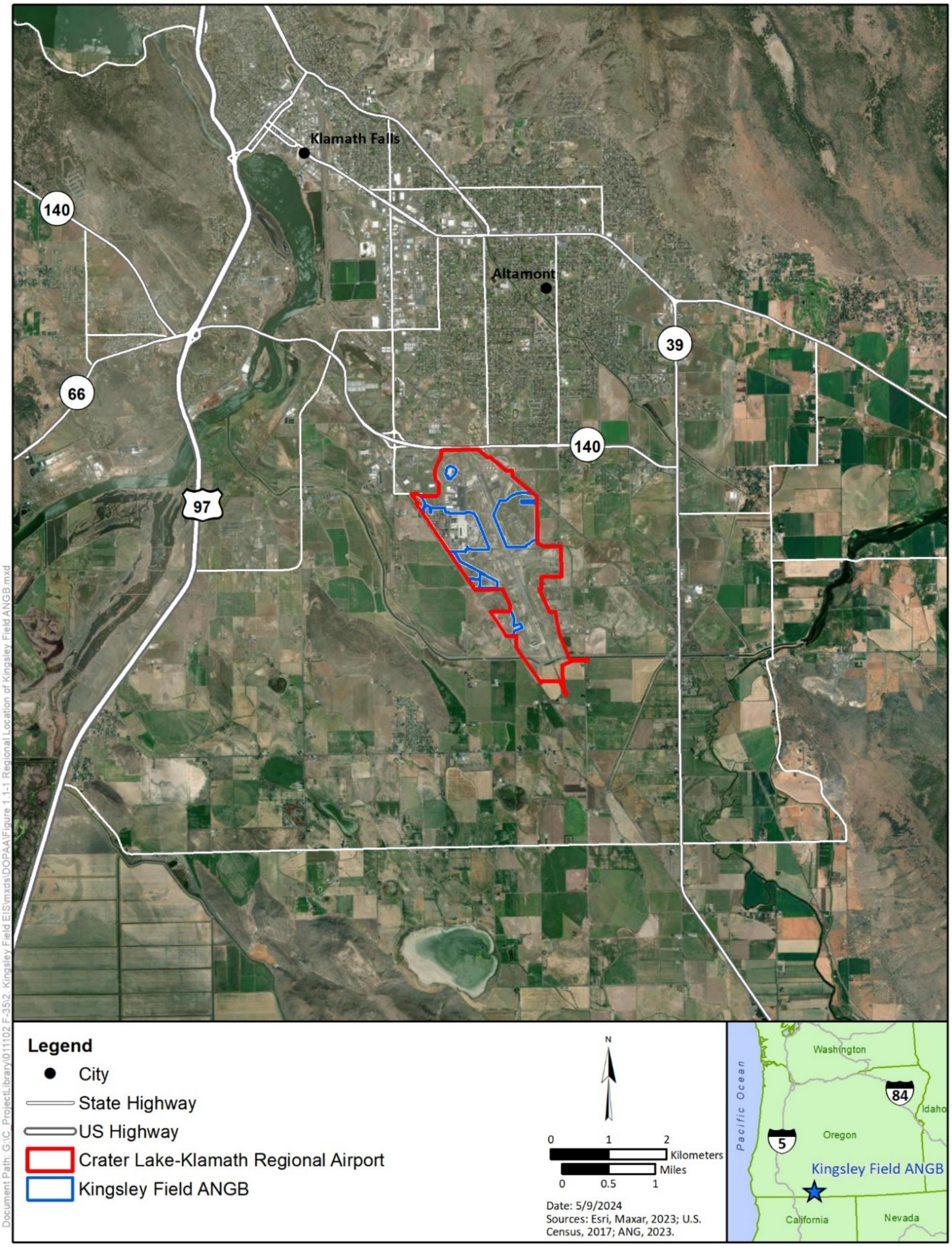


Figure 1-1 Regional Location of LMT/Kingsley Field ANGB

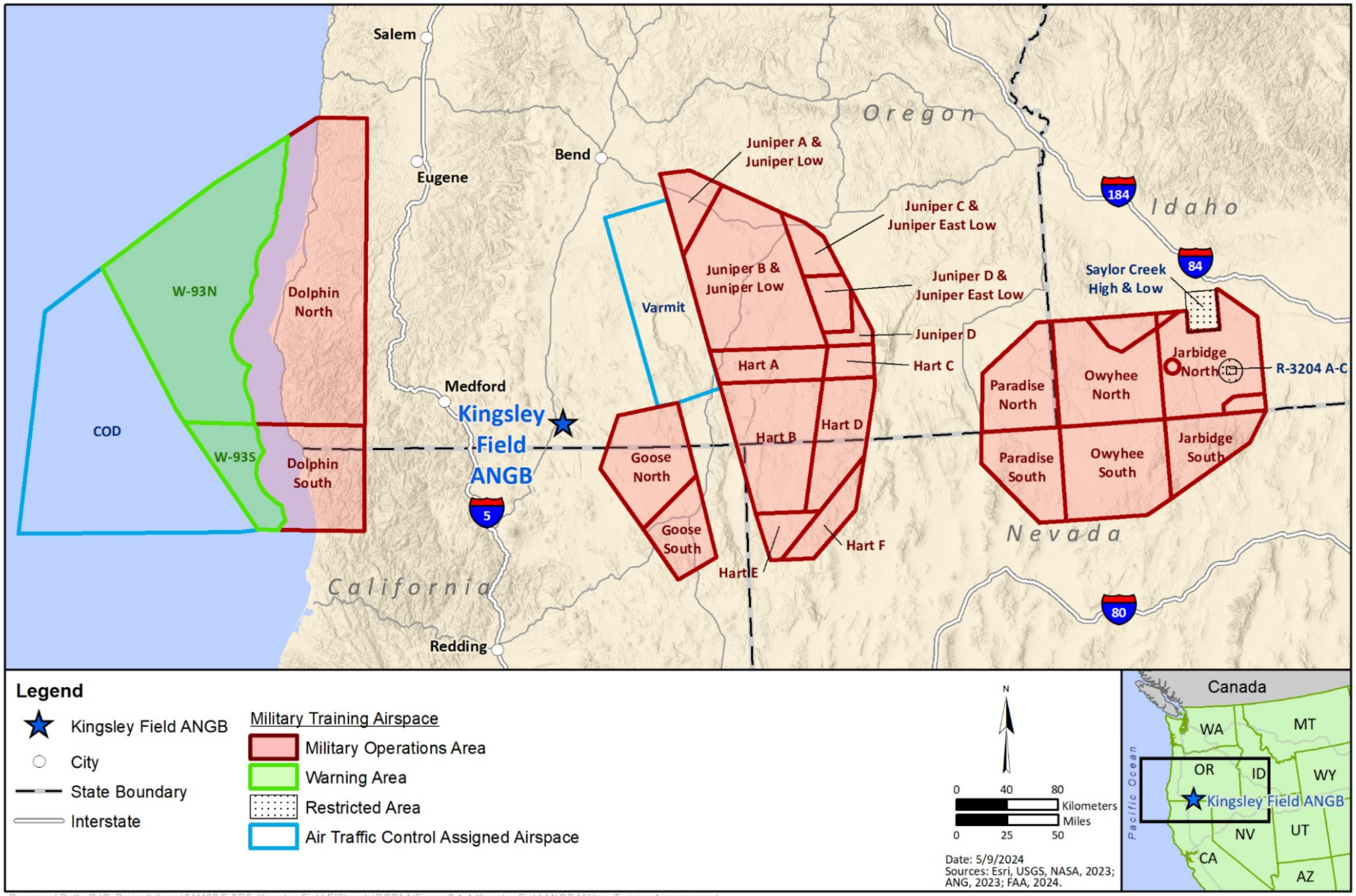


Figure 1-2 Military Training Airspace Associated with the 173 FW

1.2 DOCUMENT STRUCTURE

Section 1.0 introduced this study; while Section 2.0 describes the methodology used in the analysis. Section 3.0 provides the modeling data used and the noise exposure for Existing Conditions (2023). Section 4.0 presents the No Action Alternative data and results, and Section 5.0 provides the F-35A alternative with three afterburner scenarios. Section 6.0 presents conclusions and Section 7.0 provides the references.

2.0 METHODOLOGY

The DoD and the Federal Interagency Committee on Noise (1978) identify noise metrics used to describe noise exposure for impact assessment, while the Defense Noise Working Group (DNWG) provides guidance on military noise modeling methodology. The following subsections describe these noise metrics and noise modeling methodology.

2.1 NOISE MODELING AND PRIMARY NOISE METRICS

The DoD prescribes use of the Noisemap suite of computer programs (Wyle 1998; Wasmer Consulting 2006) containing the core computational programs called "NMAP," version 7.3, and "MRNMap," version 3.0, and the FAA's AEDT 3f for analysis of aircraft noise. For this Noise Study, the Noisemap suite of programs refers to BASEOPS as the input module, Noisemap as the noise model for predicting noise exposure in the airfield environment, and MRNMap as the noise model used to predict noise exposure in the military training airspace. Supersonic noise is estimated with BOOMAP2021. NMPLOT is the tool used to combine grid points from NOISEMAP and AEDT to generate Day-Night Average Sound Level (DNL) noise contours. Table 2-1 presents noise modeling parameters used in this analysis. Human hearing sensitivity to differing sound pitch, measured in cycles per second or hertz (Hz), varies by frequency. To account for this effect, this analysis utilizes A-weighting, which emphasizes sound roughly within the range of typical speech and de-emphasizes very low and very high frequency sounds. All decibels (dB) presented in this study utilize A-weighted (dBA or dB[A]) but are presented as dB for brevity, unless otherwise noted.

Table 2-1 Noise Modeling Parameters

Software	***Analysis***	***Version***
NMAP	Airfield noise – military aircraft	7.3
AEDT	Airfield noise – civilian aircraft	3f
MRNMap	Military Training Airspace Noise (subsonic)	3.0
BOOMAP	Military Training Airspace Noise (supersonic)	2021
Parameter	***Description***	
Receiver Grid Spacing	500 ft in x and y	
Metrics	DNL and CDNL (primary) L_{dnmr}, SEL, L_{max}, L_{eq}, NA	
Basis	AAD Operations (NMAP/AEDT); Average Month (MRNMap)	
Topography		
Elevation Data Source	USGS 30m NED	
Elevation Grid Spacing	500 ft in x and y	
Impedance Data Source	USGS Hydrography DLG	
Impedance Grid spacing	500 ft in x and y	
Flow Resistivity of Ground (soft/hard)	225 kPa-s/m^2 / 100,000 kPa-s/m^2	
Military Modeled Weather (Monthly Averages 2018-2023; March selected)		
Temperature	59°F	
Relative Humidity	70%	
Barometric Pressure	29.92 in Hg	

Legend: °F = degrees Fahrenheit; % = percent; AAD = Average Annual Day; AEDT = Aviation Environmental Design Tool; CDNL = C-weighted Day-Night Average Sound Level; DLG = Digital Line Graph; DNL = Day-Night Average Sound Level; ft = feet; in Hg = inches Mercury; kPa-s/m^2 = kilopascal-seconds per square meter; L_{dnmr} = Onset-Rate Adjusted Monthly Day-Night Average Sound Level; L_{eq} = Equivalent Sound Level; L_{max} = maximum sound level; m = meters; NA = Number of Events Above; NED = National Elevation Dataset; SEL = Sound Exposure Level; USGS = United States Geological Survey.

The primary noise metric utilized in this analysis for characterizing noise exposure is Day-Night Average Sound Level (L_{dn}, also written as DNL), which is A-weighted applicable for subsonic aircraft operations. The assessment period of DNL reflects an Average Annual Day (AAD). DNL is a cumulative metric that includes all noise events occurring in a 24-hour period with a nighttime noise weighting applied to events occurring after 10 p.m. (2200) and before 7 a.m. (0700). The daytime period is defined as 7 a.m. (0700) to 10 p.m. (2200). An adjustment (weighting) of 10 dB is added to events occurring during the nighttime period to account for the added intrusiveness while people are most likely to be relaxing at home or sleeping. Note that "daytime" and "nighttime" in calculation of DNL are sometimes referred to as "acoustic day" and "acoustic night" and always correspond to the times given above. This is often different than the "day" and "night" used commonly in military aviation, which are directly related to the times of sunrise and sunset applicable for military training in dark conditions. These times vary latitudinally, and throughout the year with the seasonal changes.

Similar to DNL, C-weighted Day-Night Average Sound Level (CDNL) represents a cumulative metric that includes all noise events occurring in a 24-hour period with a nighttime noise weighting applied to events occurring after 10 p.m. (2200) and before 7 a.m. (0700). FAA requires the use of AAD for describing DNL, which was used in this analysis for airfield operations at LMT. CDNL is C-weighted for impulsive sounds that contain greater low frequency noise, like ordnance or supersonic “booms,” to better reflect the level of annoyance generated by these activities that may occur in military training airspace.

DoD Noise Program Policy (DoD Instruction 4715.13, 28 January 2020) requires the use of the DNL noise metric to describe aircraft noise exposure levels at airfields based on AAD for the purpose of long-term compatible land use planning. Consistent with that standard, this study analyzed both military and civil operations at the airfield on an average annual basis. Flight activity in the military training airspace can vary throughout the year, so AAD may not always be the most informative approach for military operations. Therefore, military training airspace analysis typically considers the ‘busiest month’ to better represent activity during an average day of that month. However, in this case, military training airspace operations were relatively consistent throughout the year, and no single month materially represented a higher-use condition. Therefore, average annual daily operations were used as the basis for the military training airspace noise analysis.

Assessment of noise associated with a Proposed Action requires prediction of future conditions that cannot be easily measured until after implementation or would require excessive cost or time to measure. The solution to this includes the use of computer software to simulate the future conditions, as detailed in the following sections. A recent congressionally mandated study compared the accuracy of noise modeling methods described in this section to real-world field measurements. The report found that DoD-approved noise models operate as intended providing accurate prediction of noise exposure levels from aircraft operations for use in impact assessments and long-term land use planning (Department of the Navy 2021). The study also determined that the largest variable in any aircraft noise-modeling effort is the expected operational flight parameter data, such as runway and flight track utilization, altitudes at various points in the flight track, engine power settings, and other parameters.

2.1.1 Crater Lake-Klamath Regional Airport (LMT)

This section discusses the airport facilities, including the airspace, air traffic control tower (ATCT), and runways at LMT, and the aircraft noise modeling.

2.1.1.1 Airport Facilities

<u>Airspace</u>

The airspace surrounding LMT, and all airspace within the United States (U.S.) National Airspace System, is classified into a number of classes (A, B, C, D, E, and G) based on the level of air traffic control services, operating requirements, and the nature of operations. LMT is surrounded by Class D airspace when the air traffic control tower is in operation, which is positively controlled by an ATCT that operates from 7 a.m. (0700) to 10 p.m. (2200) daily. LMT’s Class D airspace extends to 2,500 feet above ground level (AGL) and has a radius of 5.4 nautical miles (or approximately 6.2 statute miles). Class D airspace rules require aircraft to maintain positive radio contact with the ATCT at the airport when operating within the airspace. The airspace surrounding the airport shifts to uncontrolled airspace designated as Class G airspace when the tower is not in operation. The LMT Class D airspace is flanked to the southeast by the Goose Military Operations Area (MOA).

Air Traffic Control Tower

The airport's ATCT is an FAA facility that is staffed daily between the hours of 7 a.m. (0700) and 10 p.m. (2200). ATCT personnel are responsible for the movement of aircraft at the airport. The LMT ATCT is operated by the 173 FW, which adheres to all rules and regulations set forth by the federal government.

Runways

Table 2-2 describes the runway details utilized within this Noise Study. LMT has two runways with Runway 14/32, oriented northwest/southeast, and Runway 07/25, oriented east/west, as depicted in Figure 2-1. The majority of aircraft operations, including all DoD aircraft operations, occur along Runway 14/32, which is 10,302 feet long and 150 feet wide. Helicopters were modeled to arrive at runway ends before turning to head to their ramp to park. This Noise Study uses runway identifiers and facility status consistent with the modeled dataset used for the analysis. Current airport references may differ (e.g., Runway 08/26 redesignation and Runway 14 Instrument Landing System [ILS] status); these updates are noted for context and do not affect the modeling results.

Table 2-2 LMT Runway Details for Noise Modeling

Rwy[1]	*Start*	*End*	*Length*	*Width*	*Elevation*	*Displaced Threshold*	*Traffic Pattern*	*Instrument Approach*
07	42-09.379118N 121-44.555740W	42-09.372875N 121-43.392607W	5,258 ft	100 ft	4,091 ft	307 ft	Left	N/A
14	42-10.152295N 121-44.424328W	42-08.577477N 121-43.578923W	10,302 ft	150 ft	4,091 ft	N/A	Left	ILS[1]
25	42-09.372875N 121-43.392607W	42-09.379118N 121-44.555740W	5,258 ft	100 ft	4,090 ft	N/A	Left	N/A
32	42-08.577477N 121-43.578923W	42-10.152295N 121-44.424328W	10,302 ft	150 ft	4,095 ft	N/A	Left	ILS

Notes: [1]At the time of noise modeling, future plans included redesignation of Runway 07/25 to Runway 08/26 and adjustment of painted runway threshold end point locations. Since completion of the noise study, Runway 07/25 has been redesignated Runway 08/26, and the Runway 14 ILS became operational (February 2026). Table values reflect the modeled dataset used for analysis

Legend: Start and End in Degrees Minutes Latitude and Longitude; ft = feet; ILS=Instrument Landing System; LMT = Crater Lake-Klamath Regional Airport; N/A=Not Applicable; Rwy = Runway.

Source: AIRNAV 2024.

Aircraft Noise Modeling

The noise modeling was completed in accordance with DoD and FAA policies. The noise modeling information was developed iteratively with a team primarily made up of representatives from the installation's flying squadrons and air traffic controllers as well as the NGB. The team reviewed available LMT flight track data from the FAA's PDARS. Based on that review, FAA determined that the FAA's 2022 National Noise Inventory provided a better basis for deriving the civilian fleet mix of operations at LMT and provided that dataset for use in the noise analysis. A review of the 2019 PDARS data also identified the need to model flight tracks for civilian aircraft between Runways 14/32, flight tracks to the practice area southwest of the airfield, and closed pattern operations for all runways (FAA 2024b; LMT 2024).

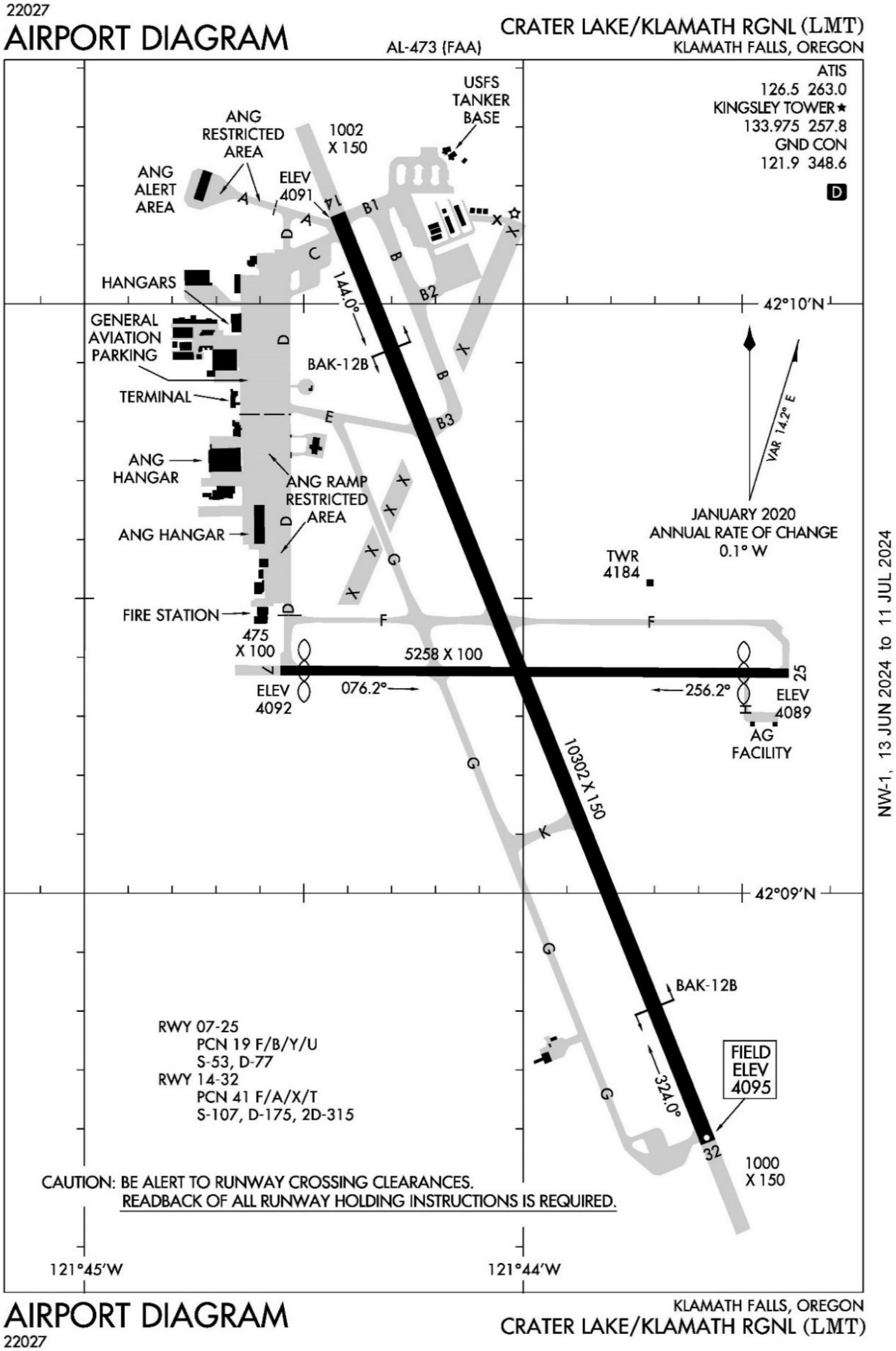


Figure 2-1 LMT Airport Layout

In accordance with DoD and FAA policies, the noise analysis used the Noisemap software suite and AEDT that relies upon modeled aircraft flight tracks (paths over the ground) and profiles, which include altitude, airspeed, power settings, and other flight conditions. The data was compiled in a data validation package, reviewed by the team, and approved for use by the NGB team prior to modeling (NGB 2024a). This data has been combined with the numbers of each type of operation by aircraft/track/profile, local climate, terrain surrounding the airfield, and similar data related to aircraft engine runs that occur at specific locations on the ground (e.g., pre- and post-flight and maintenance activities). Appendix A shows summary flight tracks, as well as representative flight profiles for the aircraft operations modeled. Because Advanced Acoustic Model (AAM) sound hemispheres are not available for the existing based F-15C/D, all military aircraft are modeled with NMAP to provide a consistent manner of analysis across alternatives in accordance with DoD standards (DoD 2022).

Noisemap's ability to account for the effects of sound propagation includes consideration of varying terrain elevation, taken from the U.S. Geological Survey (USGS) National Elevation Dataset (NED), and ground impedance conditions, taken from USGS Hydrography data. In this case, "soft ground" (e.g., grass-covered ground) is modeled with a flow resistivity of 225 kilopascal-seconds per square meter (kPa-s/m^2) and "hard ground" (in this case, water) is modeled with a flow resistivity of 100,000 kPa-s/m^2. For ambient temperature, humidity, and pressure, each month was assigned a temperature, relative humidity, and barometric pressure from data available for that month for the years 2018 through 2023. Noisemap then determined and used the month with the weather values that produced the median results in terms of noise propagation effect, which in this case was the month of March (with the values noted in Table 2-1). Modeling civil operations with AEDT software relied upon standard software weather conditions.

The results of the DoD's Noisemap and FAA's AEDT modeling were combined for all aircraft activity at the airport for Existing Conditions (2023), the No Action Alternative, and the Proposed Action three afterburner scenarios. The combined noise exposure is presented in terms of contours (i.e., which are lines of equal DNL value). DNL contours of 65 to 85 dB, presented in 5-dB increments, provide a graphical depiction of the aircraft noise environment at and adjacent to LMT. In addition to the DNL plots, specific noise sensitive locations (schools, hospitals, places of worship, and residential neighborhoods) have been identified in the surrounding communities referred to as representative Points of Interest (POIs). Table 2-3 and Figure 2-2 show the 26 selected representative POIs used for this study. Section 2.2 provides a discussion on the supplemental metric noise calculations performed for each POI.

2.1.2 Military Training Airspace

In the military training airspace environment, the Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}) serves as the primary noise metric, with predicted sound levels based on the month with the most aircraft activity in each military training airspace to account for the sporadic nature of operations. Under DNWG guidance, L_{dnmr} is the U.S. Government standard for modeling and predicting cumulative noise exposure in the military training airspace environment and for evaluating community noise exposure in that setting. L_{dnmr} is identical to the DNL except that an additional weighting is applied to account for the startle effect due to the quick increase in sound level created by aircraft operating at low altitudes and high rates of speed (over 400 knots). The weighting is based on how quickly the sound increases when heard by an observer on the ground, described as 'rise-time' rate, and ranges for 0 up to 11 dB. Thus, DNL will always be equal to or lower than L_{dnmr} but DNL is also presented for FAA impact consideration under FAA Order 1050.1G.

Table 2-3 POIs Adjacent to LMT

Map ID	*Point Type*	*Named POI*[1]
C-01	Census Tract Centroid	Census Tract 9719
C-02	Census Tract Centroid	Census Tract 9717
C-03	Census Tract Centroid	Census Tract 9718
C-04	Census Tract Centroid	Census Tract 9716
C-05	Census Tract Centroid	Census Tract 9712
C-06	Census Tract Centroid	Census Tract 9713
C-07	Census Tract Centroid	Census Tract 9714
H-01	Healthcare Facility	Sky Lakes Medical Center
R-01	Residential Area	Neighborhood
R-02	Residential Area	Anderson Avenue and Altamont Drive
R-03	Residential Area	Highland Way and Summit Street
R-04	Residential Area	Airway Drive and Homedale Road
R-05	Residential Area	Neighborhood
R-06	Residential Area	Neighborhood
R-07	Residential Area	Lombardy Lane and railroad tracks
R-08	Residential Area	Neighborhood
S-01	School	Oregon Institute of Tech
S-02	School	Klamath Family Head Start
S-03	School	Triad School
S-04	School	Mazama High School
S-05	School	Stearns Elementary School
S-06	School	Peterson Elementary
S-07	School	Klamath Community College
S-08	School	Brixner Jr High School
S-09	School	Hosanna Christian School
S-10	School	Henley High School

Notes: [1]The census tracts represent neighborhoods surrounding LMT where noise sensitive locations (such as residences, schools, places of worship, etc. are likely to occur).
Legend: ID = Identification; LMT = Crater Lake-Klamath Regional Airport; POI = Point of Interest.

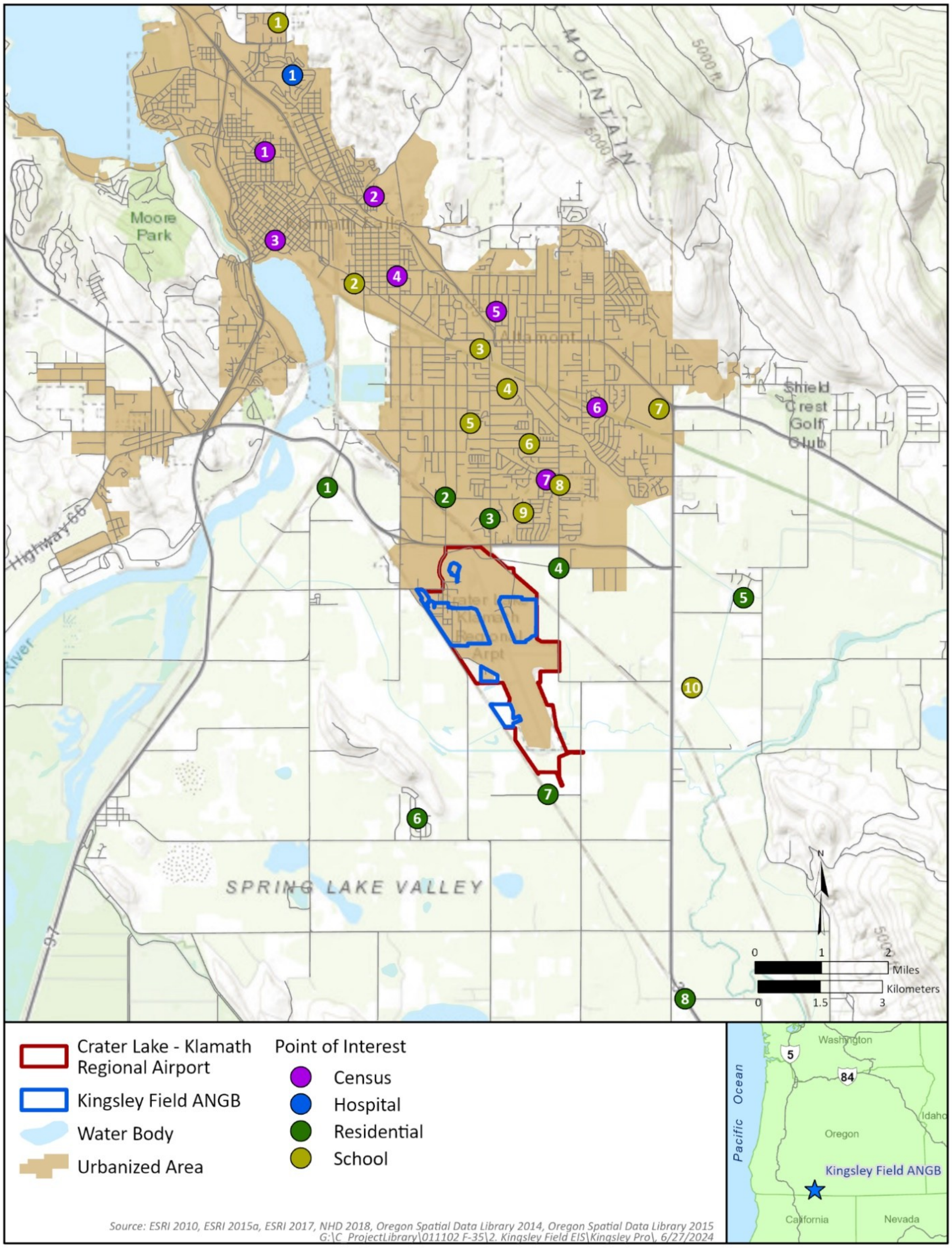


Figure 2-2 Representative POIs Adjacent to LMT

If military training airspace utilization varies substantially by month, a higher-use period may be used to characterize cumulative exposure. For this study, training activity for the existing F-15C/D and proposed F-35A scenarios is sufficiently distributed across the year such that average annual daily operations were used as the basis for the military training airspace noise analysis. Noise modeling in the military training airspace was conducted using conservative assumptions regarding location and profiles of overland training activity to characterize potential noise exposure in areas nearest noise-sensitive receptors. This approach provides a conservative estimate of the greatest L_{dnmr} that could occur within the military training airspace. L_{dnmr} for a typical year would be less because a portion of training would occur in overwater military training airspace, where there would be no noise impacts to humans. Both the rise-time weighting and potential busy month modeling of operations applicable to L_{dnmr} result in calculated L_{dnmr} that will always be equal to or greater than DNL for the same activity.

Using the MRNMap model contained in the Noisemap software suite, noise modeling requires determining the use of each military training airspace and building each aircraft's flight profiles based on the aircraft's configuration (airspeed and power setting) and the amount of time spent at various altitudes throughout. The modeling details for operation within the overland military training airspace (altitude distributions, speeds, and power settings) was developed iteratively with a team primarily made up of representatives from LMT, the 173 FW, as well representatives from the NGB. The data, including the validation package, were reviewed by LMT, 173 FW, NGB, and FAA prior to modeling to ensure that the data met the necessary standards for use in the noise study (NGB 2024a). The ambient temperature, humidity, and pressure were assumed to be the same as at the airfield (see Table 2-1).

The software program, BOOMAP2021, provides a method to estimate CDNL generated by supersonic flight operations in the military training airspace based upon empirical data. This version of the software allows the user to select or create boundaries for the analysis, identify the average ground height underneath the military training airspace, and input the supersonic operations as individual mission types and aircraft name pairs with user defined speeds and durations (Blue Ridge Research and Consulting 2021).

2.2 ADDITIONAL (SUPPLEMENTAL) NOISE METRICS

While a cumulative metric such as DNL is appropriate for characterizing the overall noise environment at airfields (and the equivalent [L_{dnmr}] in the military training airspace), a complete characterization of noise exposure at noise sensitive locations requires additional metrics. The DoD expands upon DNL with the following supplemental metrics described in the DNWG guidelines (DNWG 2009a):

- A measure of the greatest sound level generated by single aircraft events: Maximum Sound Level (L_{max})
- A combination of the sound level and duration: Sound Exposure Level (SEL)
- Number of Events at or above a specified threshold (NA)
- Equivalent Sound Level (L_{eq})
- Time Above a specified level (TA)
- Probability of Awakening (PA)

NA, TA, and L_{eq} use a specified period of time that can include an average 24-hour day, DNL daytime, DNL nighttime, school day, or other time period appropriate for the analysis. Details on the use of these supplemental metrics in this study are described in the following sections.

2.2.1 Maximum Sound Level

The highest A-weighted sound level measured during a single event in which the sound changes with time is called the maximum A-weighted sound level or L_{max}. L_{max} is the maximum level that occurs over one-eighth of a second and denoted as "fast" response on a sound level meter (American National Standards Institute [ANSI] 1988). L_{max} is used in this study for the calculation of numbers of events above, as described in Section 2.2.5 and 2.2.6, and to compare single-event noise levels between different aircraft types in Section 4.2.2. Although useful in determining when a noise event may interfere with conversation, TV or radio listening, or other common activities, L_{max} does not fully describe the noise because it does not account for how long the sound is heard.

2.2.2 Sound Exposure Level

SEL combines both the intensity of a sound and its duration by providing the sound level that would contain the same sound energy of an event if occurring over a 1 second period. This means that SEL does not represent a sound level that is heard directly at any given time. However, SEL provides a much better metric for comparison of aircraft flyovers than L_{max} because it allows normalization of disparate events to their 1 second energy average. SEL values are larger than those for L_{max} for the same event because aircraft noise events last more than a few seconds. Section 4.2.2 provides single-event SEL comparisons across different aircraft while operating in the military training airspace.

2.2.3 Equivalent Sound Level

The L_{eq} is a "cumulative" metric that combines a series of noise events over a period of time by averaging the sound energy. The time period specified for L_{eq} is typically provided along with the value and relates to a type of activity and presented in parentheses (e.g., $L_{eq(24)}$ for 24 hours). An $L_{eq(8)}$ is used in this study to represent a typical school day occurring from 7 a.m. (0700) to 3 p.m. (1500).

2.2.4 Potential for Hearing Loss

People exposed to high noise environments over a long period of time are at an increased risk of experiencing permanent hearing loss. Hearing loss is generally interpreted as a decrease in the ear's sensitivity to perceived sound, which can be either temporary or permanent. Various governmental organizations, including the Occupational Safety and Health Administration, have identified noise thresholds varying from 70 to 85 dB L_{eq} to protect workers with the exposure assumption of 40 hours per week over a 40-year work lifetime.

Exposure to noise for people residing in areas adjacent to airfields is quite different from a work environment. When people are indoors, the sound levels experienced decrease due to building attenuation. Additionally, when people spend time away from home, the exposure to noise from the airfield in question is removed so the Occupational Safety and Health Administration standards would tend to overpredict the hearing loss risk. By definition, DNL is equal to or greater than L_{eq}, so the DoD selected a screening threshold of DNL 80 dB of residences to ensure a conservative approach to assessing the potential for hearing loss (DNWG 2012). If residences are identified within the DNL 80 dB, or greater, additional analysis of L_{eq} should be performed.

Noise induced permanent threshold shift (NIPTS) is estimated as an average over all people exposed to a noise. The actual value of NIPTS for any given person will depend on their physical sensitivity to noise where some will experience more hearing loss than others. The U.S. Environmental Protection Agency (EPA) Guidelines provide information on this variation in sensitivity in the form of the NIPTS exceeded by 10 percent of the population, as documented in DNWG 2012. For example, individuals exposed to 80 dB $L_{eq(24hr)}$, the most sensitive of the population, would be expected to show a degradation to their hearing of 7 dB over time while an average individual would experience a degradation of 3 dB. To put these numbers into perspective, changes in hearing level of less than 5 dB are generally not considered noticeable or significant. Furthermore, there is no known evidence that a NIPTS of 5 dB is perceptible or has any practical significance for the individual. Lastly, the variability in audiometric testing is generally assumed to be ±5 dB (EPA 1974).

2.2.5 Non-School Speech Interference

Aircraft noise events can disrupt activities like conversation or watching television when indoor L_{max} exceeds 50 dB because word intelligibility decreases at that level (DNWG 2013a). This study determines the number of potential speech interfering events at non-school POIs (such as residential or hospital) during a 15-hour day (from 7 a.m. [0700] until 10 p.m. [2200]) and presents the average hourly number of events as NA.

2.2.6 Classroom Learning Interference

A noisy environment can adversely affect and interfere with classroom learning. Various governmental organizations have identified both L_{eq} and number of interfering events as suitable criteria for classroom impacts. Consistent with DoD recommendations, this study used an exterior L_{eq} of 60 dB (equivalent to 45 dB interior L_{eq} with windows open) as a screening criteria to determine schools at risk of classroom learning effects (DNWG 2009a). Locations that exceed this threshold have been further analyzed by counting the number of events per hour above an interior L_{max} of 50 dB, which equates to the highest permissible classroom level for speech intelligibility. The standard noise level reduction due to building attenuation of 15 dB for windows open and 25 dB for windows closed have been utilized to convert between exterior and interior sound levels. The duration, in minutes, that interior sound levels would exceed 50 dB has also been computed to provide an assessment of the relative time per day that students and teachers may be impacted.

2.2.7 Residential Sleep Disturbance

2.2.7.1 Background

Sleep disturbance can be caused by excessive noise, which can hinder people's ability to fall asleep or cause people to wake from sleep. A method for calculation of the PA from at least one event per night is described in ANSI/Acoustical Society of America (ASA) S12.9-2008/Part 6. The standard utilizes the estimated interior SEL caused by aircraft events along with the number of occurrences per night to calculate the PA from that event. The resulting PA estimates the percentage of the population that would be awakened at least once per night under the noise conditions assessed. For instance, 1 percent PA estimates that 1 percent of the population would be awakened. Multiple events can be combined to determine the PA for all events during a single night. ANSI recommends that only nighttime events occurring during the DNL nighttime with SELs between 50 and 100 dB should be used for this PA calculation. Data suggests that events below 50 dB do not contribute significantly to PA and the formula under-predicts PA for events over 100 dB. The DNWG for environmental impact analysis has endorsed this ANSI/ASA 2008 methodology (DNWG 2009b).

In addition to the ANSI/ASA 2008 methodology, the DNWG guidance identifies outdoor numbers of events (commonly abbreviated as NA) above an SEL of 90 dB as an additional criterion for sleep disturbance analysis:

> *Currently, there are no established criteria for evaluating sleep disturbance from aircraft noise, although recent studies have suggested a benchmark of an outdoor SEL of 90 dB as an appropriate tentative criterion when comparing the effects of different operational alternatives. The corresponding indoor SEL would be approximately 25 dB lower (at 65 dB) with doors and windows closed, and approximately 15 dB lower (at 75 dB) with doors or windows open.*

As described in DNWG (2009b), comparison of exterior number of events above 90 dB SEL across multiple study scenarios allows for sleep disturbance impacts to be considered. This does make use of the same PA formula identified in ANSI/ASA 2008 but groups all events as either equal to 90 dB exterior SEL or below the threshold for consideration.

As of July 2018, the ANSI and ASA have withdrawn the 2008 standard, which formed the basis of much of the DNWG 2009b guidance:

> *The decision of Working Group S12/WG 15 to withdraw ANSI/ASA S12.9-2008/Part 6 implies that the method for calculating "at least one behavioral awakening per night" contained in the former Standard should no longer be relied upon for environmental impact assessment purposes. The Working Group believes that continued reliance on the 2008 Standard would lead to unreliable and difficult-to-interpret predictions of transportation-noise-induced sleep disturbance (ANSI/ASA 2018).*

Without a reliable and standardized method to compute PA, or updated guidance from DNWG, this study presents the sleep impact analysis utilizing the previous standard (ANSI/ASA 2008; DNWG 2009b) for environmental impact disclosure purposes. The reader is cautioned that the PA metric provides only a crude estimate because it cannot truly account for all variables that could affect a person's sleep. A comparison of the Existing Conditions (2023) and various Proposed Action scenario awakening percentages showing large changes to PA could provide some insight on whether a particular action would be likely to increase or decrease sleep impacts. However, any additional conclusions may not be supportable.

2.3 IMPACT METHODOLOGY

Analysis methodologies differ across governmental agencies due to differing activities and requirements applicable to each agency when determining the potential for significant impacts. Table 2-4 presents a summary of the DoD and FAA standards, which includes prescribed software models, noise metrics, and significance determination. As discussed in Section 2.1 this analysis uses the DoD NOISEMAP suite of computer programs to model military and U.S. Forest Service (USFS) aircraft and AEDT for civil aircraft to comply with both DoD and FAA requirements. Although USFS aircraft are not military aircraft, after a review by operators, the profiles and operations were determined to be accurate so modeling with NOISEMAP was maintained in this analysis to be consistent with prior noise studies at LMT.

Table 2-4 Summary of DoD and FAA Noise Analysis Standard Methodologies

Category	*Analysis Type*	*DoD*	*FAA*
Software	Airfield	NMAP, RNM, AAM (part of the NOISEMAP Suite of programs)[1,2]	AEDT[3,4]
	Military Training Airspace	MR_NMAP (Part of the NOISEMAP Suite of programs)[1] BOOMAP96 (for supersonic operations)	AEDT, but recognizes the DoD's MRNMAP and BOOMAP96 model[3,4]
Primary Noise Metric	Airfield	DNL	DNL
	Military Training Airspace	L_{dnmr}	
Supplemental Noise Metrics	Terminology	Representative POIs[5]	Noise Sensitive Area[4]
	Classroom Learning Interference	$L_{eq(8hr)}$ 60 dB for screening; NA65 and TA65 for impacts during school hours (corresponding to interior L_{max} of 60 dB)[5]	DNL is the recommended metric. DNL analysis may optionally be supplemented on a case-by-case basis with prior permission from FAA[4]
	Speech Interference (Average Day)	NA65 for windows open and NA75 for windows closed[5]	
	Sleep Disturbance	Probability of awakening utilizing ANSI S12.9-2008. Formally withdrawn by ANSI/ASA in 2018 but still used for disclosure purposes until better methodology is developed[6]	
	Potential for Hearing Loss	Report the number of people living within each 1 dB $L_{eq(24)}$ contour band inside of the 80 DNL contour[7]	
Significance Criteria	Near an Airfield	Evaluating context and intensity of impacts through off-base acreage population and household affected by each DNL contour	DNL Noise exposure contours at least 65, 70, and 75 dB and shall identify noise increases of DNL 1.5 dB or more over noise sensitive areas that are exposed to noise at or above the DNL 65 dB noise exposure level, or that would be exposed at or above the DNL 65 dB level due to a 1.5 dB or greater increase[4] • The number of people residing within each noise contour at or above DNL 65 dB and the net change. • The location and number of noise sensitive uses in addition to residences (e.g., schools, hospitals, parks, recreation areas) exposed to DNL 65 dB or greater. • The identification of noise sensitive areas exposed to aircraft noise above DNL 60 dB but below DNL 65 dB and projected to experience an increase of DNL 3 dB or more, only when DNL 1.5 dB increases are

Category	*Analysis Type*	*DoD*	*FAA*
			documented within the DNL 65 dB contour. • Discussion of the noise impact on noise sensitive areas within the DNL 65 dB contour. • Maps and other means to depict land uses within the noise study area.
	Under Military Training Airspace	Context and Intensity determination based on primary metrics 65 dB noise contours (L_{dnmr}) and supplemental metric levels (SEL and L_{max}), as appropriate	Change-of-exposure tables and maps at population centers to identify where noise will change by the following specified amounts[4]: • For DNL 65 dB and higher: + DNL 1.5 dB • For DNL 60 dB to <65 dB: + DNL 3 dB ("reportable") • For DNL 45 dB to <60 dB: + DNL 5 dB ("reportable")

Notes: [1]DoD Instruction 4715.13. DoD Operational Noise Program. January 28.
[2]Deputy Assistant Secretary of Defense 2022. Helicopter modeling for NAS JRB New Orleans occurred prior to the AAM software release, so the helicopter portion of the analysis utilized the Rotary Noise Model (RNM).
[3]FAA Memorandum. Guidance on determining which version of the AEDT to use for FAA actions and studies. September 27.
[4]FAA 1050.1G, FAA National Environmental Policy Act Implementing Procedures. 30 June 2025.
[5]DNWG 2009a. Using Supplemental Noise Metrics and Analysis Tools. December.
[6]DNWG 2009b. Sleep Disturbance from Aviation Noise. December.
[7]DNWG 2013. Noise-Induced Hearing Impairment. December.

Legend: AEDT = Aviation Environmental Design Tool; ANSI = American National Standards Institute; ASA = Acoustical Society of America; dB = decibel; DNL = Day-Night Average Sound Level; DNWG = Defense Noise Working Group; DoD = Department of Defense; EIS = Environmental Impact Statement; FAA = Federal Aviation Administration; L_{dnmr} = Onset-Rate Adjusted Day-Night Average Sound Level; $L_{eq(24)}$ = 24-hour Equivalent Sound Level; $L_{eq(8hr)}$ = 8-hour Equivalent Sound Level; L_{max} = Maximum Sound Level; NA = Number of Events Above; POI = Point of Interest; TA = Time Above.

3.0 EXISTING CONDITIONS (2023)

The following subsections detail the modeling data and the resultant noise exposure for the Existing Conditions (2023) at the airfield as well as within the military training airspace associated with 173 FW operations.

3.1 INSTALLATION/AIRPORT

3.1.1 Modeling Data

3.1.1.1 173d FIGHTER WING

The 173 FW historically served as an FTU for F-15C/D pilots with an annual target of 55 pilots per year. However, due to aging aircraft and associated maintenance limitations, the 173 FW generated fewer operations in recent years. For Existing Conditions (2023) noise modeling, Fiscal Year 2023 airfield activity was based on a reduced training pattern of 8 aircraft for the first launch and 6 aircraft for the second launch each day (14 sorties per day). Using 260 weekdays per year and accounting for holidays and weather, this results in 3,360 annual sorties, as detailed in Table 3-1. Each sortie generates one departure, one arrival, and an average of one closed pattern event at Kingsley Field ANGB. Because closed pattern events count as two tower operations, the modeled F-15C/D activity results in 13,440 annual airfield operations (Table 3-1).

Table 3-1 Annual Airfield Operations at LMT/Kingsley Field ANGB (Existing Conditions [2023])

Aircraft	*Departures*		*Arrivals*		*Closed Patterns Ops*[2]		*Total*		*Total*
	Day	*Night*	*Day*	*Night*	*Day*	*Night*	*Day*	*Night*	
F-15C/D	3,360	0	3,260	100	6,520	200	13,140	300	13,440
Contract ADAIR	800	0	776	24	160	0	1,736	24	1,760
Civil[1]	9,102	165	9,101	165	5,664	0	23,867	330	24,197
Transients	815	0	815	0	8	0	1,638	0	1,638
Total	**14,077**	**165**	**13,952**	**289**	**12,352**	**200**	**40,381**	**654**	**41,035**

Notes: [1]Civil operations represent the combined annual runway operations of Air Carrier, Air Transport, and General Aviation.
[2]A portion of Local civil aircraft operations modeled as departures/arrivals because a significant portion of local GA flights involve departures and arrivals to the nearby practice area, in addition to touch and go pattern operations.
Legend: ADAIR = Adversary Air; ANGB = Air National Guard Base; LMT = Crater Lake-Klamath Regional Airport; Ops = operations.
Sources: FAA 2024b; NGB 2024b; DAF 2020.

The day and night periods in Table 3-1 refer to specific acoustic periods used for DNL-based airfield noise analysis and correspond to 7 a.m.–10 p.m. (0700–2200) for daytime and 10 p.m.–7 a.m. (2200–0700) for nighttime.

3.1.1.2 Adversary Air

As covered in the 2020 Adversary Air (ADAIR) EA, a private contractor began providing adversary training sorties beginning in 2021 utilizing the F-5E/F aircraft (DAF 2020). Although the ADAIR EA analyzed up to 2,000 annual sorties, the current contract provides for 800 sorties per year resulting in 1,760 annual operations at LMT/Kingsley Field ANGB. The current ADAIR contract is up for renewal, so the number of annual operations and/or the adversary aircraft type could change, which could potentially become F-16, A-3K, Mirage F-1, L-159, or similar. At the time of this analysis, no such details were available, so this analysis assumed that the F-5E/F would continue at the current level of operations for the foreseeable future under the No Action Alternative.

3.1.1.3 Transient Military and Other Agency

Table 3-2 details the transient military and USFS aircraft operations totaling 1,638 per year based upon the 2020 EA (DAF 2020) with applicable updates. Large force exercises, such as Sentry Eagle, and USFS operations are anticipated to continue for the foreseeable future, so these operations have been modeled at the same annual rate carried forward for Existing Conditions (2023), the No Action Alternative, and the Proposed Action to be fully implemented in 2029. However, the ratio of aircraft types participating in Sentry Eagle has since changed due to changes in the fighter aircraft mix resulting in an increase in F-35A aircraft across military services and a smaller proportion of F-15 and F-16 aircraft from the 2020 EA. The F-35A operations listed in Table 3-2 reflect transient activities and are not part of the permanent F-35A beddown under the Proposed Action. The proposed F-35A operations, including the beddown of up to 24 aircraft, would be part of the 173 FW's primary mission and would not include transient F-35A operations as reflected here. Table 3-2 also includes the addition of four annual C-17 operations, not part of the 2020 operations.

Table 3-2 Transient Military and USFS Operations at LMT/Kingsley Field ANGB

Category	*Aircraft Type*	*Total*
Sentry Eagle Exercises	KC-135R	52
	F-15	160
	F-16	160
	F-35A	346
	F-18	318
Other Transient Military	A-10	4
	C-12	12
	C-17	8
	C-130J	8
	F-15	6
	F-16	4
	F-18	46
	T-38	10
	T-6	4
	Helos	168
USFS	Tankers (MD-83 and C-130)	332
Total		1,638

Legend: ANGB = Air National Guard Base; LMT = Crater Lake-Klamath Regional Airport; USFS = United States Forest Service.
Source: Initially from DAF ADAIR EA 2020 with updated fleet mix for Sentry Eagle exercise and addition of C-17 operations.

3.1.1.4 Civil Aircraft

The FAA TAF contains historical and forecast data for enplanements, airport operations, Terminal Radar Approach Control (TRACON) operations; and based aircraft at FAA towered airports, FAA contract tower airports, TRACON facilities, and non-FAA airports. Table 3-3 details the FAA TAF version 2023 issued in January 2024 that detailed annual operations by calendar year where 2023 corresponds with the Existing Conditions (2023), the No Action Alternative, and Proposed Action.

Table 3-3 FAA Terminal Area Forecast at LMT by Calendar Year

Category	*2023*	*2024*	*2025*	*2026*	*2027*	*2028*	*2029*
ITN_AC	4	4	4	4	4	4	4
ITN_AT	2,503	2,528	2,553	2,579	2,605	2,631	2,657
ATN_GA	10,400	11,652	11,710	11,769	11,828	11,888	11,947
LOC_GA	11,290	11,324	11,358	11,392	11,426	11,460	11,494
Total Civil	*24,197*	*25,508*	*25,625*	*25,744*	*25,863*	*25,983*	*26,102*
_ITN_MIL	7,296	7,296	7,296	7,296	7,296	7,296	7,296
LOC_MIL	3,834	3,834	3,834	3,834	3,834	3,834	3,834
Total Military	*11,130*	*11,130*	*11,130*	*11,130*	*11,130*	*11,130*	*11,130*
Total Ops	**35,327**	**36,638**	**36,755**	**36,874**	**36,993**	**37,113**	**37,232**

Legend: AC = Air Carrier; AT = Air Taxi; GA = General Aviation; ITN = Itinerant; LMT = Crater Lake-Klamath Regional Airport; LOC = Local; MIL = Military; Ops = Operations.
Source: FAA 2024b.

Although local civil aircraft operations generally conduct a large portion of their operations as visual closed patterns at LMT, significant numbers of local civil aircraft (primarily small propeller aircraft) operating at

LMT also train in the nearby designated practice area, as confirmed by LMT airfield staff (NGB 2024a). Therefore, of the 11,290 local civil aviation operations, approximately half (5,626 operations) are proportioned to departure/arrival operations (which fly to the practice area or within the local airspace) with the remaining (5,664 operations) modeled as local closed patterns at the LMT.

To determine the civil aircraft fleet mix, this data collection effort reviewed a year of LMT PDARS obtained from the FAA in 2021 as part of a prior effort initially considering basing F-15EX at LMT/Kingsley Field ANGB, but was subsequently canceled. This data returned approximately 88 percent of the runway events without a known aircraft type. With most aircraft types of the PDARS dataset "unknown," this information would be inaccurate as a basis for fleet mix development. FAA provided a recommended fleet mix based upon the 2022 National Noise Inventory, which is presented in Appendix A (FAA 2024c). The most common modeled civil aircraft types include the CNA208 (representing Cessna 208 Caravan and similar), DHC6 (representing DeHavilland DHC-6-300 Twin Otter and similar), and 1900D (representing Raytheon Beech 1900-C/D, BAE Jetstream 1, and BAE Jetstream 200 Series). Additional details on the modeled fleet mix are provided in Table A-1 of the appendix. Civil aircraft were modeled with the latest FAA AEDT software while military aircraft were modeled with the DoD Noisemap. Detailed annual civil aircraft operations with modeled fleet mix is presented in Appendix A.

Based upon a review of the 2019 PDARS data and coordination with both the LMT manager and FAA, this analysis updated civil aircraft modeled flight tracks to include tracks between Runways 14/32 and the practice area southwest of the airfield, as well as modeling closed pattern flight tracks on all four runways for general aviation aircraft types (FAA 2024a; LMT 2024). Specifically, the predominance of flights to and from the practice area comprise local small propeller general aviation aircraft, as summarized in Table A-5 in Appendix A. Table A-3 in Appendix A details the resulting modeled runway utilization percentages for civil aircraft, which separates the small propeller general aviation from other civil (air carrier, air taxi, and other general aviation). Modeled annual civil aircraft flight operations utilized the 2023 TAF (FAA 2024b).

3.1.1.5 Military Aircraft Operation Type Breakdown

The use of afterburner power depends upon the aircraft loading and weather conditions with heavy loadings and hot weather necessitating afterburner from brake release until approximately the end of the runway after liftoff for both the No Action Alternative and the Proposed Action scenarios. Existing Conditions (2023) reflect approximately 50 percent of F-15C/D departures utilizing afterburner and 50 percent with military power. All F-5E/F departures use afterburner from brake release until the end of the runway.

- F-15C/D Departures = 50 percent afterburner, 50 percent Mil
- F-5E/F Departures = 100 percent afterburner

Both the F-15C/D and F-5E/F return to LMT/Kingsley Field ANGB using the same general procedures with clear blue skies allowing the most Visual Flight Rules (VFR) arrivals utilizing the Tactical 90 approach and instrument meteorological conditions requiring Instrument Flight Rules (IFR) (either Instrument Landing System [ILS] or Tactical Air Navigation System [TACAN]).

Table 3-4 Arrival Breakdown for F-15C/D and F-5E/F for All Scenarios

VFR	75%	TAC 90	70%
		Initial	30%
IFR	25%	ILS	50%
		TACAN	50%

Legend: % = percent; IFR = Instrument Flight Rules; ILS = Instrument Landing System; TACAN = Tactical Air Navigation System; VFR = Visual Flight Rules.

Closed patterns generally include both VFR and IFR. However, the use of IFR closed patterns at LMT/Kingsley Field ANGB are minimal to rare and the loudest portions (when aircraft are at low altitudes) coincide with the departure and arrival flight tracks already capturing that portion of flight activity. Therefore, the modeling of rare IFR pattern ops was accomplished utilizing other tracks and profiles, such as VFR. VFR patterns primarily occur to the west for both F-15C/D and F-5E/F.

- VFR West = 80 percent
- VFR East = 20 percent
- IFR = rare, not modeled

Based and transient military aircraft utilize the longer Runway 14/32 while avoiding the shorter Runway 07/25. Table A-3 in Appendix A details the modeled runway utilization percentages for military aircraft and Table A-4 presents the modeled military flight track utilization.

3.1.1.6 Maintenance and Ground Run-up Operations

This section provides the existing ground run-up operations as listed in Table 3-5. No civil aircraft maintenance operations were modeled due to rarity and lack of sufficient maintenance records to support such modeling.

The commercial ADAIR contractor (TacAir) performs F-5E/F maintenance offsite but occasionally performs high power runs on the runway. Due to the rarity of occurrence and the co-location of F-5E/F engine runs with all aircraft departures on the runway, these maintenance operations do not need to be modeled for noise due to their negligible contribution.

3.1.2 Noise Exposure

Sections 3.1.2.1 through 3.1.2.6 focus on DoD best practices for impact analysis, as summarized in DNWG guidance (DNWG 2009a). The existing DNL contours, DNL at noise sensitive locations (the FAA terminology corresponding generally to DoD POIs), acreage, population, and household affected by DNL also apply to FAA.

Table 3-5 F-15C/D Maintenance Runups at LMT/Kingsley Field ANGB

Aircraft	*Profile*	*Description*	*Pad*	*Heading*	*Power (%NC)*	*Num Engines*	*Duration (minutes)*	*Annual Day Events*	*Annual Night Events*	*Annual Total Events*
F-15C/D (modeled with F-15E PW220)	Engine Check	2 Engines	Building 400	107.5	63	2	30	13	5	18
	Engine Check	2 Engines	Building 400	107.5	80	2	1	13	5	18
	HH	Hush House Engine Runs	HH	62	63	1	113	6		6
	HH	Hush House Engine Runs	HH	62	80	1	30	6		6
	HH	Hush House Engine Runs	HH	62	90	1	40	6		6
	HH	Hush House Engine Runs	HH	62	92	1	8	6		6
	Engine Check Apron A	2 Engines	MAIN APRNa	45	63	2	9	19		19
	Engine Check Apron A	2 Engines	MAIN APRNa	45	80	2	1	19		19
	Pre Flight Apron A	2 Engines	MAIN APRNa	45	63	2	30	1207		1,207
	Single Engine Check Apron A	1 Engine	MAIN APRNa	45	63	1	23	139		139
	Single Engine Check Apron A	1 Engine	MAIN APRNa	45	80	1	2	139		139
	Engine Check Apron B	2 Engines	MAIN APRNb	315	63	2	9	19		19
	Engine Check Apron B	2 Engines	MAIN APRNb	315	80	2	1	19		19
	Pre Flight Apron B	2 Engines	MAIN APRNb	315	63	2	30	1207		1,207
	Single Engine Check Apron B	1 Engine	MAIN APRNb	315	63	1	23	139		139
	Single Engine Check Apron B	1 Engine	MAIN APRNb	315	80	1	2	139		139
	Trim North		TRIM N	338	63	2	25	2		2
	Trim North		TRIM N	338	80	2	8	2		2
	Trim North		TRIM N	338	90	2	17	2		2
	Trim North		TRIM N	338	90	2	6	2		2
	Trim South		TRIM S	158	63	2	25	2		2
	Trim South		TRIM S	158	80	2	8	2		2
	Trim South		TRIM S	158	90	2	17	2		2
	Trim South		TRIM S	158	90	2	6	2		2

Legend: %NC = percent speed of the compressor; ANGB = Air National Guard Base; HH = Hush House; LMT = Crater Lake-Klamath Regional Airport.

3.1.2.1 Day-Night Average Sound Level Contours and Point of Interest Levels

Figure 3-1 shows the DNL noise contours from 65 to 85 dB in 5-dB increments for the Existing Conditions (2023) at LMT overlaid on gradient mapping of DNL by color shading. Noise generated from aircraft operations at LMT occurs within and outside the airfield. Portions of the DNL 65 dB contour extend north of the airfield by 1.8 miles, to the east and to the west 0.3 mile, and to the south 1.6 miles. The gradient shading shows how DNL noise exposure does not end at the plotted DNL 65 dB contour line, but instead continues beyond at reduced levels plotted down to DNL 55 dB that roughly corresponds to a level typical of a suburban environment.

Table 3-6 shows the DNL values at each of the POIs under the Existing Conditions (2023). Values range from DNL 45 to 74 dB. Three residential POIs (R02 Anderson Avenue and Altamont Drive, R03 Highland Way and Summit Street, and R07 Lombardy Lane and railroad tracks) are exposed to DNL 65 dB or greater, which is the level that DoD land use recommendations for noise sensitive land uses begin (DoD Instruction 2021).

3.1.2.2 Acreage, Housing, and Population

Table 3-7 shows the acreage breakdown (excluding water bodies) within each noise contour band, with a total of 2,789 acres adjacent to LMT exposed to DNL 65 dB or greater for Existing Conditions (2023). That acreage includes 1,950 acres exposed to DNL 65 to 70 dB, 679 acres to DNL 70 to 75 dB, 154 acres to DNL 75 to 80 dB, and 5 acres to DNL 80 to 85 dB. No areas adjacent to LMT are exposed to DNL greater than 85 dB under the Existing Conditions (2023).

The population and household analysis utilized the 2022 U.S. Census American Community Survey to obtain the population in each census block (U.S. Census Bureau 2022a, 2022b). The full population is included when the entire census block group falls completely within each DNL contour band. For block groups partially within a DNL contour band the number of households and population were scaled based upon the proportion of block group area within each DNL contour band from 65 to 80 dB because households in these areas are generally equally distributed throughout each block group. Households are counted manually for DNL bands of 80 dB and above because populations in these high noise areas are often not evenly distributed and DNL 80 dB is the threshold to screen for the potential for hearing loss analysis.

Table 3-8 lists estimated households and population adjacent to LMT that are exposed to each DNL contour band under Existing Conditions (2023). Under Existing Conditions (2023), an estimated 746 households and 1,851 people are within the DNL 65 to 70 dB contour band, 336 households and 834 people within the DNL 70 to 75 dB, and 106 households and 262 people within the DNL 75 to 80 dB. A review of aerial imagery confirmed that no households exist within the DNL 80 to 85 dB band as these areas are undeveloped.

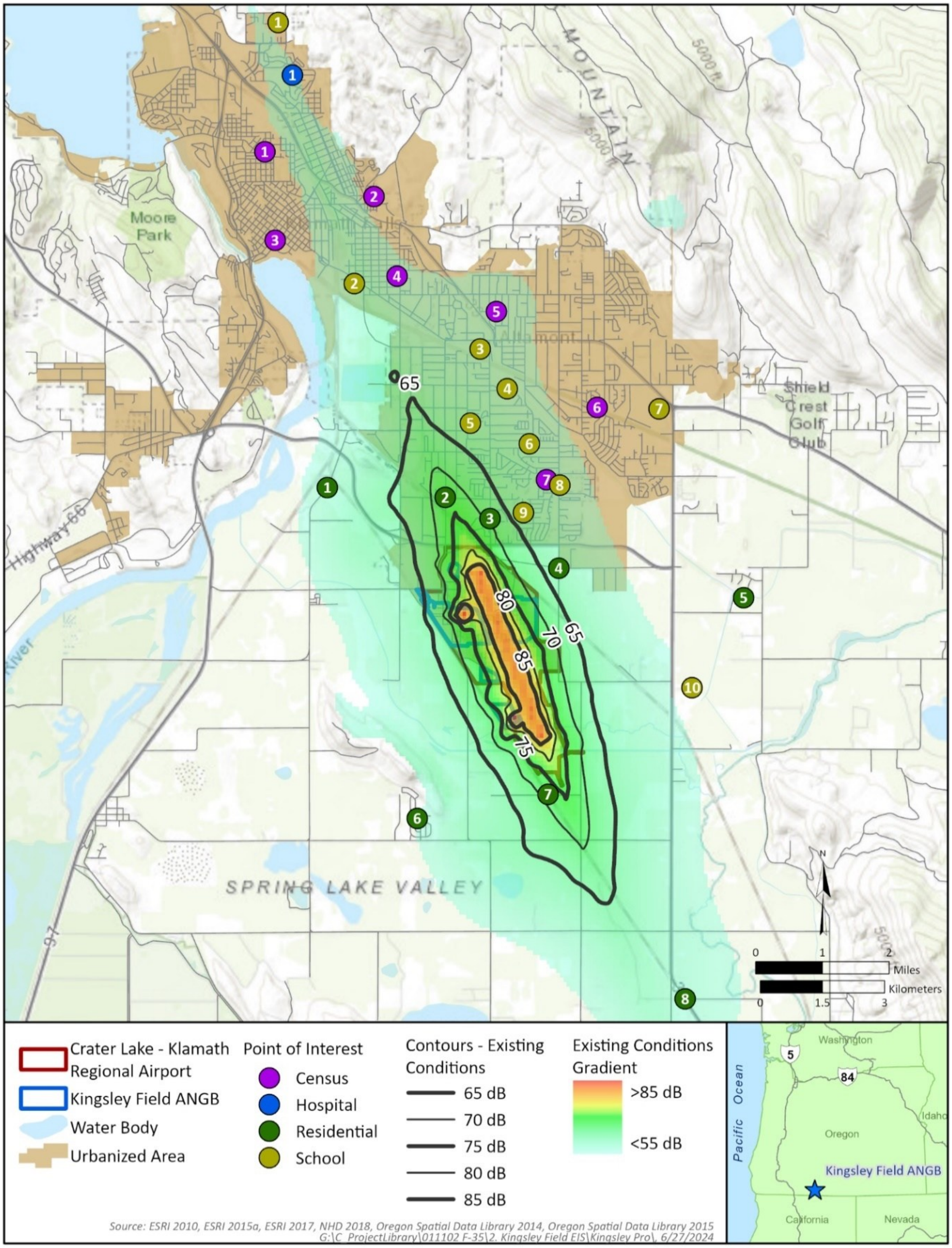


Figure 3-1 Existing Conditions (2023) DNL Contours and Noise Gradients on and Adjacent to LMT

Table 3-6 Existing Conditions (2023) at POIs Noise Exposure Adjacent to LMT

Map ID	*Point Type*	*Named POI*[1]	*DNL*[2] *(dB)*
C01	Census Tract Centroid	Census Tract 9719	52
C02	Census Tract Centroid	Census Tract 9717	54
C03	Census Tract Centroid	Census Tract 9718	52
C04	Census Tract Centroid	Census Tract 9716	56
C05	Census Tract Centroid	Census Tract 9712	56
C06	Census Tract Centroid	Census Tract 9713	52
C07	Census Tract Centroid	Census Tract 9714	60
H01	Healthcare Facility	Sky Lakes Medical Center	56
R01	Residential Area	Neighborhood	58
R02	Residential Area	Anderson Avenue and Altamont Drive	**74**[2]
R03	Residential Area	Highland Way and Summit Street	**69**[2]
R04	Residential Area	Airway Drive and Homedale Road	62
R05	Residential Area	Neighborhood	47
R06	Residential Area	Neighborhood	55
R07	Residential Area	Lombardy Lane and railroad tracks	**72**[2]
R08	Residential Area	Neighborhood	58
S01	School	Oregon Institute of Tech	54
S02	School	Klamath Family Head Start	60
S03	School	Triad School	58
S04	School	Mazama High School	58
S05	School	Stearns Elementary School	62
S06	School	Peterson Elementary	59
S07	School	Klamath Community College	48
S08	School	Brixner Jr High School	59
S09	School	Hosanna Christian School	63
S10	School	Henley High School	53

Notes: [1]The census tracts represent neighborhoods surrounding LMT where noise sensitive locations (such as residences, schools, places of worship, etc.) are likely to occur.
[2]Bold represents points exposed to DNL of 65 dB or greater.
Legend: dB = decibel; DNL = Day-Night Average Sound Level; ID = Identification; LMT = Crater Lake-Klamath Regional Airport; POI = Point of Interest.

Table 3-7 LMT Existing Conditions (2023) – Noise Exposure Acreage

DNL Band (dB)	*Existing Conditions (2023) Acreage*		
	On LMT	*Adjacent to LMT*	*Total*
65–70	84	1,950	2,034
70–75	266	679	945
75–80	335	154	490
80–85	237	5	242
85+	321	0	321
Total >65dB	1,243	2,789	4,032

Note: Totals may not add due to rounding.
Legend: dB = decibel; DNL = Day-Night Average Sound Level; LMT = Crater Lake-Klamath Regional Airport.

Table 3-8 LMT Existing Conditions (2023) – Estimated Households and Population

DNL Band (dB)	*Existing Conditions (2023)*	
	Households	*Population*
65–70	746	1,851
70–75	336	834
75–80	106	262
80–85[2]	0	0
85+[2]	0	0
Totals[1]	**1,188**	**2,947**

Notes: [1]Totals may not add due to rounding.
[2]Households and population within the DNL 80 dB and greater determined through review of aerial imagery.
Legend: dB = decibel; DNL = Day-Night Average Sound Level; LMT = Crater Lake-Klamath Regional Airport.

3.1.2.3 Classroom Learning Interference

Table 3-9 presents the classroom learning interference for schools S-01 through S-10 experienced under Existing Conditions (2023). The school screening threshold of 60 dB $L_{eq(8hr)}$ equates to an interior noise level of 45 dB $L_{eq(8hr)}$ with windows open and represents the point at which studies have found classroom learning is affected (DNWG 2009a, 2013a). Existing Conditions (2023) at LMT results in seven schools that are exposed to exterior $L_{eq(8hr)}$ greater than 60 dB. The greatest $L_{eq(8hr)}$ of 67 dB occurs at S09 Hosanna Christian School. Additional school impact analysis involves determining the number of noise-generated speech interfering events per school day hour that exceed an interior L_{max} of 50 dB (equivalent to an exterior L_{max} of 65 dB for windows open). The number of classroom interfering events ranges from 1 event at one school, 2 at five schools, 3 events at three schools, and 4 events at one school, as presented in Table 3-9. TA at an interior level of 50 dB (equivalent to an exterior of 65 dB with windows open) varies from 3 minutes to 13 minutes per average school day.

Table 3-9 LMT Existing Conditions (2023) – Classroom Learning Interference

ID	*Location[1]*	*Outdoor $L_{eq(8hr)}$ (dB)[2]*	*Number of Speech Interfering Events per School Day Hour[3]*	*Time above interior 50 dB per 8-hour school day (minutes)[3]*
S01	Oregon Institute of Tech	57	1	3
S02	Klamath Family Head Start	**63**[2]	2	4
S03	Triad School	**62**[2]	2	4
S04	Mazama High School	**62**[2]	2	4
S05	Stearns Elementary School	**66**[2]	3	5
S06	Peterson Elementary	**63**[2]	3	7
S07	Klamath Community College	52	2	6
S08	Brixner Jr High School	**62**[2]	3	9
S09	Hosanna Christian School	**67**[2]	4	13
S10	Henley High School	57	2	8

Notes: [1]Table presents the analysis for the school POIs.
[2]Bold text represents schools exposed to exterior $L_{eq(8hr)}$ of greater than 60 dB, equivalent to the recommended interior threshold of 45 dB with windows open.
[3]Assumes 90 percent of ANG daytime operations occur during the school day; windows open condition with Noise Level Reduction of 15 dB due to building attenuation.
Legend: dB = decibel; ID = Identification; $L_{eq(8hr)}$ = 8-hour Equivalent Sound Level; LMT = Crater Lake-Klamath Regional Airport; NLR = Noise Level Reduction; POI = Point of Interest.

3.1.2.4 Non-school Speech Interference

In addition to speech interference analysis, this study considers the potential for aircraft noise to interfere with non-school speech at all POIs during the DNL daytime period. Table 3-10 presents the Existing Conditions (2023) for speech interference (non-school) based upon the numbers of events per average hour during the DNL daytime period for both windows open and windows closed conditions. The number of speech interfering events with windows open ranges from 1 to 5 events per average hour. With windows closed, 7 POIs experience no interfering events per average hour, 12 POIs 1 event per average hour, and 7 POIs 2 to 3 events per average hour. The greatest of 3 events per hour with windows closed occurs at R02 Anderson Avenue and Altamont Drive, R03 Highland Way and Summit Street, and R07 Lombardy Lane and railroad tracks.

Table 3-10 LMT Existing Conditions (2023) – Non-school Speech Interference Events per Average Hour (Daytime)

Map ID[1]	*Named POI*	*Windows Open[2]*	*Windows Closed[3]*
C-01	Census Tract 9719	1	0
C-02	Census Tract 9717	1	1
C-03	Census Tract 9718	1	0
C-04	Census Tract 9716	1	1
C-05	Census Tract 9712	1	1
C-06	Census Tract 9713	2	1
C-07	Census Tract 9714	2	2
H-01	Sky Lakes Medical Center	1	0
R-01	Neighborhood	2	1
R-02	Anderson Avenue and Altamont Drive	5	3
R-03	Highland Way and Summit Street	4	3
R-04	Airway Drive and Homedale Road	4	2
R-05	Neighborhood	2	0
R-06	Neighborhood	2	1
R-07	Lombardy Lane and railroad tracks	5	3
R-08	Neighborhood	1	0
S-01	Oregon Institute of Technology	1	0
S-02	Klamath Family Head Start	2	1
S-03	Triad School	2	1
S-04	Mazama High School	2	1
S-05	Stearns Elementary School	2	1
S-06	Peterson Elementary	2	1
S-07	Klamath Community College	2	0
S-08	Brixner Junior High School	2	2
S-09	Hosanna Christian School	4	2
S-10	Henley High School	2	1

Notes: [1]School POI included because residential areas or other noise sensitive uses are often located nearby schools for which these results would apply
[2]Assumes 15 dB Noise Level Reduction.
[3]Assumes 25 dB Noise Level Reduction.
Legend: ID = Identification; LMT = Crater Lake-Klamath Regional Airport; POI = Point of Interest.

3.1.2.5 Probability of Awakening

Analysis of the potential for sleep disturbance involves determining the number and SEL of DNL nighttime aircraft events to estimate the PA metric. As presented in Table 3-11, PA with windows open ranges from negligible at 5 POIs, 1 to 5 percent at 20 POIs, and 10 percent at 1 POI. PA with windows closed is negligible at 14 POIs, 1 to 5 percent at 11 POIs, and 6 percent at 1 POI.

Table 3-11 LMT Existing Conditions (2023) – Estimated Probability of Awakening

Map ID	*Named POI*[1]	*Windows Open*[2]	*Windows Closed*[3]
C-01	Census Tract 9719	<1%	<1%
C-02	Census Tract 9717	<1%	<1%
C-03	Census Tract 9718	<1%	<1%
C-04	Census Tract 9716	1%	<1%
C-05	Census Tract 9712	1%	<1%
C-06	Census Tract 9713	1%	<1%
C-07	Census Tract 9714	1%	1%
H-01	Sky Lakes Medical Center	<1%	<1%
R-01	Neighborhood	1%	1%
R-02	Anderson Avenue and Altamont Drive	10%	6%
R-03	Highland Way and Summit Street	2%	2%
R-04	Airway Drive and Homedale Road	1%	1%
R-05	Neighborhood	1%	<1%
R-06	Neighborhood	1%	1%
R-07	Lombardy Lane and railroad tracks	4%	3%
R-08	Neighborhood	1%	<1%
S-01	Oregon Institute of Technology	<1%	<1%
S-02	Klamath Family Head Start	1%	<1%
S-03	Triad School	1%	<1%
S-04	Mazama High School	1%	1%
S-05	Stearns Elementary School	1%	1%
S-06	Peterson Elementary	1%	1%
S-07	Klamath Community College	1%	<1%
S-08	Brixner Junior High School	1%	1%
S-09	Hosanna Christian School	1%	1%
S-10	Henley High School	1%	<1%

Notes: [1]Non-residential POIs included because residential areas are often located nearby other noise sensitive areas for which these results would apply.
[2]Assumes 15 dB Noise Level Reduction.
[3]Assumes 25 dB Noise Level Reduction.
Legend: < = less than; % = percent; ID = Identification; LMT = Crater Lake-Klamath Regional Airport; POI = Point of Interest.

With a small number of DNL nighttime operations by 173 FW F-15C (approximately 25 operations per month), the majority of the PA results from civil aircraft operations.

3.1.2.6 Potential for Hearing Loss

DoD guidance prescribes analysis of the potential for hearing loss (PHL) due to elevated aircraft noise levels. The screening process begins by identifying residential areas exposed to DNL of 80 dB or greater (DNWG 2013b). As presented in Tables 3-6 and 3-7, only 5 acres outside of LMT are exposed to 80 dB or greater DNL and no households or people reside in those areas. Because no people reside in this area, no additional analysis is warranted for the Existing Conditions (2023) regarding the risk of the PHL.

3.2 MILITARY TRAINING AIRSPACE

As depicted in Figure 1-2, the 173 FW utilizes both overland and overwater military training airspace. The following section describes the modeling data and resulting noise exposure for both subsonic and supersonic operations.

3.2.1 Modeling Data (Subsonic)

Existing F-15C/D primarily utilize Juniper/Hart and Goose MOAs to the east of LMT/Kingsley Field ANGB for training while the Dolphin MOA along the coast to the west experiences occasional use. Table 3-12 details the existing operations for these military training airspace. The information below originates from data collected from the 173 FW (NGB 2024a) resulting in a total of 3,194 annual military training airspace sorties by F-15C/D. As previously mentioned, F-5E aircraft provide ADAIR for F-15C/D in the Juniper/Hart and Dolphin military training airspace generating a total of approximately 800 sorties per year. The W-93 overwater airspace, located approximately 15 miles offshore, is used for training but does not affect noise-sensitive land receptors and was not included in the noise modeling.

Table 3-12 Military Training Airspace Annual Operations (Existing Conditions [2023])

Aircraft	Juniper/Hart		Dolphin		Goose		Total Operations		
	Day	*Night*	*Day*	*Night*	*Day*	*Night*	*Day*	*Night*	*Total*
F-15C/D	1,495	46	71	3	1,531	48	3,097	97	3,194
F-5E (ADAIR)	740	23	36	1	0	0	776	24	800
Other Mil	252	0	0	0	0	0	252	0	252
Total	2,487	69	107	4	1,531	48	4,125	121	4,246

Legend: ADAIR = Adversary Air; ANG = Air National Guard.

F-15C/D use of the military training airspace is based on the breakdown of the B-Course flight syllabus shown in Table 3-13 detailing the distribution of the use of the military training airspace, along with the number of F-15 and F-5 (supporting ADAIR), the time in the military training airspace, and the use of afterburner during training. The data in Table 3-13 applies to both subsonic and supersonic modeling. Note that no "red air" sorties are listed for events such as Basic Fighter Maneuvers (BFM), where the Instructor Pilot (IP) in the other F-15 is the red-air. In these cases, those sorties are listed as blue. The analysis assumes that all the F-15C sorties are proportional to this breakdown.

The analysis assumes an average sortie duration of 1.3 hours. Time spent flying within the military training airspace depends upon the transit time to it from LMT/Kingsley Field ANGB. The round-trip transit distance varies from approximately 50 miles to the Goose MOA to 200 miles to the Dolphin MOA, which equates to between 6 and 26 mins of travel time at 400 knots. The noise modeling assumes a mid-range transit time of approximately 18 minutes resulting in 60 minutes of flight time within the military training airspace per sortie. Therefore, the sorties in Table 3-12 are also equivalent to total hours flown in the military training airspace so the training events in Table 3-13 were scaled up to the existing 3,194 hours of F-15C/D training and modeled with the MRNMAP software. Due to the randomness of aircraft flight paths in the military training airspace, the analysis utilizes MRNMAP's modeled areas rather than distinct flight paths.

Table 3-13 F-15C FTU B-Course Syllabus

Event	*Military Training Airspace Time*	*Blue F-15*	*Red Total*	*Red F-15C*	*Red F-5*	*Goose*	*Dolphin*	*Juniper*	*Juniper/ Hart*	*Block 0*	*Block 1*	*Block 2*	*Block 3*	*Block 4*	*SS mins*
TR-1	20	2				100%					100%				
TR-2	20	2				100%					100%				
TR-3	30	2				100%					100%				
TR-4	30	2				100%					100%				
TR-5	30	2				100%					100%				
I-1	0	1				N/A				N/A					
I-2	0	1				N/A				N/A					
BFM-1	20	2				100%					100%				4
BFM-2	20	2				100%					100%				4
BFM-3	20	2				100%					100%				4
BFM-4	20	2				100%					100%				4
BFM-5	20	2				100%					100%				4
BFM-6	20	2				100%					100%				4
BFM-7	20	2				100%					100%				4
BFM-8	20	2				100%					100%				4
BFM-9	20	2				100%					100%				4
BFM-10	20	2				100%					100%				4
BFM-11	20	2				100%					100%				4
BFM-12	20	2				100%					100%				4
BFM-13	20	2				100%					100%				4
BFM-14	20	2				100%					100%				4
ACM-1	20	2	1	1		100%					100%				
ACM-2	20	2	1	1		100%					100%				
ACM-3	40	2	2		2		5%		95%		50%	50%			
ACM-4	40	2	2		2		5%		95%		50%	50%			
ACM-5	40	2	2		2		5%		95%		50%	50%			
TI-1	60	2	0				5%		95%		5%	45%	45%	5%	10
TI-2	40	2	4	1	3		5%		95%		5%	45%	45%	5%	10
TI-3	40	2	4	1	3		5%		95%		5%	45%	45%	5%	10
TI-4	40	2	4	1	3		5%		95%		5%	45%	45%	5%	10
TI-5	40	4	6	2	4		5%		95%		5%	45%	45%	5%	10

Event	*Military Training Airspace Time*	*Blue F-15*	*Red Total*	*Red F-15C*	*Red F-5*	*Goose*	*Dolphin*	*Juniper*	*Juniper/ Hart*	*Block 0*	*Block 1*	*Block 2*	*Block 3*	*Block 4*	*SS mins*
TI-6	40	4	6	2	4		5%		95%		5%	45%	45%	5%	10
ACT	40	4	6	2	4		5%		95%	5%	5%	45%	40%	5%	10
NINT-1	30	2	0				5%		95%		50%	50%			4
NINT-2	30	2	0				5%		95%		50%	50%			4
NINT-3	30	2	2		2		5%		95%		5%	45%	45%	5%	10
LASDT-1	30	2	0					100%		90%	10%				2
LASDT-2	30	2	2		2			100%		75%	25%				2
1 B course		*80*		*11*	*31*										
				Total F-15C	**Total F-5**										
				91	**31**										

Legend: % percent; N/A = Not Applicable; SS mins = supersonic minutes.

3.2.2 Noise Exposure (Subsonic)

Table 3-14 presents the resulting distributed DNL and L_{dnmr} for each military training airspace due to existing operations. L_{dnmr} is similar to DNL except it includes a rise-time correction factor to account for the increase in annoyance from high-speed aircraft traveling at low altitudes. Because most training occurs above 10,000 feet mean sea level (MSL), the rise-time effect remains small, resulting in no difference between the two metrics for Existing Conditions (2023) when rounded to whole decibels.

Table 3-14 Noise Exposure from Existing Conditions (2023) Military Training Airspace Operations

Military Training Airspace[1]	*DNL (dB)*	*L_{dnmr} (dB)*
Goose North MOA/ATCAA	45	45
Goose South MOA/ATCAA	45	45
Juniper Low MOA	48	48
Juniper East Low MOA	48	48
Juniper A/B/C/D MOA/ATCAA[1]	35	35
Hart A/B/C/D/E/F MOA/ATCAA	35	35
Dolphin North and South MOA/ATCAA	<35	<35

Note: [1]Noise level applies only to the parts of Juniper A/B/C/D outside of Juniper Low and Juniper East Low MOA, which are reported separately.

Legend: ADAIR = Adversary Air; ANG = Air National Guard; ATCAA = Air Traffic Control Assigned Airspace; dB = decibel; DNL = Day-Night Average Sound Level; Ldnmr = Onset-Rate Adjusted Monthly Day-Night Average A-weighted Sound Level; MOA = Military Operations Area.

The greatest DNL/L_{dnmr} of 48 dB occurs in the Juniper Low and Juniper East Low MOAs due to the lower floor and lower altitudes flown in these areas. The rest of the Juniper/Hart MOA complex outside of the Juniper Low and Juniper East Low areas experiences DNL/L_{dnmr} of 35 dB or less. Both Goose North and Goose South MOAs experience DNL/L_{dnmr} of 45 dB. The existing DNL/L_{dnmr} in Dolphin North and South MOA is less than 35 dB due to the relatively small number of sorties spread over a large area with a minimum altitude of 11,000 feet MSL.

3.2.3 Modeling Data (Supersonic)

The existing operating areas for the supersonic operations by the 173 FW comprise the Juniper/Hart MOA Complex limited to above 30,000 feet to minimize supersonic noise at ground level where human receptors could be impacted. Air Combat Maneuvering (ACM) involves offensive and defensive maneuvering, which may include reaching supersonic speeds.

BOOMAP2021 software used for this analysis was developed to analyze supersonic aircraft activity within military training airspace with updates that allow the user to enter aircraft altitude bands, ground height, Mach number, aircraft types, and supersonic duration. For the purposes of the analysis, all ACM sorties that train within Juniper/Hart MOA and listed in Table 3-13 are assumed to reach supersonic speeds for a portion of the training event. This includes both F-15C/D and the ADAIR flown by F-5.

3.2.4 Noise Exposure (Supersonic)

Using BOOMAP2021 software, the maximum CDNL is 39 C-weighted decibel (dBC), which occurs roughly in the center of the Juniper/Hart MOA complex. The relatively low CDNL value is primarily due to the 30,000-foot MSL minimum altitude required for existing supersonic operations within the Juniper/Hart MOA complex.

4.0 NO ACTION ALTERNATIVE

4.1 INSTALLATION/AIRPORT

4.1.1 Modeling Data

4.1.1.1 Military Aircraft

Under the No Action Alternative, modeled 173 FW F-15C/D aircraft operations are reduced relative to Existing Conditions (2023) to a training pattern of 6 aircraft for the first launch and 4 aircraft for the second launch each day (10 sorties per day). This equates to approximately 2,400 annual sorties (9,600 annual operations), representing an approximate 29 percent reduction from Existing Conditions (2023) (Table 4-1). Contract ADAIR aircraft, military transients, and other agency transients are assumed to remain consistent with Existing Conditions (2023).

Table 4-1 Annual Airfield Operations at LMT/Kingsley Field ANGB (No Action Alternative)

Aircraft	*Departures*		*Arrivals*		*Closed Patterns Ops*[2]		*Total*		*Total*
	Day	*Night*	*Day*	*Night*	*Day*	*Night*	*Day*	*Night*	
F-15C/D	2,400	0	2,328	72	4,656	144	9,384	216	9,600
Contract ADAIR	800	0	776	24	160	0	1,736	24	1,760
Civil[1]	9,818	178	9,818	178	6,110	0	25,746	356	26,102
Transients	815	0	815	0	8	0	1,638	0	1,638
Total	**13,833**	**178**	**13,737**	**274**	**10,934**	**144**	**38,504**	**596**	**39,100**

Notes: [1]Civil operations represent the combined annual runway operations of Air Carrier, Air Transport, and General Aviation.
[2]A portion of Local civil aircraft operations modeled as departures/arrivals because a significant portion of local GA flights involve departures and arrivals to the nearby practice area, in addition to touch and go pattern operations.
Legend: ADAIR = Adversary Air; ANGB = Air National Guard Base; LMT = Crater Lake-Klamath Regional Airport; Ops = operations.
Sources: FAA 2024b; NGB 2024b; DAF 2020.

Maintenance and ground run-up operations by F-15C/D would scale down proportional to the 29 percent reduction in flight operations while all other military or other agency operations would remain the same as Existing Conditions (2023).

4.1.1.2 Civil Aircraft

As presented in Table 4-1 and based upon the FAA's 2023 TAF, in 2029 civil aircraft operations at LMT would be 26,102, representing an increase of approximately 8 percent from Existing Conditions (2023). The analysis assumes that the civil aircraft fleet mix for 2029 would not change from Existing Conditions (2023), as detailed in Appendix A.

4.1.2 Noise Exposure

Sections 4.1.2.1 through 4.1.2.6 focus on DoD best practices for impact analysis, as summarized in DNWG guidance (DNWG 2009a). The No Action Alternative DNL contours, DNL at noise sensitive locations (the FAA terminology corresponding generally to DoD POIs), acreage, population, and household affected by DNL also apply to FAA.

4.1.2.1 Day-Night Average Sound Level Contours and Point of Interest Levels

Figure 4-1 shows the DNL noise contours from 65 to 85 dB in 5-dB increments for the No Action Alternative at LMT overlaid on gradient mapping of DNL by color shading. Noise generated from aircraft operations at LMT occurs within and outside the airfield. Portions of the DNL 65 dB contour extend north of the airfield by 1.7 miles, to the east and to the west 0.2 mile, and to the south 1.5 miles. The gradient shading shows how DNL noise exposure does not end at the plotted DNL 65 dB contour line, but instead continues beyond at reduced levels plotted down to DNL 55 dB that roughly corresponds a level typical of a suburban environment.

As depicted in Figure 4-2, when compared with Existing Conditions (2023), the No Action Alternative would result in an overall reduction in the size of the DNL contours by 1 to 2 dB due to the approximate 29 percent reduction in F-15C/D operations.

Table 4-2 shows the DNL values at each of the POIs under the No Action Alternative with values ranging from DNL 46 to 73 dB. Three residential POIs (R02 Anderson Avenue and Altamont Drive, R03 Highland Way and Summit Street, and R07 Lombardy Lane and railroad tracks) would be exposed to DNL 65 dB or greater consistent with Existing Conditions (2023). The relative change in DNL under the No Action Alternative when compared to Existing Conditions (2023) would be no change at 2 POIs, a reduction of 1 dB at 20 POIs, and a reduction of 2 dB at 4 POIs.

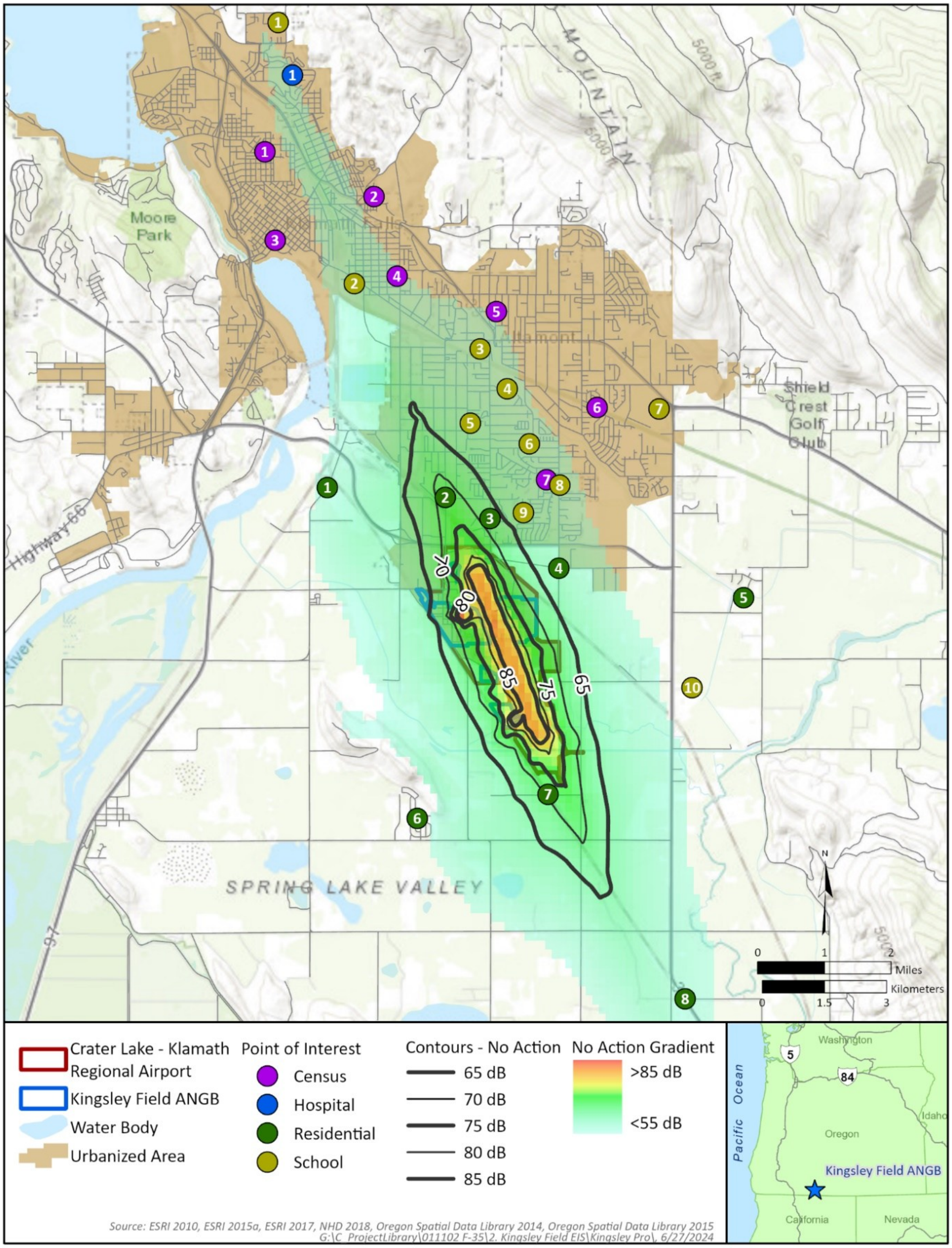


Figure 4-1 No Action Alternative DNL Contours and Noise Gradients on and Adjacent to LMT

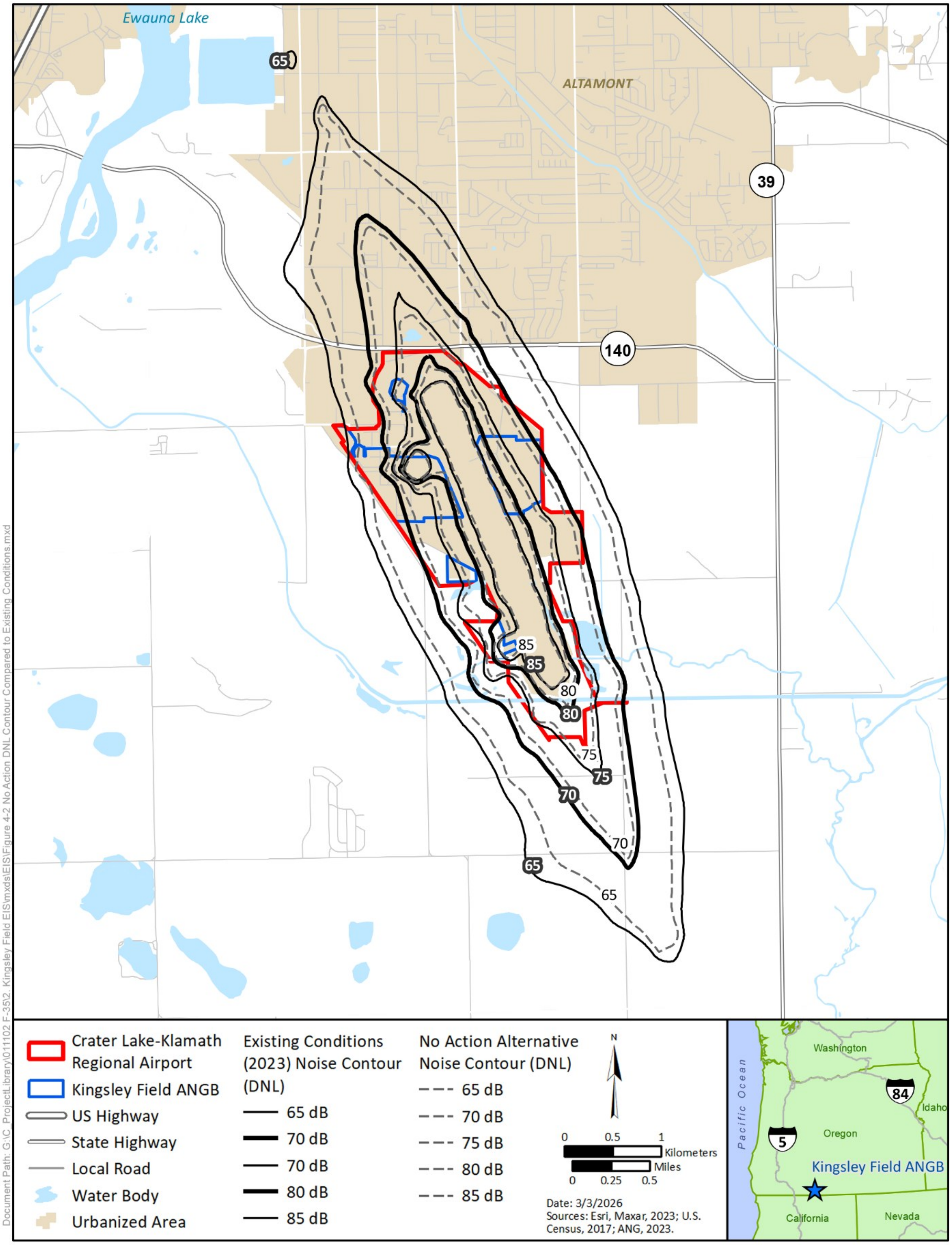


Figure 4-2 No Action Alternative DNL Contour Comparison to Existing Conditions (2023) at LMT

Table 4-2 No Action Alternative DNL at POIs Noise Exposure Adjacent to LMT

Map ID	*Point Type*	*Named POI[1]*	*Existing DNL[2] (dB)*	*No Action DNL[2] (dB)*	*No Action Change RE Existing DNL[2] (dB)*
C01	Census Tract Centroid	Census Tract 9719	52	52	0
C02	Census Tract Centroid	Census Tract 9717	54	53	-1
C03	Census Tract Centroid	Census Tract 9718	52	51	-1
C04	Census Tract Centroid	Census Tract 9716	56	56	0
C05	Census Tract Centroid	Census Tract 9712	56	55	-1
C06	Census Tract Centroid	Census Tract 9713	52	50	-2
C07	Census Tract Centroid	Census Tract 9714	60	58	-2
H01	Healthcare Facility	Sky Lakes Medical Center	56	55	-1
R01	Residential Area	Neighborhood	58	57	-1
R02	Residential Area	Anderson Avenue and Altamont Drive	**74**[2]	**73**[2]	-1
R03	Residential Area	Highland Way and Summit Street	**69**[2]	**68**[2]	-1
R04	Residential Area	Airway Drive and Homedale Road	62	61	-1
R05	Residential Area	Neighborhood	47	46	-1
R06	Residential Area	Neighborhood	55	54	-1
R07	Residential Area	Lombardy Lane and railroad tracks	**72**[2]	**71**[2]	-1
R08	Residential Area	Neighborhood	58	57	-1
S01	School	Oregon Institute of Technology	54	53	-1
S02	School	Klamath Family Head Start	60	59	-1
S03	School	Triad School	58	57	-1
S04	School	Mazama High School	58	56	-2
S05	School	Stearns Elementary School	62	61	-1
S06	School	Peterson Elementary	59	58	-1
S07	School	Klamath Community College	48	47	-1
S08	School	Brixner Junior High School	59	57	-2
S09	School	Hosanna Christian School	63	62	-1
S10	School	Henley High School	53	52	-1

Notes: [1]The census tracts represent neighborhoods surrounding LMT where noise sensitive locations (such as residences, schools, places of worship, etc. are likely to occur.
[2]Bold represents points exposed to DNL of 65 dB or greater.
Legend: dB = decibel; DNL = Day-Night Average Sound Level; ID = Identification; LMT = Crater Lake-Klamath Regional Airport; POI = Point of Interest.

4.1.2.2 Acreage, Housing, and Population

Table 4-3 shows the acreage breakdown (excluding water bodies) within each noise contour band, resulting in a total of 2,177 acres adjacent to LMT exposed to DNL 65 dB or greater for the No Action Alternative. That acreage is comprised of 1,558 acres exposed to DNL 65 to 70 dB, 529 acres to DNL 70 to 75 dB, 89 acres to DNL 75 to 80 dB, and 2 acres to DNL 80 to 85 dB. No areas off-airport would be exposed to DNL greater than 85 dB under the No Action Alternative.

Table 4-3 No Action Alternative – Noise Exposure Acreage

DNL Band (dB)	*No Action Alternative Acreage*			*Change Relative to Existing Conditions (2023)*		
	On LMT	*Adjacent to LMT*	*Total*	*On LMT*	*Adjacent to LMT*	*Total*
65–70	133	1,558	1,691	49	-392	-343
70–75	284	529	813	18	-150	-132
75–80	335	89	423	-1	-66	-66
80–85	204	2	205	-33	-4	-37
85+	279	-	279	-42	0	-42
Total >65dB	1,234	2,177	3,412	-9	-612	-621

Note: Totals may not add due to rounding.
Legend: > = greater than; dB = decibel; DNL = Day-Night Average Sound Level; LMT = Crater Lake-Klamath Regional Airport.

Table 4-4 lists the estimated households and population off-airport that would be exposed to each DNL contour band under the No Action Alternative resulting in 588 households and 1,459 people within the DNL 65 to 70 dB contour band. A total of 300 households and 744 people would reside within the DNL 70 to 75 dB contour band and 58 households and 145 people within the DNL 75 to 80 dB contour band. A review of aerial imagery confirmed no households or people would be located within the 2 acres exposed to DNL 80 dB; therefore, no people would be affected.

Table 4-4 No Action Alternative – Estimated Households and Population

DNL Band (dB)	*No Action Alternative*		*Change Relative to Existing Conditions (2023)*	
	Households	*Population*	*Households*	*Population*
65–70	588	1,459	-158	-392
70–75	300	744	-36	-90
75–80	58	145	-48	-117
80–85	0	0	0	0
85+	0	0	0	0
Totals	946	2,348	-242	-599

Legend: dB = decibel; DNL = Day-Night Average Sound Level.

4.1.2.3 Classroom Learning Interference

Table 4-5 presents the classroom learning interference for schools S-01 through S-10 that would be experienced under the No Action Alternative. Consistent with Existing Conditions (2023), this alternative would result in seven schools that would be exposed to exterior $L_{eq(8hr)}$ greater than 60 dB equating to interior of 45 dB. The greatest $L_{eq(8hr)}$ of 65 dB would occur at S05 Stearns Elementary School and S09

Hosanna Christian School. Additional school impact analysis involves determining the number of noise-generated speech interfering events per school day hour that exceed an interior L_{max} of 50 dB (equivalent to an exterior L_{max} of 65 dB for windows open). The number of classroom interfering events would range from 1 event at 2 schools, 2 at 7 schools, and 3 events at 1 school, as presented in Table 4-5. Five schools would experience a reduction of 1 fewer interfering event per average hour while the remaining would experience no change. TA at an interior level of 50 dB (equivalent to an exterior of 65 dB with windows open) would vary from 3 minutes to 10 minutes per average school day, which would be a reduction of 1 to 3 minutes at 8 schools and no change at 2 schools.

Table 4-5 LMT No Action Alternative – Classroom Learning Interference

ID	***Location[1]***	***Outdoor $L_{eq(8hr)}$ (dB)[2]***	***Change Outdoor $L_{eq(8hr)}$ dB Relative to Existing Conditions (2023)***	***Number of Speech Interfering Events per School Day Hour[3]***	***Change Events per School Day Hour Relative to Existing Conditions (2023)***	***TA interior 50 dB per 8-hour school day (minutes)[3]***	***Change TA Relative to Existing Conditions (2023)***
S01	Oregon Institute of Tech	57	0	1	0	3	0
S02	Klamath Family Head Start	**62**[2]	-1	2	0	4	0
S03	Triad School	**61**[2]	-1	2	0	3	-1
S04	Mazama High School	**60**[2]	-2	2	0	3	-1
S05	Stearns Elementary School	**65**[2]	-1	2	-1	4	-1
S06	Peterson Elementary	**62**[2]	-1	2	-1	5	-2
S07	Klamath Community College	51	-1	1	-1	5	-1
S08	Brixner Junior High School	**61**[2]	-1	2	-1	7	-2
S09	Hosanna Christian School	**65**[2]	-2	3	-1	10	-3
S10	Henley High School	56	-1	2	0	6	-2

Notes: [1]Table presents the analysis for the school POIs.
[2]Bold text represents schools exposed to exterior $L_{eq(8hr)}$ of greater than 60 dB, equivalent to the recommended interior threshold of 45 dB with windows open.
[3]Assumes 90 percent of ANG daytime operations occur during the school day; windows open condition with Noise Level Reduction of 15 dB due to building attenuation.
Legend: dB = decibel; ID = Identification; $L_{eq(8hr)}$ = 8-hour Equivalent Sound Level; LMT = Crater Lake-Klamath Regional Airport; POI = Point of Interest; TA= Time Above.

4.1.2.4 Non-school Speech Interference

In addition to speech interference analysis, this study considers the potential for aircraft noise to interfere with non-school speech at all POIs during the DNL daytime period. Table 4-6 presents Existing Conditions (2023) for speech interference (non-school) based upon the numbers of events per average hour during the DNL daytime period for both windows open and windows closed conditions. The number of speech interfering events with windows open would range from 1 to 5 events per average hour with 12 POIs experiencing a reduction of 1 event per average hour. With windows closed, 13 POIs would experience no interfering events per average hour, 10 POIs 1 event per average hour, and 3 POIs two events per average hour.

Table 4-6 LMT No Action Alternative – Non-school Speech Interference Events per Average Hour (Daytime)

Map ID[1]	*Named POI*	*Windows Open[2]*	*Windows Open Change Relative to Existing Conditions (2023)*	*Windows Closed[3]*	*Windows Closed Change Relative to Existing Conditions (2023)*
C-01	Census Tract 9719	1	0	0	0
C-02	Census Tract 9717	1	0	0	-1
C-03	Census Tract 9718	1	0	0	0
C-04	Census Tract 9716	1	0	0	-1
C-05	Census Tract 9712	1	0	0	-1
C-06	Census Tract 9713	1	0	-1	-1
C-07	Census Tract 9714	2	1	0	-1
H-01	Sky Lakes Medical Center	1	0	0	0
R-01	Neighborhood	1	1	-1	0
R-02	Anderson Avenue and Altamont Drive	5	2	0	-1
R-03	Highland Way and Summit Street	3	2	-1	-1
R-04	Airway Drive and Homedale Road	3	1	-1	-1
R-05	Neighborhood	1	0	-1	0
R-06	Neighborhood	1	1	-1	0
R-07	Lombardy Lane and railroad tracks	5	2	0	-1
R-08	Neighborhood	1	0	0	0
S-01	Oregon Institute of Technology	1	0	0	0
S-02	Klamath Family Head Start	2	1	0	0
S-03	Triad School	1	0	-1	-1
S-04	Mazama High School	1	0	0	0
S-05	Stearns Elementary School	2	1	0	-1
S-06	Peterson Elementary	2	1	0	0
S-07	Klamath Community College	1	0	0	-1
S-08	Brixner Junior High School	1	1	0	-1
S-09	Hosanna Christian School	3	1	-1	-1
S-10	Henley High School	1	1	0	-1

Notes: [1]School POIs included because residential areas or other noise sensitive uses are often located nearby schools for which these results would apply.
[2]Assumes 15 dB Noise Level Reduction.
[3]Assumes 25 dB Noise Level Reduction.
Legend: ID = Identification; LMT = Crater Lake-Klamath Regional Airport; POI = Point of Interest.

4.1.2.5 Probability of Awakening

Analysis of the potential for sleep disturbance involves determining the number and SEL of DNL nighttime aircraft events to estimate the PA metric. As presented in Table 4-7, PA with windows open would range from negligible at 11 POIs and 1 to 10 percent at 15 POIs. PA with windows closed is negligible at 20 POIs and 1 to 6 percent at 6 POIs. With minimal DNL nighttime operations by 173 FW F-15C (approximately 18 operations per month), the majority of PA would be due to civil aircraft operations.

Table 4-7 LMT No Action Alternative – Estimated Probability of Awakening

Map ID	*Named POI[1]*	*Windows Open[2]*	*Change to Windows Open Relative to Existing Conditions (2023)*	*Windows Closed[3]*	*Change to Windows Closed Relative to Existing Conditions (2023)*
C-01	Census Tract 9719	<1%	0%	<1%	0%
C-02	Census Tract 9717	<1%	0%	<1%	0%
C-03	Census Tract 9718	<1%	0%	<1%	0%
C-04	Census Tract 9716	<1%	-1%	<1%	0%
C-05	Census Tract 9712	<1%	-1%	<1%	0%
C-06	Census Tract 9713	<1%	-1%	<1%	0%
C-07	Census Tract 9714	1%	0%	<1%	-1%
H-01	Sky Lakes Medical Center	<1%	0%	<1%	0%
R-01	Neighborhood	1%	0%	1%	0%
R-02	Anderson Avenue and Altamont Drive	10%	0%	6%	0%
R-03	Highland Way and Summit Street	2%	0%	1%	-1%
R-04	Airway Drive and Homedale Road	1%	0%	1%	0%
R-05	Neighborhood	1%	0%	<1%	0%
R-06	Neighborhood	1%	0%	<1%	-1%
R-07	Lombardy Lane and railroad tracks	4%	0%	3%	0%
R-08	Neighborhood	<1%	-1%	<1%	0%
S-01	Oregon Institute of Technology	<1%	0%	<1%	0%
S-02	Klamath Family Head Start	<1%	-1%	<1%	0%
S-03	Triad School	1%	0%	<1%	0%
S-04	Mazama High School	1%	0%	<1%	-1%
S-05	Stearns Elementary School	1%	0%	<1%	-1%
S-06	Peterson Elementary	1%	0%	<1%	-1%
S-07	Klamath Community College	<1%	-1%	<1%	0%
S-08	Brixner Junior High School	1%	0%	<1%	-1%
S-09	Hosanna Christian School	1%	0%	1%	0%
S-10	Henley High School	1%	0%	<1%	0%

Notes: [1]Non-residential POIs included because residential areas are often located nearby other noise sensitive areas for which these results would apply.
[2]Assumes 15 dB Noise Level Reduction.
[3]Assumes 25 dB Noise Level Reduction.

Legend: < = less than; % = percent; ID = Identification; LMT = Crater Lake-Klamath Regional Airport; POI = Point of Interest.

4.1.2.6 Potential for Hearing Loss

DoD guidance prescribes analysis of the PHL due to elevated aircraft noise levels. The screening process begins by identifying residential areas exposed to DNL of 80 dB or greater (DNWG 2013b). As presented in Tables 4-3 and 4-4, only 2 acres outside of LMT are exposed to 80 dB or greater DNL and no households or people reside in those areas. Because no people reside in this area, no additional analysis is warranted for the No Action Alternative regarding the risk of the potential for hearing loss.

4.2 MILITARY TRAINING AIRSPACE

4.2.1 Modeling Data (Subsonic)

Existing F-15C/D primarily utilize Juniper/Hart and Goose MOAs to the east of LMT/Kingsley Field ANGB for training while the Dolphin MOA experiences occasional use, which would continue under the No Action Alternative but at a reduction of approximately 26 percent. Table 4-8 details the resulting operations for the 173 FW, F-5E ADAIR, and other military training airspace. The W-93 overwater airspace, located approximately 15 miles offshore, is used for training but does not affect noise-sensitive land receptors and was not included in the noise modeling.

Table 4-8 No Action Alternative
Annual Military Training Airspace Operations

Aircraft	Juniper/Hart		Dolphin		Goose		Total Operations		
	Day	*Night*	*Day*	*Night*	*Day*	*Night*	*Day*	*Night*	*Total*
F-15C/D	1,099	34	52	2	1,126	35	2,277	71	2,348
F-5E (ADAIR)	740	23	36	1	0	0	776	24	800
Other Mil	252	0	0	0	0	0	252	0	252
Total	**2,091**	**57**	**88**	**3**	**1,126**	**35**	**3,305**	**95**	**3,400**

Legend: ADAIR = Adversary Air; ANGB = Air National Guard Base.

As detailed in Table 3-13, the F-15C/D use of the military training airspace is based on the breakdown of the B-Course flight syllabus, which would continue under the No Action Alternative. The individual training exercises and proportional events for each would continue but the overall total hours would scale down to a total of 2,348 sorties, which equates to an estimated 2,348 hours in the military training airspace by 173 FW F-15C/D. All other modeling parameters would remain the same as Existing Conditions (2023).

4.2.2 Noise Exposure (Subsonic)

Table 4-9 presents the resulting distributed DNL and L_{dnmr} for each military training airspace due to the No Action Alternative. Consistent with Existing Conditions (2023), most training would occur above 10,000 feet MSL, so the rise-time effect applied to L_{dnmr} would remain small resulting in no difference between the two metrics for Existing Conditions (2023) when rounded to whole decibels.

Table 4-9 Noise Exposure from the No Action Alternative Military Training Airspace Operations

Military Training Airspace[1]	*DNL (dB)*	*Change DNL (dB) from Existing Conditions (2023)*	*L_{dnmr} (dB)*	*Change L_{dnmr} (dB) from Existing Conditions (2023)*
Goose North MOA/ATCAA	44	-1	44	-1
Goose South MOA/ATCAA	44	-1	44	-1
Juniper Low MOA	47	-1	47	-1
Juniper East Low MOA	47	-1	47	-1
Juniper A/B/C/D MOA/ATCAA[1]	<35	-1	<35	-1
Hart A/B/C/D/E/F MOA/ATCAA	<35	-1	<35	-1
Dolphin North and South MOA/ATCAA	<35	N/A	<35	N/A

Note: [1]Noise level applies only to the parts of Juniper A/B/C/D outside of Juniper Low and Juniper East Low MOA, which are reported separately

Legend: ATCAA = Air Traffic Control Assigned Airspace; dB = decibel; DNL = Day-Night Average Sound Level; L_{dnmr} = Onset-Rate Adjusted Monthly Day-Night Average A-weighted Sound Level; MOA = Military Operations Area.

The greatest DNL/L_{dnmr} of 47 dB would occur in the Juniper Low and Juniper East Low MOAs due to the lower floor and lower altitudes flown in these areas. The rest of the Juniper/Hart MOA complex outside of the Juniper Low and Juniper East Low areas would experience DNL/L_{dnmr} of less than 35 dB. Both Goose North and Goose South MOAs would experience DNL/L_{dnmr} of 44 dB. The DNL/L_{dnmr} in Dolphin North and South MOA would be less than 35 dB due to the relatively small number of sorties spread over a large area with a minimum altitude of 11,000 feet MSL. Overall, there would be an approximate 1 dB reduction in DNL/L_{dnmr} across the military training airspace under the No Action Alternative when compared to Existing Conditions (2023).

4.2.3 Modeling Data (Supersonic)

The existing operating areas for the supersonic operations by the 173 FW comprise the Juniper/Hart MOA Complex limited to above 30,000 feet to minimize supersonic noise at ground level where human receptors could be impacted, which would continue but at a reduced number of annual operations.

4.2.4 Noise Exposure (Supersonic)

Using BOOMAP2021 software, the maximum CDNL would be 36 dBC, which occurs roughly in the center of the Juniper/Hart MOA complex. The CDNL would remain relatively low due primarily to the 30,000-foot MSL minimum altitude requirement for supersonic operations within the Juniper/Hart MOA complex.

5.0 PROPOSED ACTION ALTERNATIVE AND AFTERBURNER SCENARIOS

The following section details the modeling data and the resultant noise exposure for three afterburner scenarios, in which the F-35A aircraft would replace the F-15C/D aircraft of the 173 FW at LMT, as described in Section 1.1. All other aircraft operations (other than the 173 FW) are assumed to remain unchanged from those described in Section 4.0, *No Action Alternative*.

5.1 Installation

5.1.1 Modeling Data

The Proposed Action would replace the existing F-15C/D aircraft with 24 PAA plus 2 BAA F-35A aircraft at LMT/Kingsley Field ANGB. The annual flying program for the F-35A is 250 hours per aircraft. Though aircraft may not achieve the full amount of annual flying hours, this analysis evaluates the full 250 hours per aircraft. Thus, with 24 PAA proposed for the F-35A, the total flying hour program for the 173 FW would be 6,000 hours annually. An average sortie duration of 1.3 equates to 4,615 annual sorties conducted at LMT/Kingsley Field ANGB. Resulting annual operations would be:

- Approximately 6,000 annual flying hours with an average sortie duration of 1.3 hours
- 4,615 annual F-35A sorties
- 20,780 annual airfield operations
  - 4,615 departures
  - 4,615 arrivals
  - 9,230 closed pattern ops
  - 2,320 Precautionary Flameout (PFO) training operations (1,160 PFO or chase, plus upwind departure or downwind turn after the PFO low approach)
- Same Daytime (0700–2200) and Nighttime (2200–0700) distribution as existing F-15C/D
- All other airfield operations would remain the same under the Proposed Action as presented in Section 4.0, *No Action Alternative*.

Although not directly a part of the Proposed Action, the noise study includes three modeled scenarios of different rates of afterburner use on departure operations at LMT/Kingsley Field ANGB. Afterburner use on departure results in greater acceleration and climb ability while within the airfield boundary, which generally provides a greater level of safety when compared with the lower thrust of military power departures. Because the 173 FW would support an FTU, the 95 percent afterburner scenario would be the most likely (and is carried forward in the EIS) but all three potential afterburner scenarios are analyzed in this Noise Study.

Table 5-1 details the modeled annual flight operations at LMT that would occur under any of the three proposed afterburner scenarios. Should the F-35A be based at LMT, that would eliminate all F-15C/D operations and would add 20,780 F-35A flight operations per year. All other aircraft operations would remain the same as described under the No Action Alternative, resulting in a total of 50,280 annual operations.

Table 5-1 Proposed Action Annual Airfield Operations at LMT/Kingsley Field ANGB (2029)

Aircraft	*Departures*		*Arrivals*		*Closed Patterns Ops*[2]		*Total*		*Total*
	Day	*Night*	*Day*	*Night*	*Day*	*Night*	*Day*	*Night*	
F-35A	5,659	0	5,522	137	9,187	275	20,368	412	20,780
Contract ADAIR	800	0	776	24	160	0	1,736	24	1,760
Civil	9,818	178	9,818	178	6,110	0	25,746	356	26,102
Transients	815	0	815	0	8	0	1,638	0	1,638
Total	**17,092**	**178**	**16,931**	**339**	**15,465**	**275**	**49,488**	**792**	**50,280**

Notes: [1]Civil operations represent the combined annual runway operations of Air Carrier, Air Transport, and General Aviation.
[2]A portion of Local civil aircraft operations modeled as departures/arrivals because a significant portion of local GA flights involve departures and arrivals to the nearby practice area, in addition to touch and go pattern operations.
Legend: ADAIR = Adversary Air; ANGB = Air National Guard Base; LMT = Crater Lake-Klamath Regional Airport; Ops = operations.
Sources: FAA 2024b; NGB 2024b; DAF 2020.

5.1.1.1 Departures

The principal difference between the proposed aircraft afterburner scenarios involves the use of afterburner for departure operations. The following describes the three scenarios considered in this analysis:

- F-35A Scenario A = F-35A afterburner use on 5 percent of departures
- F-35A Scenario B = F-35A afterburner use on 50 percent of departures
- F-35A Scenario C = F-35A afterburner use on 95 percent of departures (most likely)

5.1.1.2 Arrivals and Closed Patterns

The F-35A proposed scenarios would follow the same arrival types at similar rates proportional to the existing F-15C/D and would perform closed patterns at LMT only as required (primarily for Functional Check Flights).

5.1.1.3 DNL Nighttime (10 p.m.–7 a.m. [2200–0700]) Operations

DNL Nighttime operations at LMT would remain near zero for the F-35A proposed scenarios with DNL nighttime operations comprising 2 percent of operations.

5.1.1.4 Runway Use

The proposed F-35A aircraft would utilize LMT runways at the same proportion as the No Action Alternative. Table A-3 in Appendix A provides details on the modeled runway utilization for military aircraft, which is applicable to all modeled scenarios.

5.1.1.5 Maintenance or Static Operations

Table 5-2 presents the representative run-up operations profiles for the F-35A alternatives that would replace the existing F-15C/D run-ups. Note that the run-up type operations for F-35A would not change for the analyzed ‘afterburner scenarios,’ which only apply to departure flight operations.

Table 5-2 F-35A Annual Maintenance and Ground Engine Runs

Aircraft	*Description*	*Pad*	*Heading*	*Power (%ETR[1])*	*Num Engines*	*Duration*	*Annual Events[2]*	*Day/Night Split[3]*
F-35A	BIT	MAIN APRNa/ MAIN APRNb	110	10	1	5 mins	150	90% / 10%
			110	31	1	3 mins		
			110	10	1	5 mins		
	High Speed, Low Thrust	MAIN APRNa/ MAIN APRNb	110	10	1	5 mins	50	90% / 10%
			110	10	1	3 mins		
			110	10	1	5 mins		

Notes: [1]ETR = Engine Thrust Request.
[2]Maintenance and ground run-ups would be the same for all modeled F-35A ‘Afterburner’ take-off scenarios.
[3]Day = 0700–2200, Night = 2200–0700.
Legend: % = percent; BIT = Built in Test.

5.1.2 Noise Exposure

Sections 5.1.2.1 through 5.1.2.6 focus on DoD best practices for impact analysis at airfields, as summarized in DNWG guidance (DNWG 2009a). FAA Order 1050.1G impact analysis applicable to airfields is presented in Section 5.1.2.7.

5.1.2.1 Day-Night Average Sound Level Contours and Point of Interest Levels

Figure 5-1 shows the DNL noise contours from 65 to 85 dB in 5-dB increments for the F-35A at LMT with 5 percent afterburner usage. As with the No Action Alternative operations, noise generated by aircraft operations at LMT would occur within and outside of the airfield. Portions of the DNL 65 dB contour extend north of the airfield by 2.2 miles, to the east and to the west 0.4 mile, and to the south 2 miles. As depicted in Figure 5-2, when compared with the No Action Alternative, the F-35A 5 percent afterburner scenario would result in an increase in the size of the DNL contours in all directions as a result of the proposed increase in operations and the higher noise levels of the F-35A as compared to the F-15C/D.

Figure 5-3 shows the DNL noise contours from 65 to 85 dB in 5-dB increments for the F-35A at LMT with 50 percent afterburner usage. As with No Action Alternative operations, noise generated by aircraft operations at LMT would occur within and outside of the airfield. Portions of the DNL 65 dB contour extend north of the airfield by 2.2 miles, to the east 0.4 miles, to the west 0.5 mile, and to the south 2 miles. As depicted in Figure 5-4, when compared with the No Action Alternative, the F-35A 50 percent afterburner scenario would result in an increase in the size of the DNL contours in all directions as a result of the proposed increase in operations and the higher noise levels of the F-35A as compared to the F-15C/D.

Figure 5-5 shows the DNL noise contours from 65 to 85 dB in 5-dB increments for the F-35A at LMT with 95 percent afterburner usage. As with the No Action Alternative operations, noise generated by aircraft operations at LMT would occur within and outside of the airfield. Portions of the DNL 65 dB contour extend north of the airfield by 2.2 miles, to the east 0.4 mile, to the west 0.5 mile, and to the south 2 miles. As depicted in Figure 5-6, when compared with the No Action Alternative, the F-35A 95 percent afterburner scenario would result in an increase in the size of the DNL contours in all directions as a result of the proposed increase in operations and the higher noise levels of the F-35A as compared to the F-15C/D. Figure 5-7 shows a comparison of the 65 dB noise contours for the Existing Conditions (2023), No Action Alternative, and the Proposed Action 5 percent, 50 percent, and 95 percent afterburner scenarios.

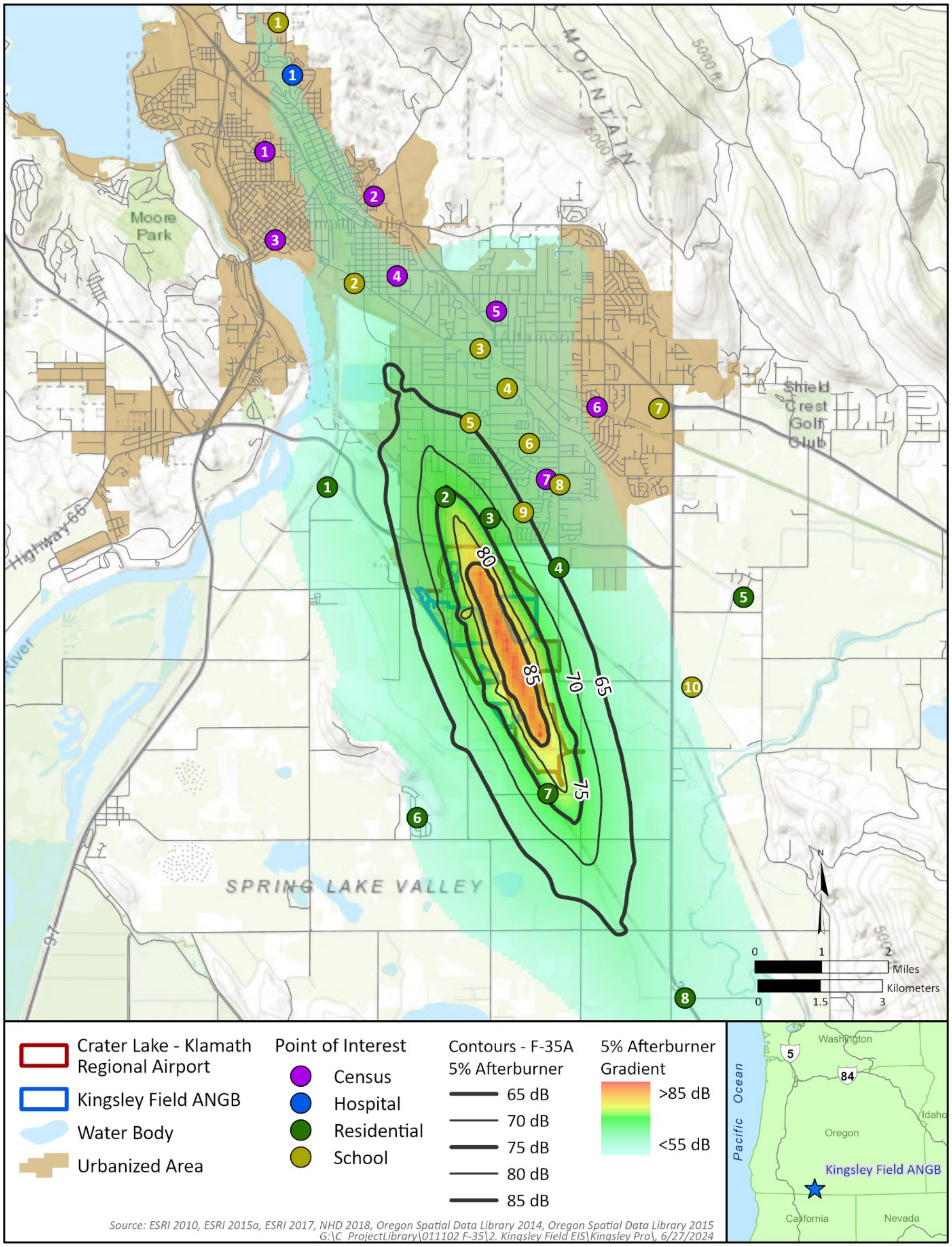


Figure 5-1 Proposed Action F-35A DNL Contours and Gradient (5% Afterburner)

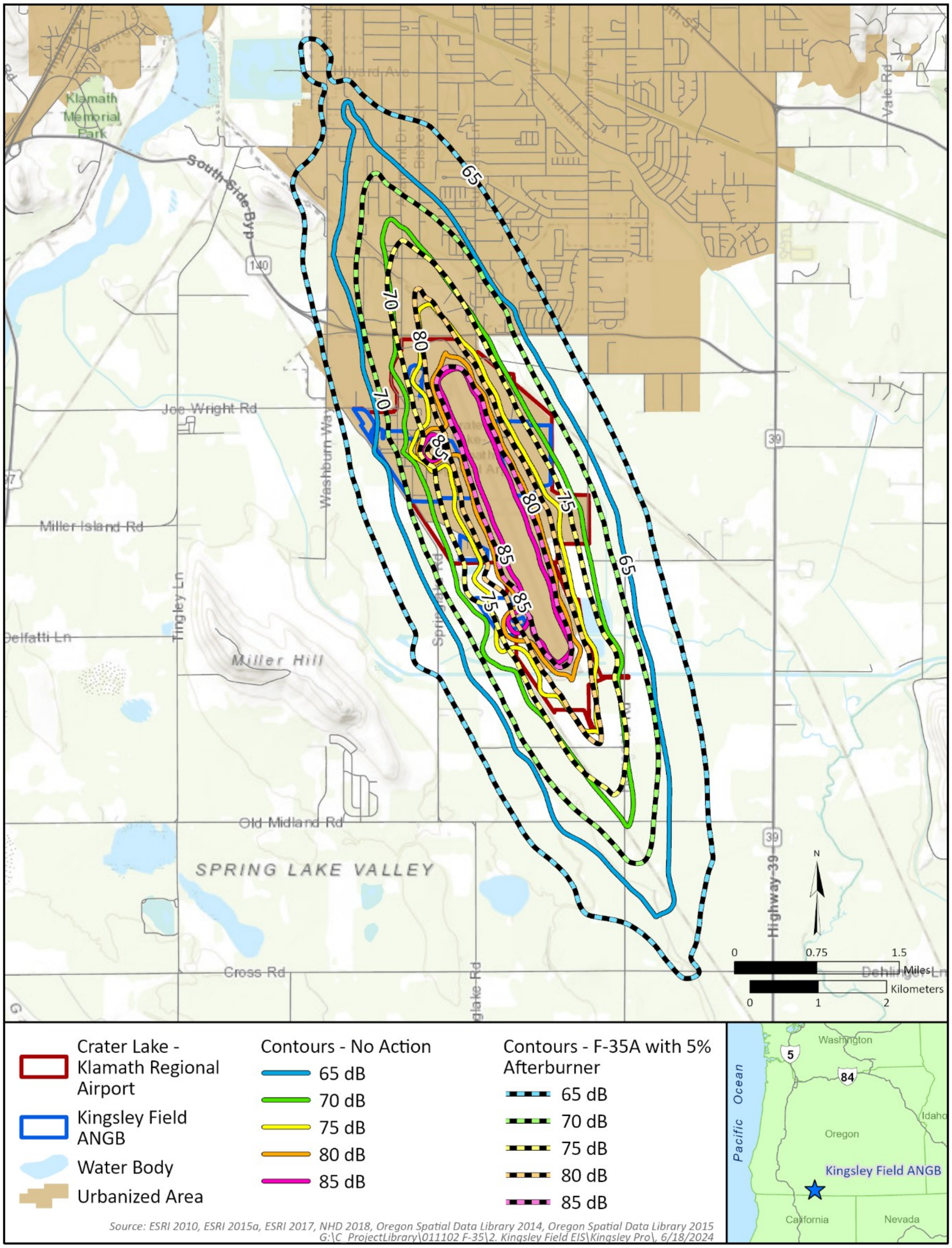


Figure 5-2 Proposed Action F-35A (5% Afterburner) DNL Contours Comparison to No Action Alternative

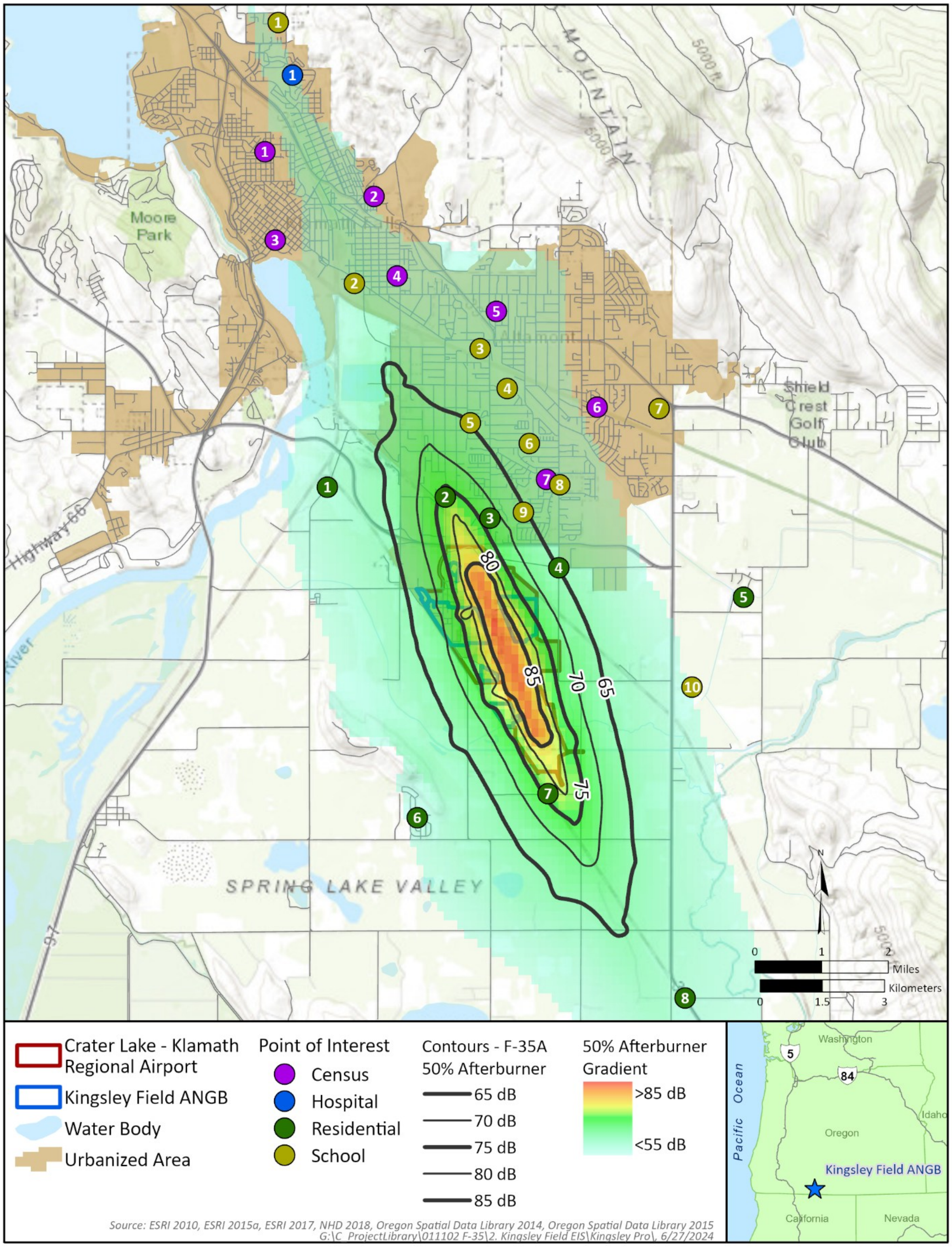


Figure 5-3 Proposed Action F-35A DNL Contours and Gradient (50% Afterburner)

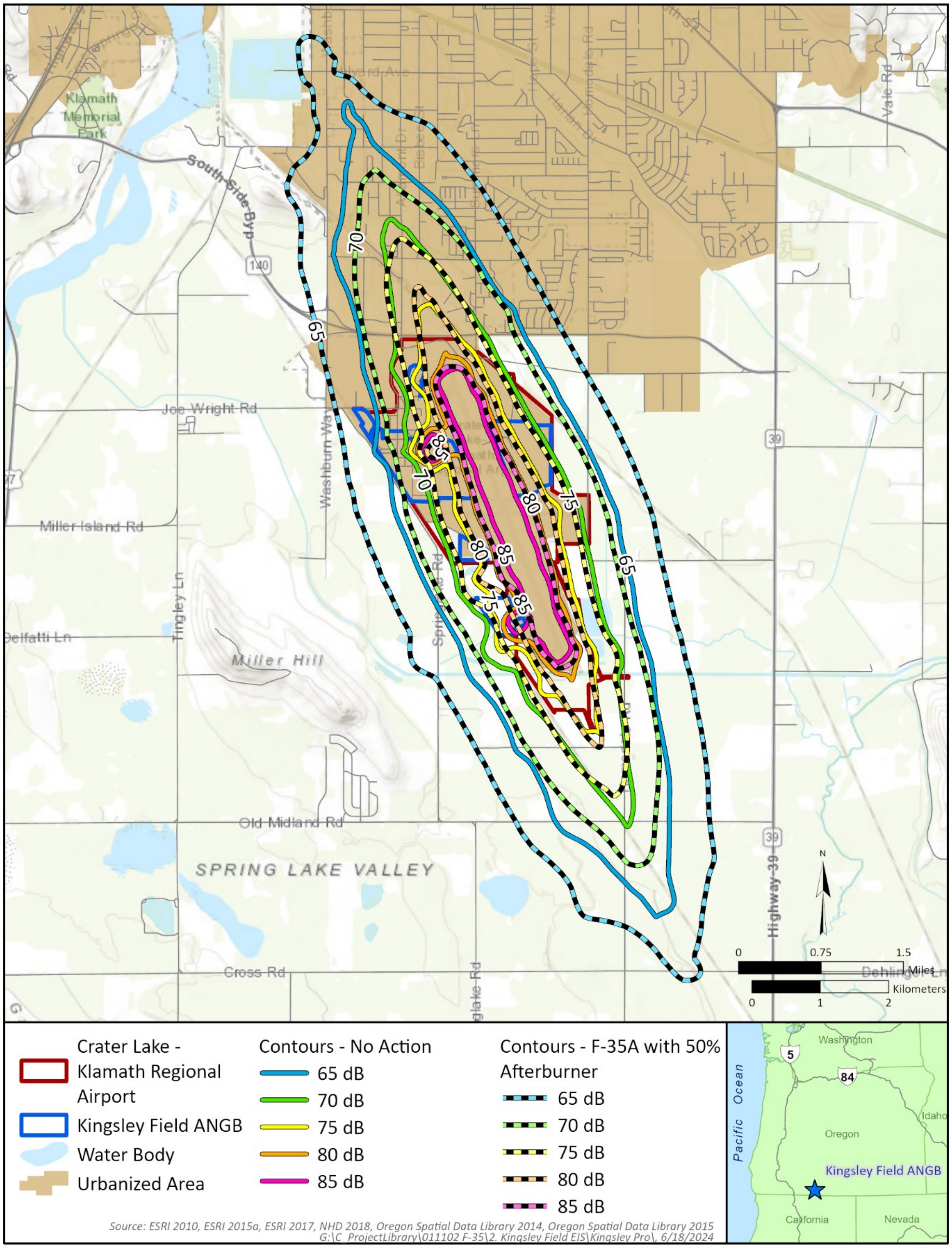


Figure 5-4 Proposed Action F-35A (50% Afterburner) DNL Contours Comparison to No Action Alternative

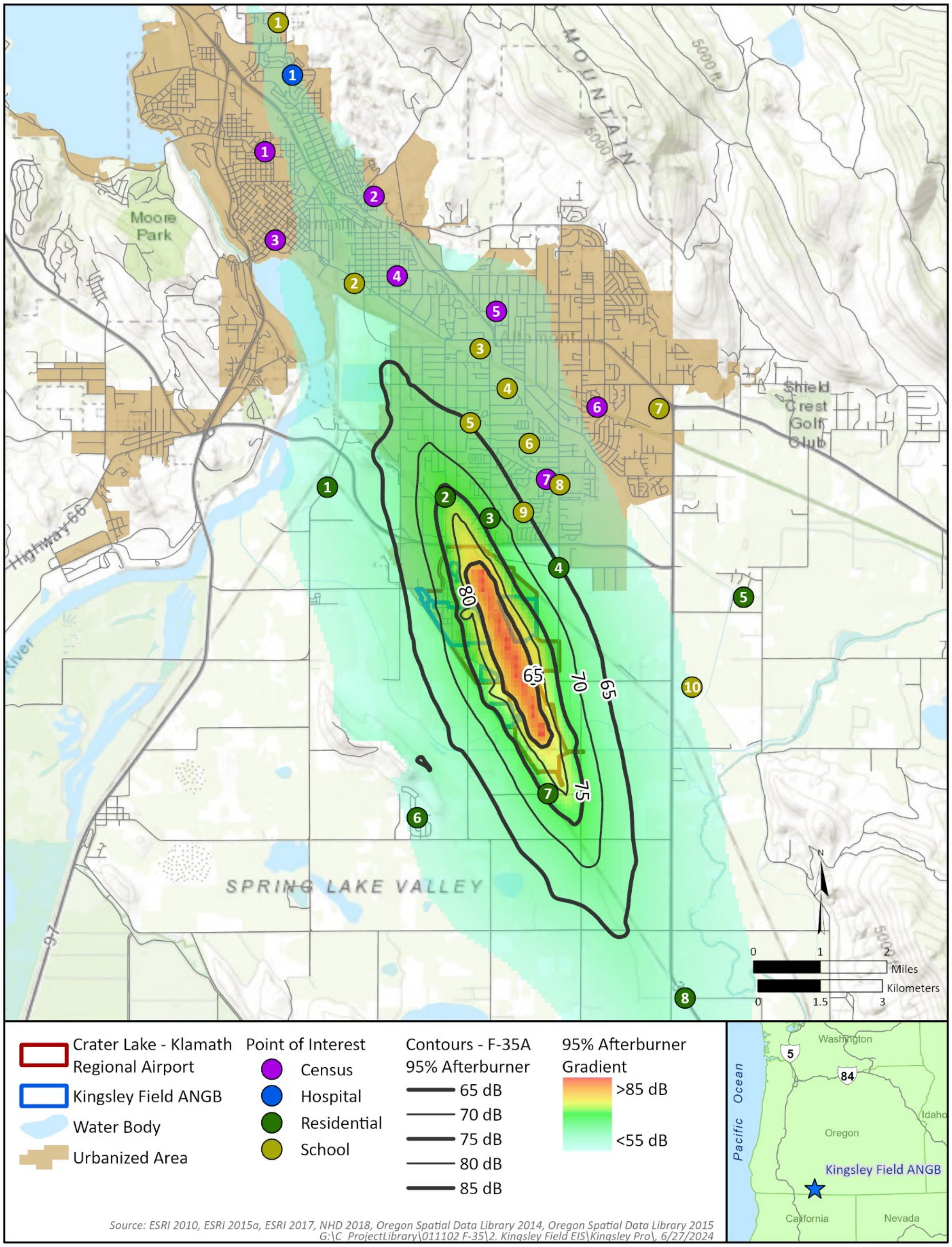


Figure 5-5 Proposed Action F-35A DNL Contours and Gradient (95% Afterburner)

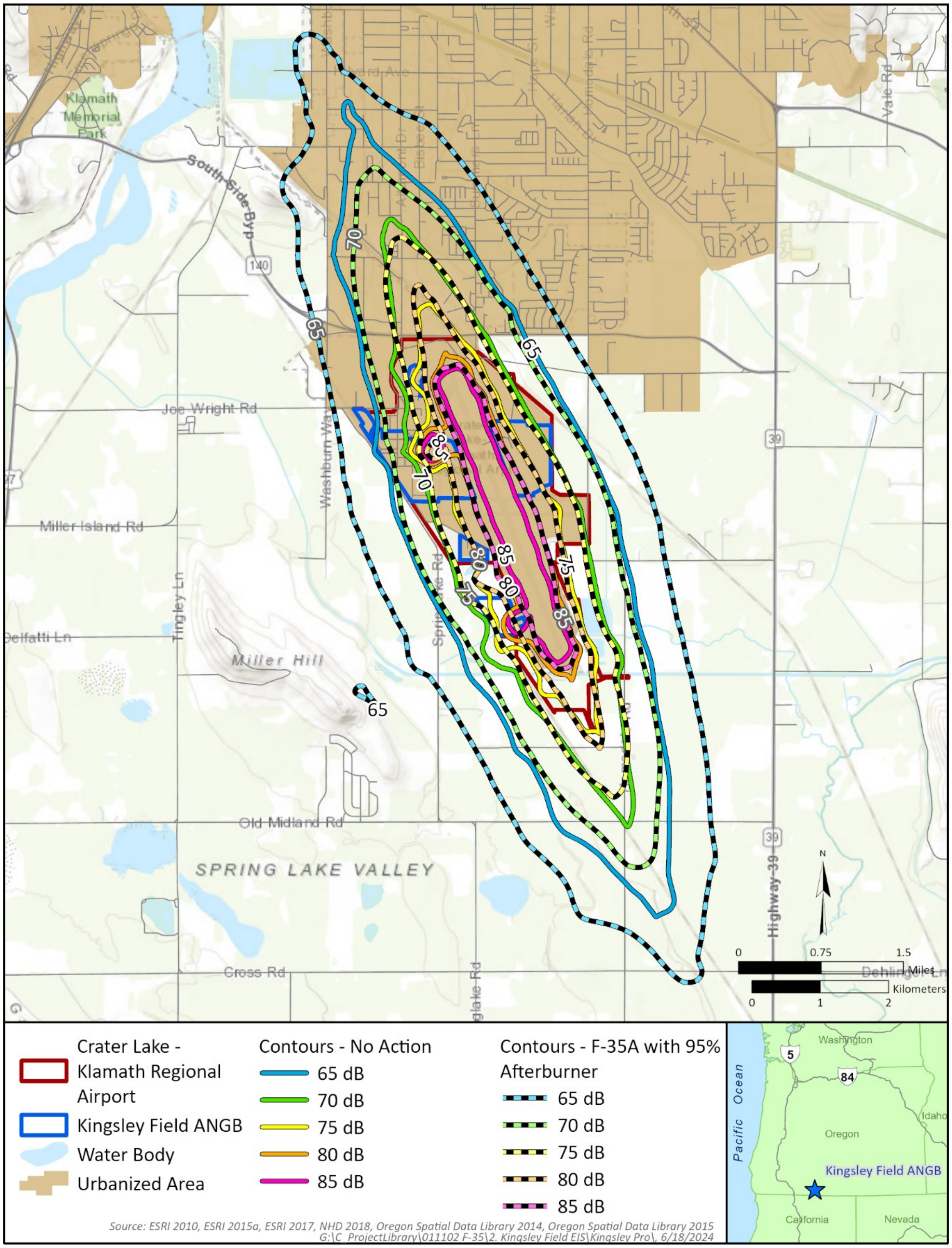


Figure 5-6 Proposed Action F-35A Comparison to No Action DNL Contours (95% Afterburner Departure Assumption)

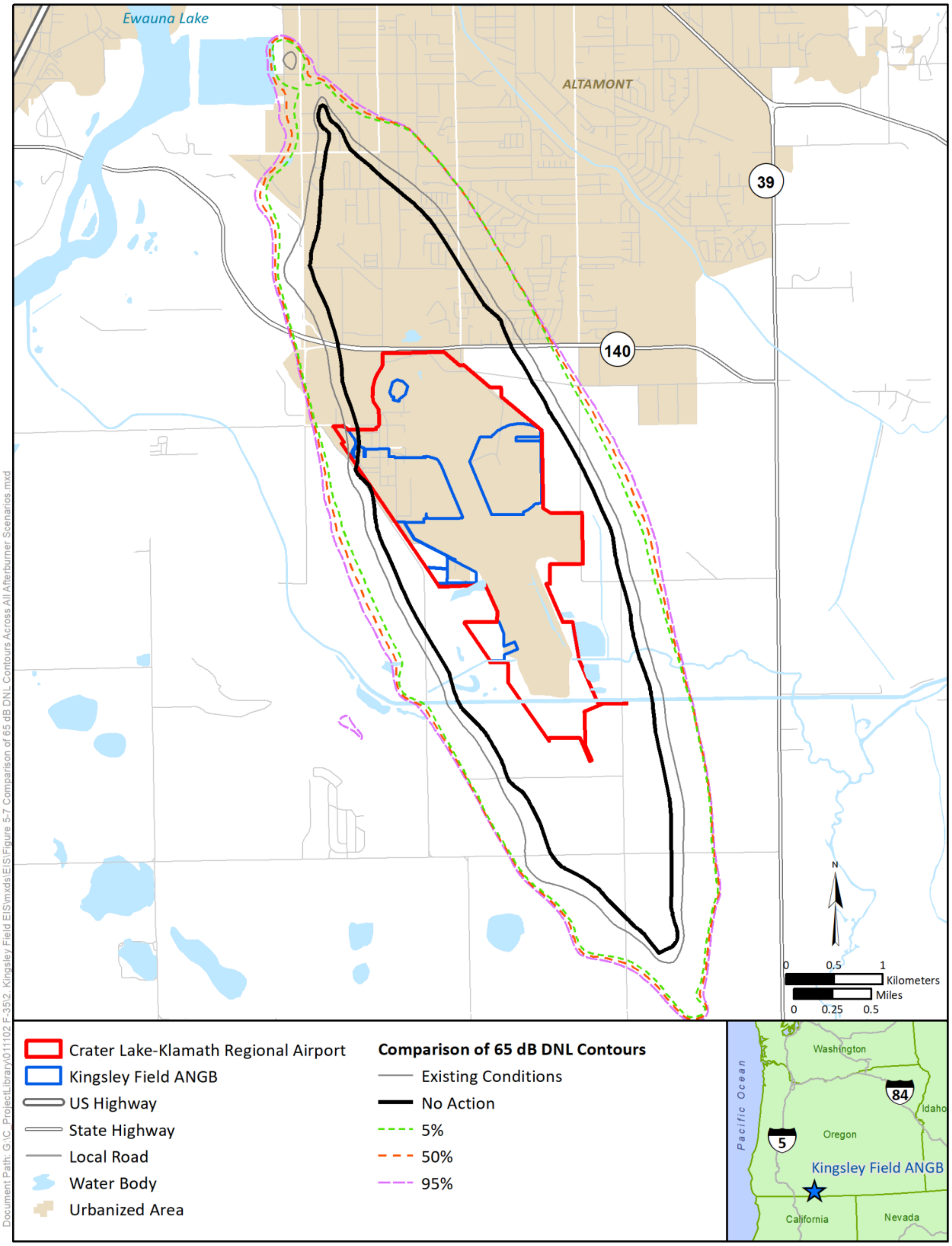


Figure 5-7 Comparison of DNL 65 dB Contours for Existing Conditions (2023), No Action Alternative, and Proposed Action F-35A Afterburner Scenarios

The three F-35A afterburner scenarios would result in very similar DNL 65 dB contours that would be larger than the No Action Alternative in all areas off-airport. The 95 percent afterburner condition would generally create the largest DNL 65 dB contour, followed by 50 percent afterburner in the middle, and 5 percent afterburner would be the smallest contour. This occurs because the F-35A engine generates greater noise levels while using afterburner during the initial acceleration along the runway contributing more noise adjacent to LMT. Because the F-35A would reduce power from afterburner to military power before the end of the runway and within the airport boundary, the effect on the DNL contours would be small. Additionally, the largest contributor to the length of the DNL 65 dB contours to the northwest and southeast would be closed pattern operations, which would be the same across the three F-35A afterburner scenarios. To the northeast, the largest contour is the 5 percent afterburner while the 95 percent afterburner would be the smallest. This occurs because a portion of departures turn right over the city in this general area. The additional thrust during the start of afterburner departures allows the F-35A to gain speed and altitude quicker along this turning flight path, reaching a slightly greater altitude and generating less noise at the ground. Although, in this case the difference in DNL would be very small and may not be perceptible.

Table 5-3 details the calculated DNL and the numbers of POIs that would be exposed to relevant DNL thresholds of 65, 70, and 75 dB at all POIs for the No Action Alternative and the three F-35A scenario alternatives. The F-35A 5 percent scenario would result in 5 POIs exposed to DNL of 65 dB or greater (an increase of 2 POIs). The F-35A 50 and 95 percent scenarios would result in 6 POIs exposed to DNL of 65 dB or greater (an increase of 3 POIs). The greatest DNL of 77 dB would occur at R02 Anderson Avenue and Altamont Drive under all three proposed F-35A scenarios followed by DNL of 76 dB at R07 Lombardy Lane and railroad tracks. In terms of change in DNL, all three scenarios would experience a similar increase of 1 to 5 dB greater than the No Action Alternative.

Table 5-3 DNL at POIs for Proposed Action F-35A Afterburner Scenarios Adjacent to LMT

Map ID	*Named Point of Interest*	*No Action*	*F-35A 5% AB*	*F-35A 50% AB*	*F-35A 95% AB*
C01	Census Tract 9719	52	52 (0)	52 (0)	53 (+1)
C02	Census Tract 9717	53	54 (+1)	55 (+2)	55 (+2)
C03	Census Tract 9718	51	52 (+1)	53 (+2)	54 (+3)
C04	Census Tract 9716	56	57 (+1)	58 (+2)	58 (+2)
C05	Census Tract 9712	55	59 (+4)	58 (+3)	57 (+2)
C06	Census Tract 9713	50	54 (+4)	54 (+4)	53 (+3)
C07	Census Tract 9714	58	61 (+3)	61 (+3)	61 (+3)
H01	Sky Lakes Medical Center	55	56 (+1)	56 (+1)	57 (+2)
R01	Neighborhood	57	60 (+3)	60 (+3)	60 (+3)
R02	Anderson Avenue and Altamont Drive	**73**[1]	**77 (+4)**[1]	**77 (+4)**[1]	**77 (+4)**[1]
R03	Highland Way and Summit Street	**68**[1]	**72 (+4)**[1]	**72 (+4)**[1]	**73 (+5)**[1]
R04	Airway Drive and Homedale Road	61	64 (+3)	**65 (+4)**[1]	**65 (+4)**[1]
R05	Neighborhood	46	51 (+5)	51 (+5)	51 (+5)
R06	Neighborhood	54	56 (+2)	56 (+2)	56 (+2)
R07	Lombardy Lane and railroad tracks	**71**[1]	**76 (+5)**[1]	**76 (+5)**[1]	**76 (+5)**[1]
R08	Neighborhood	57	59 (+2)	59 (+2)	59 (+2)
S01	Oregon Institute of Technology	53	54 (+1)	54 (+1)	54 (+1)

Map ID	*Named Point of Interest*	*No Action*	*F-35A 5% AB*	*F-35A 50% AB*	*F-35A 95% AB*
S02	Klamath Family Head Start	59	60 (+1)	61 (+2)	61 (+2)
S03	Triad School	57	60 (+3)	60 (+3)	59 (+2)
S04	Mazama High School	56	61 (+5)	60 (+4)	60 (+4)
S05	Stearns Elementary School	61	**65 (+4)** [1]	**65 (+4)** [1]	**65 (+4)** [1]
S06	Peterson Elementary	58	61 (+3)	61 (+3)	61 (+3)
S07	Klamath Community College	47	50 (+3)	50 (+3)	49 (+2)
S08	Brixner Junior High School	57	60 (+3)	60 (+3)	60 (+3)
S09	Hosanna Christian School	62	**65 (+3)** [1]	**66 (+4)** [1]	**66 (+4)** [1]
S10	Henley High School	52	55 (+3)	55 (+3)	55 (+3)

Note: [1]Bold represents results that would exceed DNL 65 dB, which is the level at which the Air Force begins recommending land use controls for noise sensitive uses.

Legend: A/B = afterburner; DNL = Day-Night Average Sound Level; ID = Identification; LMT = Crater Lake-Klamath Regional Airport; POI = Point of Interest.

Table 5-4 presents the change in DNL at each POI for each action F-35A scenario relative to the No Action Alternative along with a summary of the number of POIs experiencing a decrease, no change, or several magnitudes of increase. The number of POIs exposed to DNL 70 dB or greater would increase from 2 to 3 and of those POIs, the number also exposed to 75 dB would increase by 2 from the No Action Alternative for all three proposed F-35A scenarios. The F-35A 5 percent scenario would result in 1 POI that would experience no change to DNL, 6 POIs that would experience an increase in DNL of 1 dB, 17 POIs that would experience an increase in DNL of 2 to 4 dB, and 2 POIs that would experience an increase in DNL of 5 dB or greater. The F-35A 50 percent scenario would result in 1 POI that would experience no change to DNL, 2 POIs that would experience an increase in DNL of 1 dB, 22 POIs that would experience an increase in DNL of 2 to 4 dB, and 1 POI that would experience an increase in DNL of 5 dB or greater. The F-35A 95 percent scenario would result in no POIs that would experience no change to DNL, 2 POIs that would experience an increase in DNL of 1 dB, 21 POIs that would experience an increase in DNL of 2 to 4 dB, and 3 POIs that would experience an increase in DNL of 5 dB or greater.

Table 5-4 Change to DNL at POIs for Proposed Action F-35A Afterburner Scenarios Adjacent to LMT

Condition	*No Action Alternative*	*F-35A 5% AB*	*F-35A 50% AB*	*F-35A 95% AB*
Number of POIs exposed to DNL 65 dB or greater	3	5	6	6
Number of POIs exposed to DNL 70 dB or greater	2	3	3	3
Number of POIs exposed to DNL 75 dB or greater	0	2	2	2
Change to number of POIs exposed to DNL 65 dB		+2	+3	+3
Change to number of POIs exposed to DNL 70 dB		+1	+1	+1
Change to number of POIs exposed to DNL 75 dB		+2	+2	+2
Number of POIs with decrease of 1 dB or greater		0	0	0
Number of POIs with no change		1	1	0
Number of POIs with increase of 1 dB		6	2	2
Number of POIs with increase of 2 to 4 dB		17	22	21
Number of POIs with increase of 5 dB or greater		2	1	3

Legend: % = percent; AB = afterburner; dB = decibel; DNL = Day-Night Average Sound Level; LMT = Crater Lake-Klamath Regional Airport; POI = Point of Interest.

5.1.2.2 Acreage, Housing, and Population

Table 5-5 presents acreage for both on and adjacent to LMT for all proposed alternatives and the change in acreage relative to Existing Conditions (2023). Under the F-35A 5 percent scenario, acreage adjacent to LMT exposed to greater than DNL 65 dB would be 4,164, an increase of 1,987 from the No Action Alternative. The acreage would be composed of 2,619 acres exposed to DNL 65 to 70 dB (an increase of 1,061 acres), 1,066 acres exposed to DNL 70 to 75 dB (an increase of 537 acres), 410 acres exposed to DNL 75 to 80 dB (an increase of 321 acres), 71 acres exposed to DNL 80 to 85 dB (an increase of 69 acres). No areas off-airport would be exposed to DNL greater than 85 dB under the F-35A 5 percent scenario.

Table 5-5 Acreage within DNL for Proposed Action F-35A Afterburner Scenarios on and Adjacent to LMT

Scenario	*DNL (dB)*	*On LMT*	*Adjacent to LMT*	*Total*	*Change Relative to No Action Alternative*		
					On LMT	*Adjacent to LMT*	*Total*
F-35A 5% AB	65–70	40	2,619	2,659	-93	+1,061	+968
	70–75	215	1,066	1,281	-69	+537	+468
	75–80	328	410	738	-6	+321	+315
	80–85	313	71	384	+109	+69	+178
	85+	351	0	351	+71	0	+71
	Total >65 dB	**1,247**	**4,164**	**5,412**	**+13**	**+1,987**	**+2,000**
F-35A 50% AB	65–70	34	2,707	2,741	-99	+1,149	+1,050
	70–75	194	1,130	1,324	-90	+601	+511
	75–80	328	421	750	-7	+333	+326
	80–85	317	81	399	+113	+80	+193
	85+	375	0	375	+96	0	+96
	Total >65 dB	**1,247**	**4,340**	**5,588**	**+13**	**+2,163**	**+2,176**
F-35A 95% AB	65–70	29	2,788	2,817	-104	+1,229	+1,126
	70–75	174	1,192	1,366	-110	+663	+553
	75–80	328	435	763	-7	+346	+340
	80–85	324	90	413	+120	+88	+208
	85+	393	2	394	+114	+2	+115
	Total >65 dB	**1,247**	**4,506**	**5,753**	**+13**	**+2,329**	**+2,342**

Note: Totals may not add due to rounding.
Legend: % = percent; > = greater than; A/B = afterburner; dB = decibel; DNL = Day-Night Average Sound Level; LMT = Crater Lake-Klamath Regional Airport.

Under the F-35A 50 percent afterburner scenario, acreage adjacent to LMT exposed to greater than DNL 65 dB would be 4,340, an increase of 2,163 from the No Action Alternative. The acreage would be composed of 2,707 acres exposed to DNL 65 to 70 dB (an increase of 1,149 acres), 1,130 acres exposed to DNL 70 to 75 dB (an increase of 601 acres), 421 acres exposed to DNL 75 to 80 dB (an increase of 333 acres), 81 acres exposed to DNL 80 to 85 dB (an increase of 80 acres). No areas off-airport would be exposed to DNL greater than 85 dB under the F-35A 50 percent scenario.

Under the F-35A 95 percent scenario, acreage adjacent to LMT exposed to greater than DNL 65 dB would be 4,506 an increase of 2,329 from the No Action Alternative. The acreage would be composed of 2,788 acres exposed to DNL 65 to 70 dB (an increase of 1,229 acres), 1,192 acres exposed to DNL 70 to 75 dB (an increase of 663 acres), 435 acres exposed to DNL 75 to 80 dB (an increase of 346 acres), 90 acres exposed to DNL 80 to 85 dB (an increase of 88 acres), and 2 acres exposed to greater than DNL 85 dB (an increase of 2 acres).

Table 5-6 presents the acreage, households, and population estimations by DNL band for each proposed scenario at LMT for areas adjacent to LMT.

Table 5-6 Acreage, Households, and Estimated Population by DNL Contour Adjacent to LMT (Proposed Action and No Action Alternative)

Scenario	*DNL (dB)*	*Acreage Adjacent to LMT*	*Households*	*Estimated Population*	*Change from No Action Alternative*		
					Acreage	*Households*	*Estimated Population*
F-35A 5% AB	65–70	2,619	1,118	2,774	+1,061	+530	+1,315
	70–75	1,066	371	921	+537	+71	+177
	75–80	410	244	606	+321	+186	+461
	80–85	71	0	0	+69	+0	+0
	85+	0	0	0	+0	+0	+0
	Total	**4,164**	**1,733**	**4,301**	**+1,987**	**+787**	**+1,953**
F-35A 50% AB	65–70	2,707	1,155	2,866	+1,149	+567	+1,407
	70–75	1,130	393	975	+601	+93	+231
	75–80	421	251	623	+332	+193	+478
	80–85	81	1	3	+79	+1	+3
	85+	0	0	0	+0	+0	+0
	Total	**4,340**	**1,800**	**4,467**	**+2,163**	**+854**	**+2,119**
F-35A 95% AB	65–70	2,788	1,190	2,953	+1,229	+602	+1,494
	70–75	1,192	415	1,030	+663	+115	+286
	75–80	435	259	643	+346	+201	+498
	80–85	90	1	3	+88	+1	+3
	85+	2	0	0	+2	0	0
	Total	**4,506**	**1,865**	**4,629**	**+2,329**	**+919**	**+2,281**

Note: Totals may not add due to rounding.
Households and population within the DNL 80 dB and greater determined through review of aerial imagery.
Legend: % = percent; A/B = afterburner; dB = decibel; DNL = Day-Night Average Sound Level; LMT = Crater Lake-Klamath Regional Airport.

Under the F-35A 5 percent scenario, a total of 1,733 households and 4,301 people would be exposed to DNL of 65 dB or greater, an increase of 787 households and 1,953 people. Of those totals, 371 households and 921 people would be exposed to DNL 70 to 75 dB (an increase of an additional 71 households and 177 people), 244 households and 606 people would be exposed to DNL 75 to 80 dB (an increase of an additional 186 households and 461 people). As confirmed through a review of aerial imagery, no households or people would be exposed to DNL greater than 80 dB. These changes would be due to the general increase in length and width of the DNL 65 dB contour to the north caused by the increase in operations, and the greater noise generated by the F-35A on departures.

Under the F-35A 50 percent scenario, a total of 1,800 households and 4,467 people would be exposed to DNL of 65 dB or greater, an increase of 854 households and 2,119 people. Of those totals, 393 households and 975 people would be exposed to DNL 70 to 75 dB (an increase of an additional 93 households and 231 people), 251 households and 623 people would be exposed to DNL 75 to 80 dB (an increase of an additional 193 households and 478 people). As confirmed through a review of aerial imagery, no households or people would be exposed to DNL greater than 80 dB. These changes would be due to the general increase in length and width of the DNL 65 dB contour to the north caused by the increase in operations, and the greater noise generated by the F-35A on departures.

Under the F-35A 95 percent scenario, a total of 1,865 households and 4,629 people would be exposed to DNL of 65 dB or greater, an increase of 919 households and 2,281 people. Of those totals, 415 households and 1,030 people would be exposed to DNL 70 to 75 dB (an increase of an additional 115 households and 286 people), 259 households and 643 people would be exposed to DNL 75 to 80 dB (an increase of an additional 201 households and 498 people). A review of aerial imagery found one household within the DNL 80 dB and none exposed to DNL 85 dB, which would be an increase of one household from the No Action Alternative. These changes would be due to the general increase in length and width of the DNL 65 dB contour to the north caused by the increase in operations, and the greater noise generated by the F-35A on departures.

Because households would be exposed to DNL of 80 dB or greater, Section 5.1.2.6 provides an analysis of the PHL

5.1.2.3 Classroom Learning Interference

Table 5-7 presents $L_{eq(8hr)}$ for the 10 school POIs. Under all three F-35A scenarios, the number of school POIs exposed to greater than 60 dB $L_{eq(8hr)}$ would remain at 7 consistent with the No Action Alternative. The $L_{eq(8hr)}$ at each POI would increase 1 to 5 dB except at S01 Oregon Institute of Technology, which would decrease by 1 dB $L_{eq(8hr)}$ under the 5 percent afterburner scenario.

Table 5-7 Classroom Screening Criteria ($L_{eq[8hr]}$) for POIs Adjacent to LMT

ID	***Location***	***No Action Alternative***	***F-35A 5% AB***	***F-35A 50% AB***	***F-35A 95% AB***
S01	Oregon Institute of Technology	57	56 (-1)	58 (+1)	59 (+2)
S02	Klamath Family Head Start	**62**[3]	**63 (+1)**[3]	**65 (+3)**[3]	**65 (+3)**[3]
S03	Triad School	**61**[3]	**64 (+3)**[3]	**65 (+4)**[3]	**64 (+3)**[3]
S04	Mazama High School	**60**[3]	**65 (+5**[3]	**65 (+5)**[3]	**64 (+4)**[3]
S05	Stearns Elementary School	**65**[3]	**69 (+4)**[3]	**69 (+4)**[3]	**69 (+4)**[3]
S06	Peterson Elementary	**62**[3]	**65 (+3)**[3]	**65 (+3)**[3]	**65 (+3)**[3]
S07	Klamath Community College	51	54 (+3)	54 (+3)	54 (+3)
S08	Brixner Junior High School	**61**[3]	**64 (+3)**[3]	**64 (+3)**[3]	**64 (+3)**[3]
S09	Hosanna Christian School	**65**[3]	**69 (+4)**[3]	**70 (+5)**[3]	**70 (+5)**[3]
S10	Henley High School	56	58 (+2)	59 (+3)	59 (+3)
Number of School POIs greater than 60 dB $L_{eq(8hr)}$		7	7 (+0)	7 (+0)	7 (+0)

Notes: [1]Assumes 90 percent of ANG daytime operations occur during the school day; Windows open condition with NLR of 15 dB due to building attenuation.
[2]Parenthetical number represents the change to $L_{eq(8hr)}$ relative to Existing Conditions (2023).
[3]Bold represents results that would exceed the screening threshold of 60 dB $L_{eq(8hr)}$.

Legend: % = percent; A/B = afterburner; ID = Identification; $L_{eq(8hr)}$ = 8-hour equivalent sound level; LMT = Crater Lake-Klamath Regional Airport; POI = Point of Interest.

Table 5-8 presents the average number of speech interfering events per school day hour from LMT aircraft operations. The 5 percent afterburner scenario would result in 1 additional event per hour at 2 school POIs, 3 additional events at 7 POIs, and no change at 1 POI. Both the 50 and 95 percent afterburner scenarios would result in 1 additional event per hour at 3 POIs, 2 additional events per hour at 4 POIs, and 3 additional events at 3 POIs.

Table 5-8 Classroom Speech Interfering Events per School Day Hour Adjacent to LMT

ID	*Location*	*No Action Alternative*	*F-35A 5% AB*	*F-35A 50% AB*	*F-35A 95% AB*
S01	Oregon Institute of Technology	1	1 (0)	2 (+1)	2 (+1)
S02	Klamath Family Head Start	2	3 (+1)	3 (+1)	3 (+1)
S03	Triad School	2	3 (+1)	3 (+1)	3 (+1)
S04	Mazama High School	2	4 (+2)	4 (+2)	4 (+2)
S05	Stearns Elementary School	2	4 (+2)	5 (+3)	5 (+3)
S06	Peterson Elementary	2	4 (+2)	4 (+2)	4 (+2)
S07	Klamath Community College	1	3 (+2)	4 (+3)	4 (+3)
S08	Brixner Junior High School	2	4 (+2)	4 (+2)	4 (+2)
S09	Hosanna Christian School	3	5 (+2)	6 (+3)	6 (+3)
S10	Henley High School	2	4 (+2)	4 (+2)	4 (+2)

Notes: [1]Assumes 90 percent of ANG daytime operations occur during the school day; Windows open condition with NLR of 15 dB due to building attenuation.
[2]Parenthetical represents the change to average number of classroom speech interfering events per hour relative to Existing Conditions (2023).
Legend: % = percent; A/B = afterburner; ID = Identification; LMT = Crater Lake-Klamath Regional Airport.

Table 5-9 presents the estimated time in minutes during an average school day that interior noise levels would be above an interior level of 50 dB. Under the F-35A 5 percent scenario, 1 school POI would experience no change, 3 school POIs would experience an increase of 1 to 2 minutes per school day, and 6 school POIs would experience an increase of 3 to 5 minutes per school day. Under the F-35A 50 percent scenario, 3 school POIs would experience an increase of 3 to 5 minutes per school day, and 7 school POIs would experience an increase of 6 to 9 minutes per school day. Under the F-35A 95 percent scenario, 2 school POIs would experience an increase of 3 to 5 minutes per school day, 6 school POIs would experience an increase of 6 to 9 minutes per school day, and 2 school POIs would experience an increase of 10 to 14 minutes per school day.

Table 5-9 Classroom Time Above Interior 50 dB during 8-hour School Day Adjacent to LMT

ID	*Location*	*No Action Alternative*	*F-35A 5% AB*	*F-35A 50% AB*	*F-35A 95% AB*
S01	Oregon Institute of Technology	3	4 (+1)	6 (+3)	8 (+5)
S02	Klamath Family Head Start	4	6 (+2)	9 (+5)	10 (+6)
S03	Triad School	3	6 (+3)	9 (+6)	11 (+8)
S04	Mazama High School	3	6 (+3)	9 (+6)	10 (+7)
S05	Stearns Elementary School	4	9 (+5)	12 (+8)	13 (+9)
S06	Peterson Elementary	5	8 (+3)	11 (+6)	12 (+7)
S07	Klamath Community College	5	5 (0)	8 (+3)	9 (+4)
S08	Brixner Junior High School	7	10 (+3)	16 (+9)	21 (+14)
S09	Hosanna Christian School	10	11 (+1)	16 (+6)	20 (+10)
S10	Henley High School	6	11 (+5)	14 (+8)	15 (+9)

Notes: [1]Assumes 90 percent of ANG daytime operations occur during the school day; Windows open condition with NLR of 15 dB due to building attenuation.
[2]Parenthetical represents the change to time above 50 dB, in minutes, relative to Existing Conditions (2023).
Legend: % = percent; A/B = afterburner; dB = decibel; ID = Identification; LMT = Crater Lake-Klamath Regional Airport.

5.1.2.4 Non-school Speech Interference

Table 5-10 details the number of speech interfering events during the DNL daytime (7 a.m. to 10 p.m. [0700 to 2200]) per average day for both windows open and windows closed conditions. With windows open, under all three F-35A scenarios the number of daytime events would range from 1 to 2 per average hour at 9 POIs, 3 to 4 events at 12 POIs, and 5 to 7 events at 5 POIs. With windows closed, under the F-35A 5 percent scenario the number of daytime events would be none at 3 POIs, range from 1 to 2 per average hour at 18 POIs, and 3 to 4 events at 5 POIs. With windows closed, under the F-35A 50 percent scenario the number of daytime events would range from 1 to 2 per average hour at 21 POIs, and 3 to 4 events at 5 POIs. With windows closed, under the F-35A 95 percent scenario the number of daytime events would range from 1 to 2 per average hour at 18 POIs, and 3 to 4 events at 8 POIs.

Table 5-10 Non-School Speech Interfering Events per Day During DNL Daytime (Windows Open/Windows Closed) Adjacent to LMT

ID	*Location*	*No Action Alternative*	*F-35A 5% AB*	*F-35A 50% AB*	*F-35A 95% AB*
C01	Census Tract 9719	1 / 0	1 / 0	1 / 1	1 / 1
C02	Census Tract 9717	1 / 0	2 / 1	2 / 1	2 / 1
C03	Census Tract 9718	1 / 0	2 / 1	2 / 1	2 / 1
C04	Census Tract 9716	1 / 0	2 / 1	2 / 1	2 / 1
C05	Census Tract 9712	1 / 0	2 / 1	2 / 1	2 / 1
C06	Census Tract 9713	1 / 0	3 / 1	3 / 1	3 / 1
C07	Census Tract 9714	2 / 1	3 / 2	3 / 2	3 / 3
H01	Sky Lakes Medical Center	1 / 0	2 / 0	2 / 1	2 / 1
R01	Neighborhood	1 / 1	3 / 2	3 / 2	3 / 2
R02	Anderson Avenue and Altamont Drive	5 / 2	7 / 4	7 / 4	7 / 4
R03	Highland Way and Summit Street	3 / 2	5 / 4	5 / 4	5 / 4
R04	Airway Drive and Homedale Road	3 / 1	5 / 3	5 / 3	5 / 3
R05	Neighborhood	1 / 0	3 / 1	3 / 1	3 / 1
R06	Neighborhood	1 / 1	3 / 2	3 / 2	3 / 2
R07	Lombardy Lane and railroad tracks	5 / 2	7 / 4	7 / 4	7 / 4
R08	Neighborhood	1 / 0	2 / 1	2 / 1	2 / 1
S01	Oregon Institute of Technology	1 / 0	1 / 0	2 / 1	2 / 1
S02	Klamath Family Head Start	2 / 1	3 / 1	3 / 1	3 / 1
S03	Triad School	1 / 0	2 / 1	2 / 1	2 / 1
S04	Mazama High School	1 / 0	3 / 2	3 / 2	3 / 2
S05	Stearns Elementary School	2 / 1	4 / 2	4 / 2	4 / 2
S06	Peterson Elementary	2 / 1	3 / 2	3 / 2	3 / 2
S07	Klamath Community College	1 / 0	3 / 1	3 / 1	3 / 1
S08	Brixner Junior High School	1 / 1	3 / 2	3 / 2	3 / 3
S09	Hosanna Christian School	3 / 1	5 / 3	5 / 3	5 / 3
S10	Henley High School	1 / 1	3 / 2	3 / 2	3 / 3

Note: [1]Values represent events for conditions with windows open / windows closed.
Legend: % = percent; A/B = afterburner; DNL = Day-Night Average Sound Level; ID = Identification; LMT = Crater Lake-Klamath Regional Airport.

5.1.2.5 Probability of Awakening

Table 5-11 presents the existing estimated PA and the change that would occur under each of the proposed F-35A scenarios. The PA results would be the same for all three proposed F-35A scenarios. With windows open 11 POIs would experience no change to PA, 14 POIs would experience an increase of 1 percent, and 1 POI would experience a 2 percent increase. With windows closed 15 POIs would experience no change to PA and 11 POIs would experience an increase of 1 percent. The change to the PA would be small because the proportion of nighttime flights (10 p.m. to 7 a.m.) by the 173 FW would remain low relative to civil aircraft.

Table 5-11 Estimated Change to Probability of Awakening (Windows Open/Windows Closed) Relative to the No Action Alternative Adjacent to LMT

ID	*Location*	*No Action Alternative*	*Change Relative to No Action Alternative*		
			F-35A 5% AB	*F-35A 50% AB*	*F-35A 95% AB*
C01	Census Tract 9719	<1% / <1%	+1% / 0	+1% / 0	+1% / 0
C02	Census Tract 9717	<1% / <1%	+1% / 0	+1% / 0	+1% / 0
C03	Census Tract 9718	<1% / <1%	+1% / 0	+1% / 0	+1% / 0
C04	Census Tract 9716	<1% / <1%	+1% / 0	+1% / 0	+1% / 0
C05	Census Tract 9712	<1% / <1%	+1% / 0	+1% / 0	+1% / 0
C06	Census Tract 9713	<1% / <1%	+1% / 0	+1% / 0	+1% / 0
C07	Census Tract 9714	1% / <1%	0 / +1%	0 / +1%	0 / +1%
H01	Sky Lakes Medical Center	<1% / <1%	0 / 0	0 / 0	0 / 0
R01	Neighborhood	1% / 1%	+1% / 0	+1% / 0	+1% / 0
R02	Anderson Avenue and Altamont Drive	10% / 6%	+1% / +1%	+1% / +1%	+1% / +1%
R03	Highland Way and Summit Street	2% / 1%	+1% / +1%	+1% / +1%	+1% / +1%
R04	Airway Drive and Homedale Road	1% / 1%	+1% / 0	+1% / 0	+1% / 0
R05	Neighborhood	1% / <1%	0 / +1%	0 / +1%	0 / +1%
R06	Neighborhood	1% / <1%	0 / +1%	0 / +1%	0 / +1%
R07	Lombardy Lane and railroad tracks	4% / 3%	+2% / +1%	+2% / +1%	+2% / +1%
R08	Neighborhood	<1% / <1%	+1% / 0	+1% / 0	+1% / 0
S01	Oregon Institute of Technology	<1% / <1%	0 / 0	0 / 0	0 / 0
S02	Klamath Family Head Start	<1% / <1%	+1% / 0	+1% / 0	+1% / 0
S03	Triad School	1% / <1%	0 / +1%	0 / +1%	0 / +1%
S04	Mazama High School	1% / <1%	0 / +1%	0 / +1%	0 / +1%
S05	Stearns Elementary School	1% / <1%	0 / +1%	0 / +1%	0 / +1%
S06	Peterson Elementary	1% / <1%	0 / +1%	0 / +1%	0 / +1%
S07	Klamath Community College	<1% / <1%	+1% / 0	+1% / 0	+1% / 0
S08	Brixner Junior High School	1% / <1%	0 / +1%	0 / +1%	0 / +1%
S09	Hosanna Christian School	1% / 1%	+1% / 0	+1% / 0	+1% / 0
S10	Henley High School	1% / <1%	0 / 0	0 / 0	0 / 0
POIs with no change			11 / 15	11 / 15	11 / 15
POIs with increase of 1 percent or greater			15 / 11	15 / 11	15 / 11

Notes: [1]Non-residential POIs included because residential areas are often located nearby other noise sensitive areas for which these results would apply.
[2]Assumes 15 dB Noise Level Reduction.
[3]Assumes 25 dB Noise Level Reduction.

Legend: % = percent; < = less than; A/B = afterburner; ID = Identification; LMT = Crater Lake-Klamath Regional Airport; POI = Point of Interest.

5.1.2.6 Potential for Hearing Loss

Figures 5-8, 5-9, and 5-10 depict both the DNL 80 dB screening threshold and relevant $L_{eq(24hr)}$ contours for PHL analysis for the proposed F-35A 5, 50, and 95 percent afterburner scenarios, respectively. All three of the proposed F-35A scenarios would result in acreage adjacent to LMT exposed to DNL 80 dB that would extend beyond LMT property to the north, south, southwest, and southeast by as much as 2,000 feet. Under the 5 percent afterburner scenario, portions of two residentially zoned properties south of LMT would be exposed to DNL 80 dB but no residential structures would be exposed to DNL 80 dB or greater so PHL would not be anticipated for any residents.

Under both the 50 and 95 percent afterburner scenarios, the same two residentially zoned properties south of LMT would be exposed to DNL 80 dB while one of the residential structures would also be within that contour. Therefore, the additional PHL analysis described in DNWG 2012 would apply that relies upon a separate noise metric, $L_{eq(24hr)}$, which is similar to DNL except without the nighttime adjustment. As presented in Figures 5-9 and 5-10 the 80 dB and above $L_{eq(24hr)}$ contours would not affect any households in either scenario, which corresponds to an average NIPTS of 3 dB. However, one household would be within the 78 to 79 dB $L_{eq(24hr)}$ band under both the F-35A 50 and 95 percent scenarios, which corresponds to an average NIPTS of 2 dB and a most sensitive NIPTS of 5.5 dB. For reference, changes in hearing level of less than 5 dB are generally not considered noticeable or significant. Furthermore, there is no known evidence that a NIPTS of 5 dB is perceptible or has any practical significance for the individual. Lastly, the variability in audiometric testing is generally assumed to be ±5 dB (EPA 1974).

5.1.2.7 FAA Order 1050.1G Airfield Impact Analysis

Because the FAA, which is a cooperating agency for this study, applies different significance criteria for noise impact analyses, this section presents results that support the two proposed alternatives presented in the EIS. FAA Order 1050.1G defines an impact as significant if it "would increase noise by DNL 1.5 dB or more for a noise sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that would be exposed at or above the DNL 65 dB level due to a DNL 1.5 dB or greater increase, when compared to the No Action Alternative for the same timeframe." Additionally, FAA Order 1050.1G requires disclosure of noise sensitive areas that would be exposed "to aircraft noise at or above DNL 60 dB but below DNL 65 dB and are projected to experience a noise increase of DNL 3 dB or more, only when DNL 1.5 dB increases are documented within the DNL 65 dB contour."

Table 5-12 quantifies the acreage, households, and population that would be affected according to FAA Order 1050.1G. Under the Proposed F-35A scenario with 5 percent afterburner a total of 4,112 acres, 1,901 households, and an estimated 4,716 people would be exposed to greater than DNL 65 dB under the F-35A 5 percent afterburner alternative while experiencing an increase of 1.5 dB or greater change to DNL relative to the No Action Alternative, which meets the FAA Order 1050.1G significance threshold for noise. Additionally, a total of 2,947 acres, 1,531 households, and an estimated 3,799 people would be exposed to DNL of 60 to 65 dB while experiencing a 3 dB or greater increase in DNL, which FAA criteria defines as a reportable noise increase.

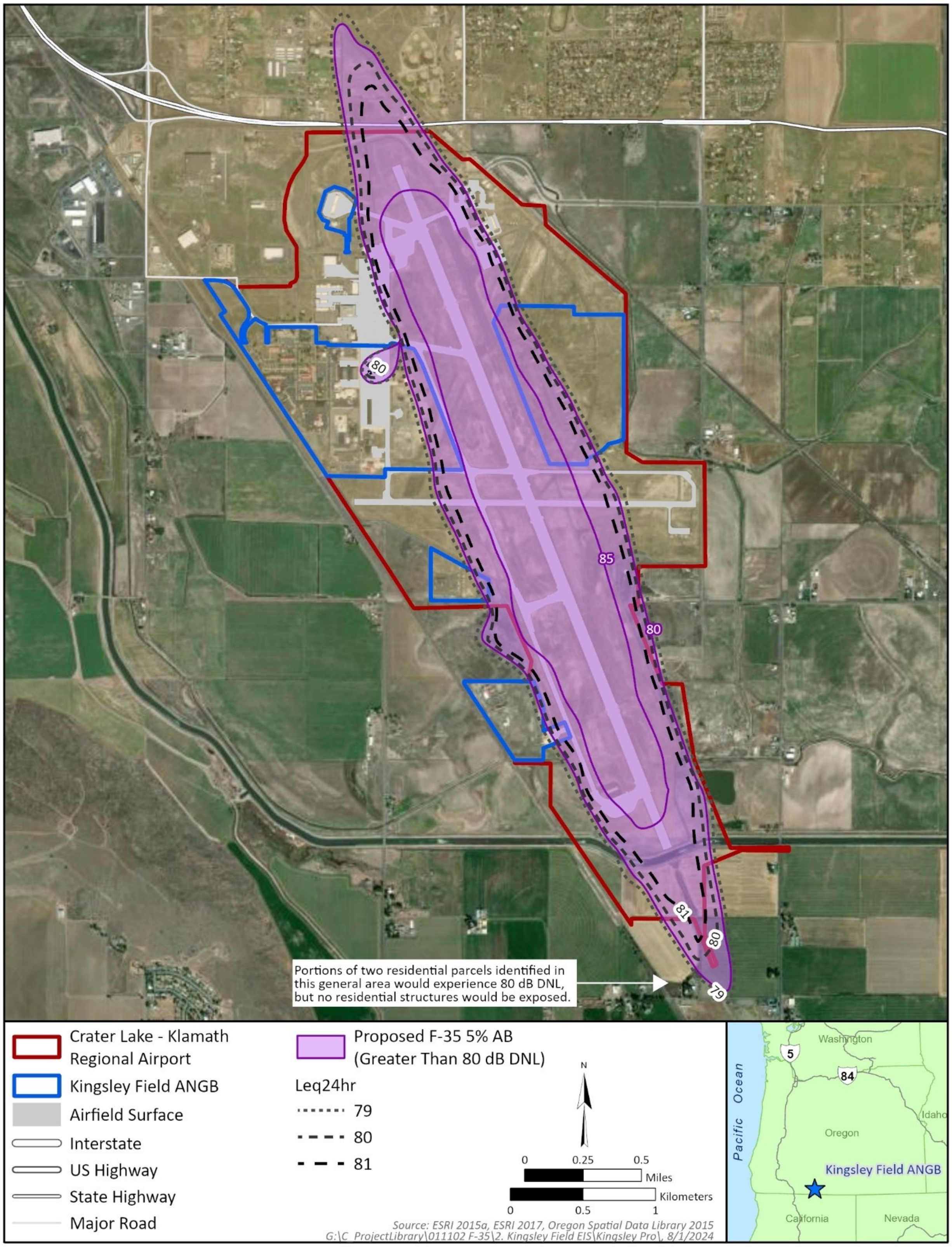


Figure 5-8 Potential For Hearing Loss – Proposed F-35A 5 Percent Afterburner

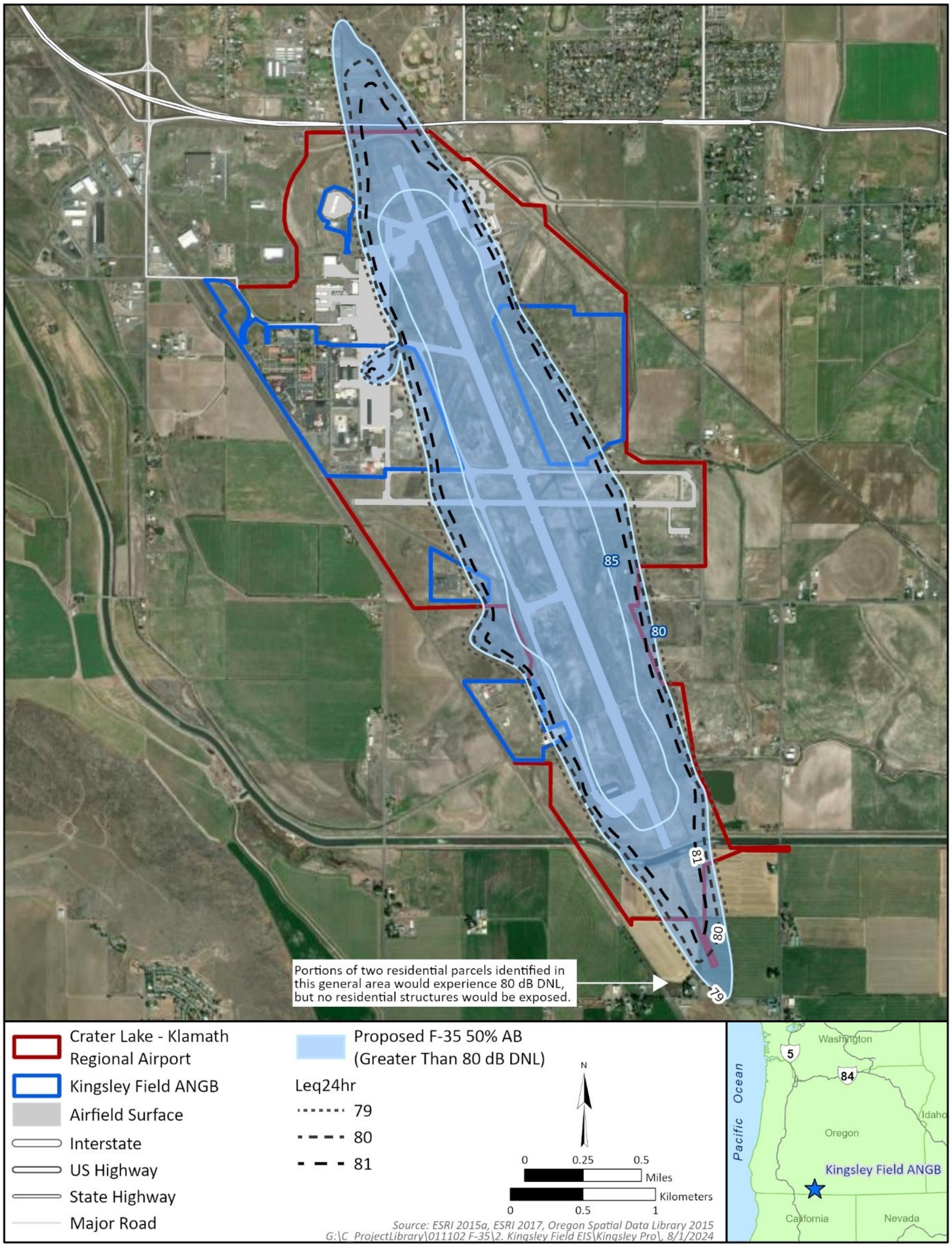


Figure 5-9 Potential For Hearing Loss – Proposed F-35A 50 Percent Afterburner

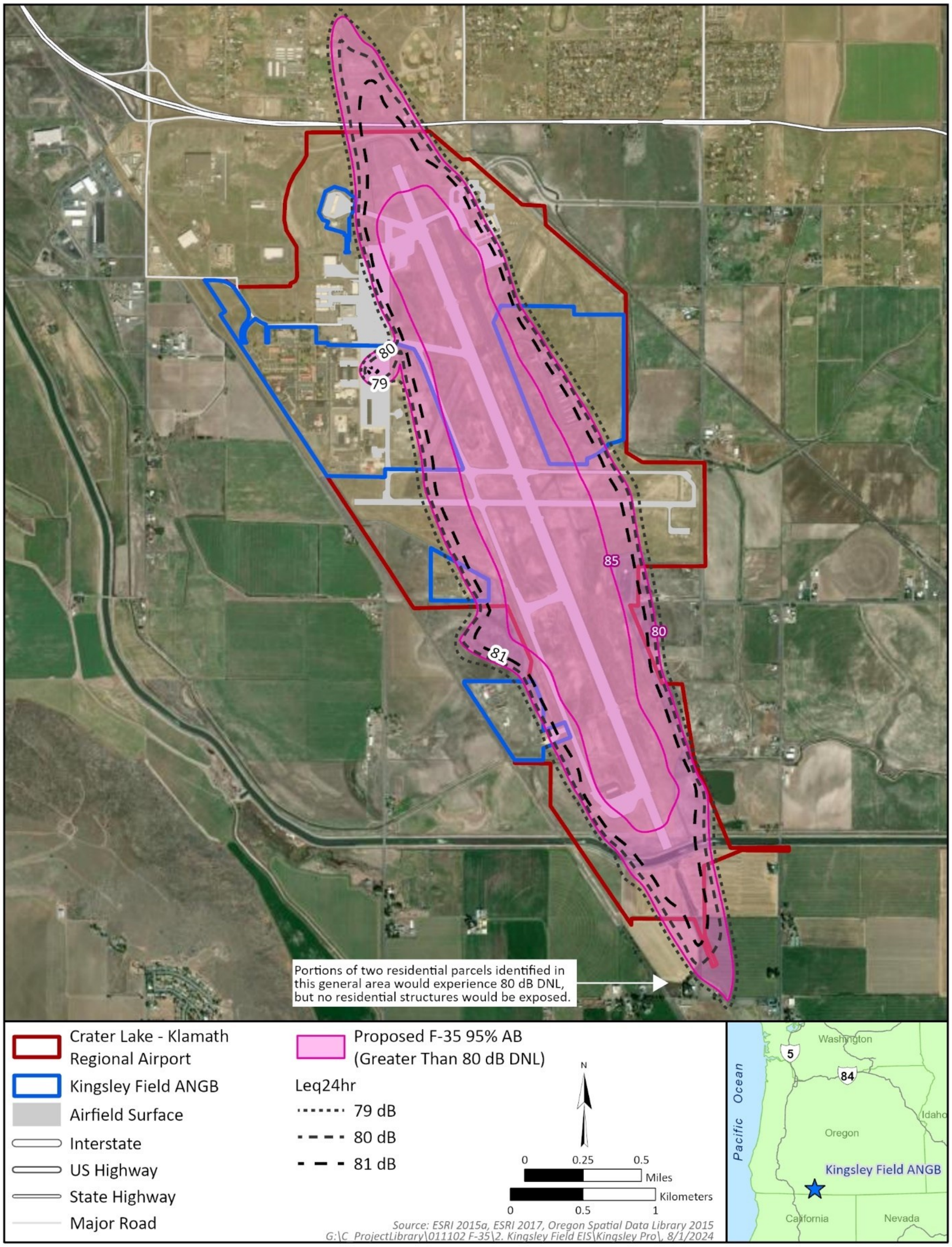


Figure 5-10 Potential For Hearing Loss – Proposed F-35A 95 Percent Afterburner

Table 5-12 FAA DNL Exposure Thresholds Affecting Acreage, Population, and Households Under the Three Afterburner Scenarios

Scenario	*FAA Classification[1]*	*Description*	*Acreage*	*Households*	*Population*
F-35A 5% AB	Significant	+1.5 dB (or higher) Change within DNL 65+ dB	4,112	1,901	4,716
	Reportable	+3 dB (or higher) Change within DNL 60–65 dB	2,947	1,531	3,799
F-35A 50% AB	Significant	+1.5 dB (or higher) Change within DNL 65+ dB	4,303	1,926	4,779
	Reportable	+3 dB (or higher) Change within DNL 60–65 dB	3,221	1,475	3,660
F-35A 95% AB	Significant	+1.5 dB (or higher) Change within DNL 65+ dB	4,486	1,948	4,834
	Reportable	+3 dB (or higher) Change within DNL 60–65 dB	3,466	1,430	3,549

Note: [1]FAA 1050.1G, FAA National Environmental Policy Act Implementing Procedures. 30 June 2025.
Legend: % = percent; A/B = afterburner; dB = decibel; DNL = Day-Night Average Sound Level; FAA = Federal Aviation Administration.

Under the Proposed F-35A scenario with 50 percent afterburner, a total of 4,303 acres, 1,926 households, and an estimated 4,779 people would be exposed to greater than DNL 65 dB under the F-35A 50 percent afterburner alternative while experiencing an increase of 1.5 dB or greater change to DNL relative to the No Action Alternative, which meets the FAA Order 1050.1G significance threshold for noise. Additionally, a total of 3,221 acres, 1,475 households, and an estimated 3,660 people would be exposed to DNL of 60 to 65 dB while experiencing a 3 dB or greater increase in DNL, which FAA criteria defines as a reportable noise increase.

Under the Proposed F-35A scenario with 95 percent afterburner, a total of 4,486 acres, 1,948 households, and an estimated 4,834 people would be exposed to greater than DNL 65 dB under the F-35A 95 percent afterburner alternative while experiencing an increase of 1.5 dB or greater change to DNL relative to the No Action Alternative, which meets the FAA Order 1050.1G significance threshold for noise. Additionally, a total of 3,466 acres, 1,430 households, and an estimated 3,549 people would be exposed to DNL of 60 to 65 dB while experiencing a 3 dB or greater increase in DNL, which FAA criteria defines as a reportable noise increase.

Because the potential for impacts from each of the three proposed afterburner scenarios would be very similar to one another, as shown in Table 5-12, and the 95 percent afterburner scenario would be the most likely outcome that is the scenario described in the EIS, Figures 5-11 through 5-13 present graphical depictions of change to DNL under each afterburner scenario.

Under the F-35A 5 percent scenario, areas on all sides of LMT would experience increases in DNL greater than 1.5 dB that would be exposed to DNL 65 dB. This would affect five noise sensitive locations (R-02, R-03, R-07, S-05, and S-09) that would be considered under FAA 1050.1G guidelines to experience a significant noise impact. Three noise sensitive locations (R-04, S-03, and S-04) that would be exposed to DNL between 60 and 65 dB would experience reportable increases of 3 dB or greater in DNL from the No Action Alternative under the Proposed Action F-35A 5 percent afterburner scenario.

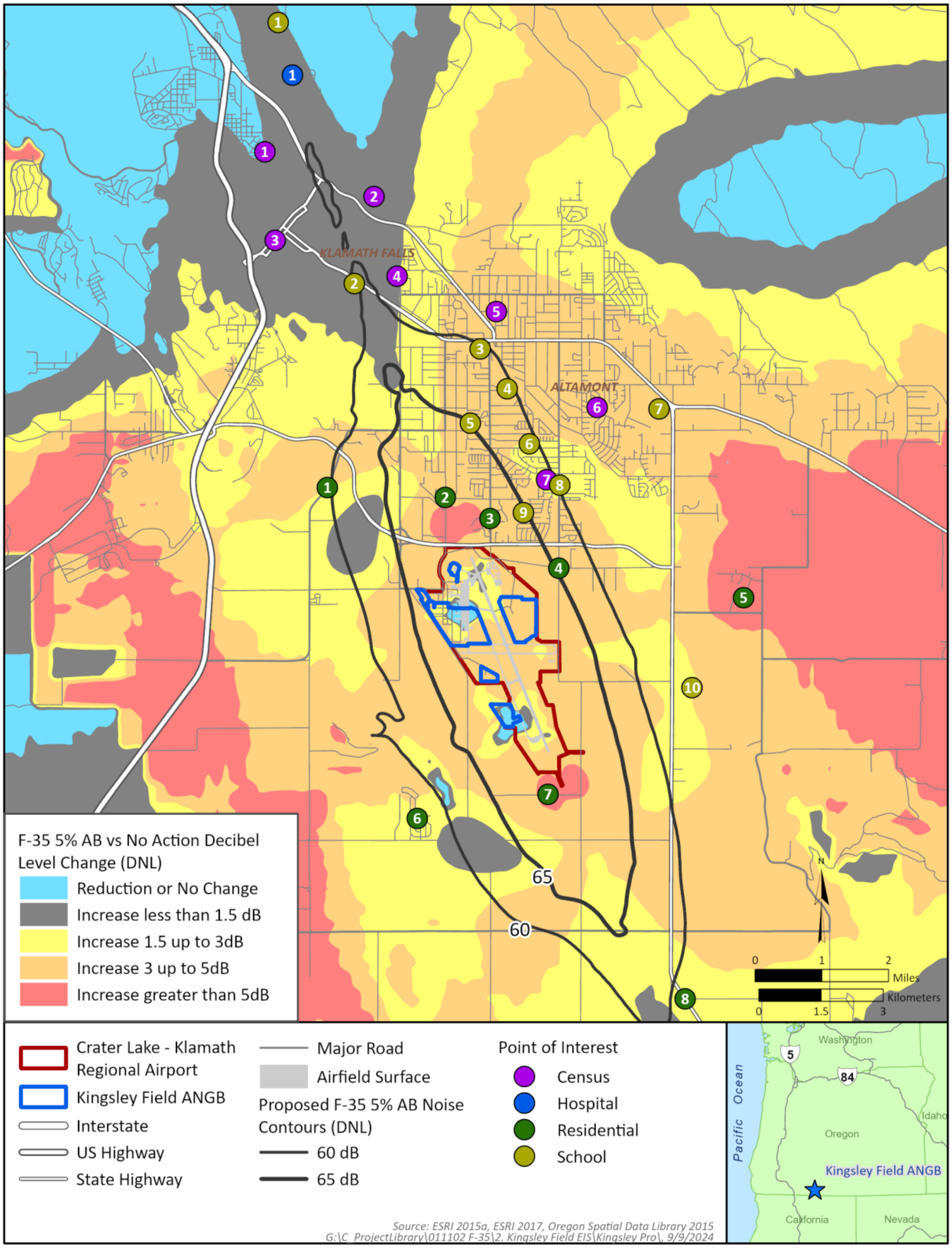


Figure 5-11 F-35A 5 Percent Scenario Difference Contours Relative to No Action Alternative at LMT for FAA Analysis

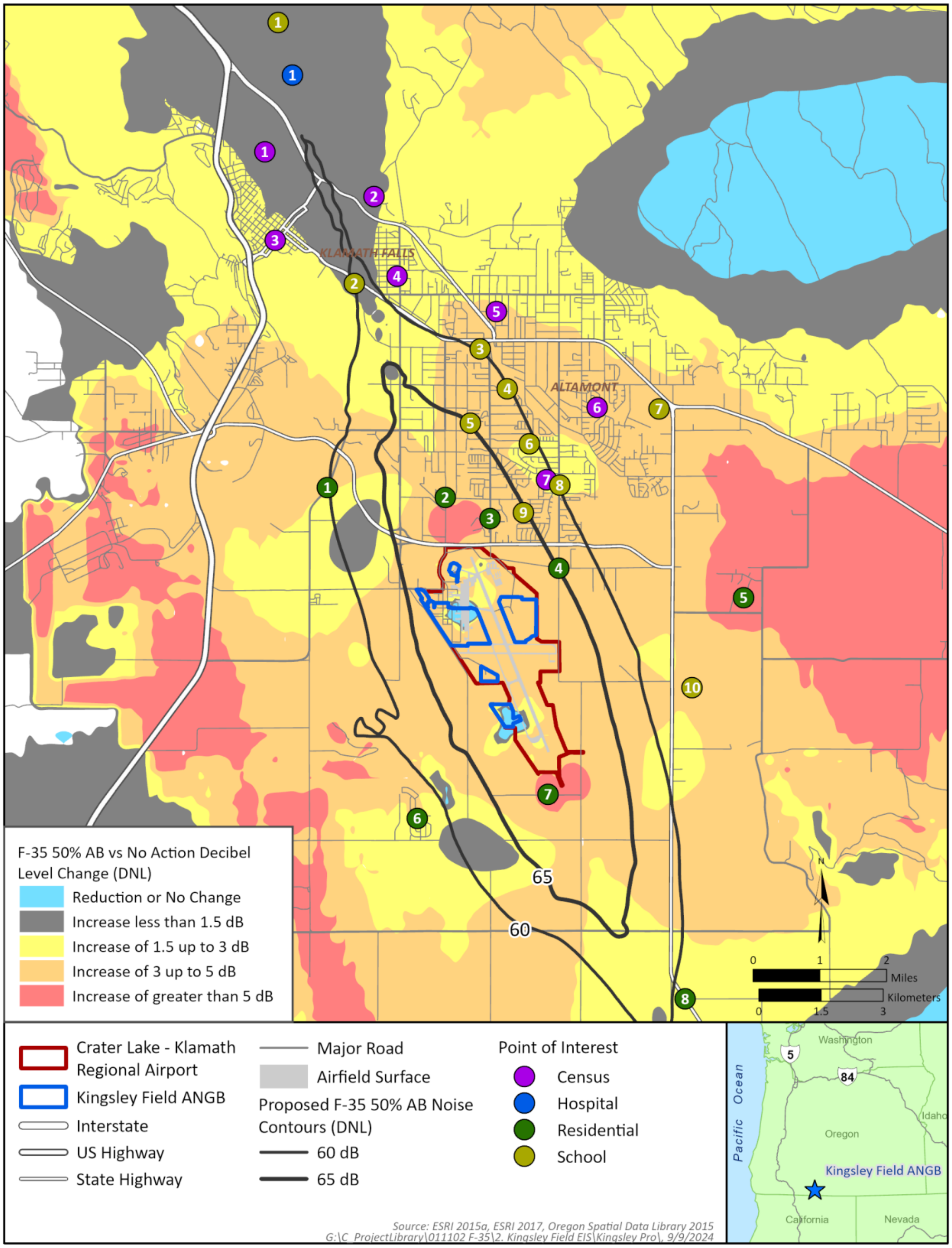


Figure 5-12 F-35A 50 Percent Scenario Difference Contours Relative to No Action Alternative at LMT for FAA Analysis

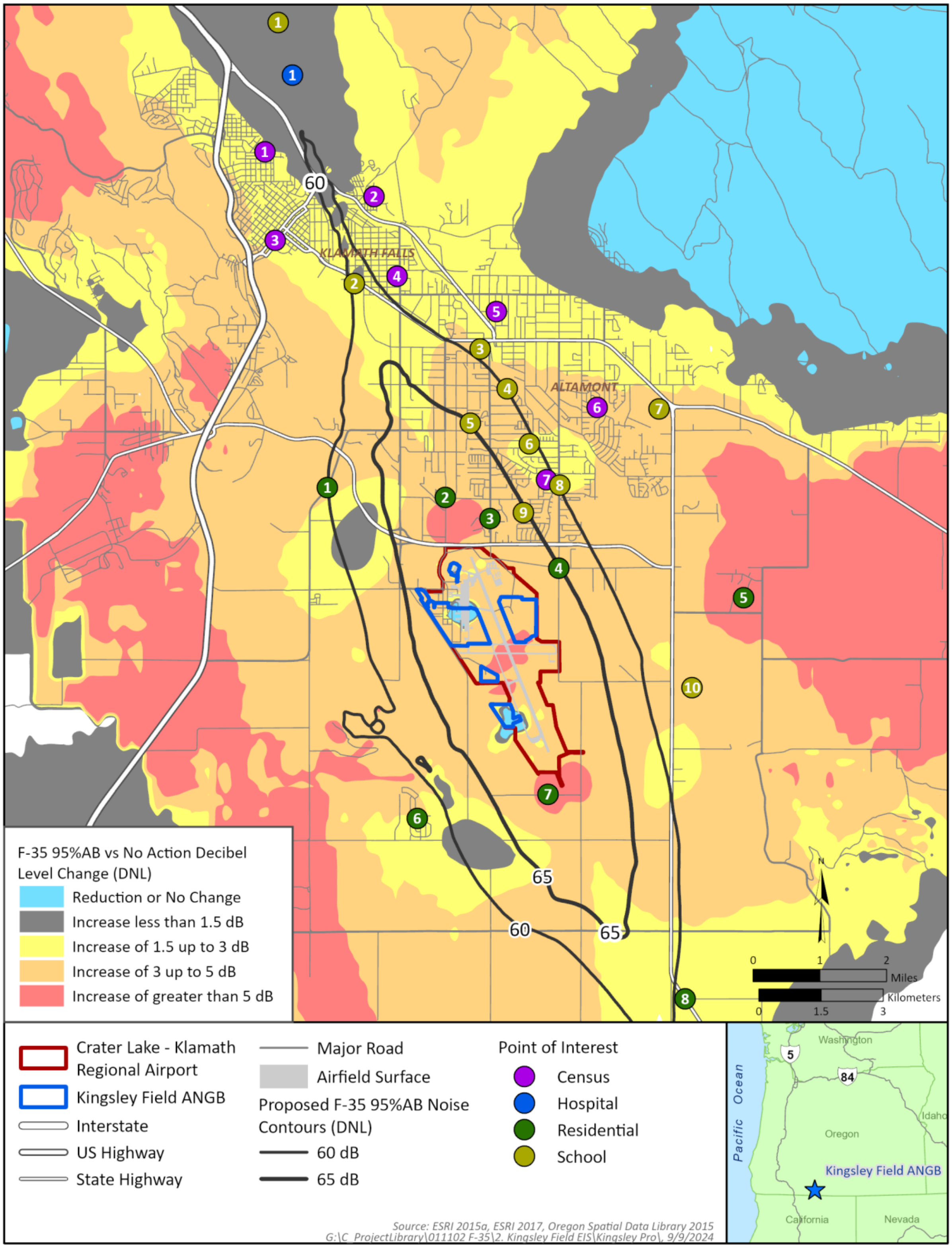


Figure 5-13 Modeled DNL (Proposed Action F-35A; 95% Afterburner Departures) Relative to No Action for FAA Analysis

Under the F-35A 50 percent scenario, areas on all sides of LMT would experience increases in DNL greater than 1.5 dB that would be exposed to DNL 65 dB. This would affect six noise sensitive locations (R-02, R-03, R-04, R-07, S-05, and S-09) that would be considered under FAA 1050.1G guidelines to experience a significant noise impact. One noise sensitive location (S-04) that would be exposed to DNL between 60 and 65 dB would experience reportable increases of 3 dB or greater in DNL from the No Action Alternative under the 50 percent scenario.

Under the F-35A 95 percent scenario, areas on all sides of LMT would experience increases in DNL greater than 1.5 dB that would be exposed to DNL 65 dB. This would affect six noise sensitive locations (R-02, R-03, R-04, R-07, S-05 and S-09) that would be considered under FAA 1050.1G guidelines to experience a significant noise impact. One noise sensitive location (S-04) that would be exposed to DNL between 60 and 65 dB would experience reportable increases of 3 dB or greater in DNL from the No Action Alternative under the Proposed Action 95 percent afterburner scenario.

5.2 MILITARY TRAINING AIRSPACE

The following section details the modeling data and the resultant noise exposure for the three modeled F-35A afterburner scenarios for aircraft training activity in the 173 FW associated military training airspace. Under the Proposed Action, F-35A aircraft would replace the F-15C/D aircraft of the 173 FW. Because the three F-35A afterburner scenarios only differ by afterburner usage rates at LMT, the military training airspace conditions would be the same for each scenario of the same aircraft types so only one F-35A condition has been analyzed.

5.2.1 Modeling Data (Subsonic)

The proposed F-35A aircraft would not require any changes to the current lateral or vertical configurations of any MOA, Restricted Area, Warning Area, or Air Traffic Control Assigned Airspace (ATCAA), nor would it alter their normal scheduled times of use. Since military training airspace scheduled activation times would not change from Existing Conditions (2023) or the No Action Alternative, the impacts to the National Airspace System would be unaffected. VFR aircraft would still be allowed to exercise their right to transition through MOAs and IFR aircraft would not experience any extra flight plan deviations because the military training airspace activation times would remain the same. Air Traffic Control would continue to provide the required separation pertaining to specific aircraft and type in the military training airspace.

Since there is a different mission set, the training syllabus for the F-35A is different from that of the F-15C/D. Table 5-13 depicts the F-35A FTU B-Course syllabus. Table 5-13 shows the distribution of the use of the military training airspace, along with the number of F-35A and F-5 (supporting ADAIR), the time in the military training airspace, and the use of afterburner during training. Note that no "red air" sorties are listed for events such as BFM, where the IP in the other F-35 is the red-air. In these cases, those sorties are listed as blue. The noise modeling assumes that training for courses other than the B-Course would be proportional to the data in Table 5-13, using the B-Course Equivalent percentages for the other courses (TX-1 [58 percent], TX-2 [40 percent], TX-3 [12 percent], STX [5 percent]). Instructor Pilot Upgrade (IPUG) programs of instruction (IPUG T1 and IPUG-T2) are assumed to be proportional to the rest of the syllabus, in terms of military training airspace use and flight profiles, since those courses are designed to mimic actual instruction. Consistent with Existing Conditions (2023) and the No Action Alternative, the F-35A average sortie duration would be approximately 1.3 hours resulting in roughly 1 hour of flight time within the military training airspace per sortie.

Table 5-13 F-35A FTU B-Course Syllabus

Event	*Military Training Airspace Time*	*Blue F-35*	*Red Total*	*Red F-35*	*Red F-5*	*Goose*	*Dolphin*	*Juniper*	*Juniper/ Hart*	*Block 0*	*Block 1*	*Block 2*	*Block 3*	*Block 4*	*SS mins*
TR-1	20	2	0			100%					100%				
TR-2	20	2	0			100%					100%				
TR-3	20	2	0			100%					100%				
TR-4	20	2	0			100%					100%				
TR-5	20	2	0			100%					100%				
TR-6	20	2	0			100%					100%				
BFM-1	30	2	0			100%					100%				20%
BFM-2	30	2	0			100%					100%				20%
BFM-3	30	2	0			100%					100%				20%
BFM-4	30	2	0			100%					100%				20%
BFM-5	30	2	0			100%					100%				20%
BFM-6	30	2	0			100%					100%				20%
BFM-7	30	2	0			100%					100%				20%
ACM-1	40	2	4	0.8	3.2	5%	32%		63%		50%	50%			20%
ACM-2	40	2	4	0.8	3.2	5%	32%		63%		50%	50%			20%
ACM-3	40	2	4	0.8	3.2	5%	32%		63%		50%	50%			20%
TI-1	40	2	4	0.8	3.2				100%	5%	30%	30%	30%	5%	25%
TI-2	40	2	4	0.8	3.2				100%	5%	30%	30%	30%	5%	25%
TI-3	40	2	4	0.8	3.2				100%	5%	30%	30%	30%	5%	25%
TI-4	40	4	8	1.6	6.4				100%	5%	30%	30%	30%	5%	25%
DCA	40	4	8	1.6	6.4				100%	5%	30%	30%	30%	5%	25%
SA-1	60	2	0			50%	10%		40%		10%	90%			
SA-2	60	2	0			50%	10%		40%		10%	90%			
SA-3	60	2	0			50%	10%		40%		10%	90%			
SA-4	60	2	0			50%	10%		40%		10%	90%			
SA-5	60	2	0			50%	10%		40%		10%	90%			
SA-6	60	2	0			50%	10%		40%		10%	90%			
CAS-1	60	2	0			50%	10%		40%		10%	90%			
CAS-2	60	2	0			50%	10%		40%		10%	90%			
SEAD-1	60	4	0						100%	5%	25%	35%	35%		
SEAD-2	60	4	0						100%	5%	25%	35%	35%		

Event	*Military Training Airspace Time*	*Blue F-35*	*Red Total*	*Red F-35*	*Red F-5*	*Goose*	*Dolphin*	*Juniper*	*Juniper/ Hart*	*Block 0*	*Block 1*	*Block 2*	*Block 3*	*Block 4*	*SS mins*
SEAD-3	60	4	0						100%	5%	25%	35%	35%		
STK-1	60	4	2	0.4	1.6				100%	5%	25%	35%	35%		25%
STK-2	60	4	2	0.4	1.6				100%	5%	25%	35%	35%		25%
STK-3	60	4	2	0.4	1.6				100%	5%	25%	35%	35%		25%
OCA-1	60	4	4	0.8	3.2				100%	5%	25%	35%	35%		25%
OCA-2	60	4	4	0.8	3.2				100%	5%	25%	35%	35%		25%
OCA-3	60	4	4	0.8	3.2				100%	5%	25%	35%	35%		25%
OCA-4	60	4	4	0.8	3.2				100%	5%	25%	35%	35%		25%
OCA-5	60	4	4	0.8	3.2				100%	5%	25%	35%	35%		25%
LASDT-1	60	2	0					100%		75%	25%				5%
LASDT-2	60	2	0					100%		75%	25%				5%
1 B course		110		13.2	52.8										
				Total F-15C	**Total F-5**										
				124	**53**										

Legend: % percent; SS mins = supersonic minutes.

5.2.2 Noise Exposure (Subsonic)

Aircraft altitudes, speeds, and power settings vary while operating within the military training airspace based upon the training exercise. For comparison, Table 5-14 presents single-event noise levels in terms of SEL and L_{max} for the F-15C/D, and F-35A. In general, the F-35A would be 3 to 5 dB greater in terms of SEL and 6 to 8 dB greater in L_{max} when compared to the F-15C/D at times when both aircraft would operate at military power and 400 knots.

Table 5-14 SEL and L_{max} Comparison for Typical Military Training Airspace Profiles

Altitude (feet AGL)	*F-15C/D (PW-220)*		*F-35A (PW-100)*	
Metric	***SEL***	***L_{max}***	***SEL***	***L_{max}***
500	116	111	121	119
1,000	111	104	115	111
2,000	105	97	108	103
5,000	95	85	99	91
10,000	86	75	89	81

Note: All aircraft modeled at military power and 400 knots for comparison.
Legend: AGL = above ground level; L_{max} = Maximum Sound Level; SEL = Sound Exposure Level.
Source: NOISEMAP version 7.3.

Table 5-15 presents the resulting distributed DNL and L_{dnmr} for each military training airspace due to the three proposed F-35A scenarios. Consistent with Existing Conditions (2023) and the No Action Alternative, most training would occur above 10,000 feet MSL so the rise-time effect applied to L_{dnmr} would remain small resulting in no difference between the two metrics for Existing Conditions (2023) when rounded to whole decibels.

The greatest DNL/L_{dnmr} of 49 dB would occur in Juniper Low, Juniper East Low, Goose North, and Goose South MOAs due to a combination of an increase in operations in Goose and the lower floor and lower altitudes in Juniper Low and Juniper East Low MOAs. The rest of the Juniper/Hart MOA complex outside of the Juniper Low and Juniper East Low areas would experience DNL/L_{dnmr} of 40 dB. The DNL/L_{dnmr} in Dolphin North and South MOA would be less than 35 dB due to the relatively small number of sorties spread over a large area with a minimum altitude of 11,000 feet MSL. Overall, there would be an increase in DNL/L_{dnmr} of 2 to 5 dB across the military training airspace, except Dolphin North and South MOAs that would experience a negligible change from the No Action Alternative.

Table 5-15 Noise Exposure from Proposed F-35A Military Training Airspace Operations

Military Training Airspace[1]	*DNL (dB)*	*Change DNL (dB) from No Action Alternative*	*L_{dnmr} (dB)*	*Change L_{dnmr} (dB) from No Action Alternative*
Goose North MOA/ATCAA	49	+5	49	+5
Goose South MOA/ATCAA	49	+5	49	+5
Juniper Low MOA	49	+2	49	+2
Juniper East Low MOA	49	+2	49	+2
Juniper A/B/C/D MOA/ATCAA[1]	40	+5	40	+5
Hart A/B/C/D/E/F MOA/ATCAA	40	+5	40	+5
Dolphin North and South MOA/ATCAA	<35	N/A	<35	N/A

Note: [1]Noise level applies only to the parts of Juniper A/B/C/D outside of Juniper Low and Juniper East Low MOA, which are reported separately

Legend: < = less than; ADAIR = Adversary Air; ATCAA = Air Traffic Control Assigned Airspace; dB = decibel; DNL = Day-Night Average Sound Level; L_{dnmr} = Onset-Rate Adjusted Monthly Day-Night A-weighted Sound Level; MOA = Military Operations Area; N/A = Not Applicable.

5.2.3 Modeling Data (Supersonic)

Supersonic flight would primarily be associated with air combat training. Some of these training sorties require aircraft to exceed Mach 1.0 (supersonic) for brief periods of time, which creates a shock wave. Depending on the aircraft's altitude and the local atmospheric conditions, this shock wave can reach the ground, causing a "sonic boom." Higher altitudes and warmer surface temperatures can result in the sonic boom not reaching the surface of the earth. Lower altitudes for supersonic flight and higher speeds (higher Mach numbers) increase the likelihood and intensity of sonic booms.

Supersonic operations for the F-35A would occur in the same military training airspace as the existing F-15C/D in the Juniper/Hart MOA complex, but the frequency of supersonic events would increase proportional to the overall increase in sorties. Although the training exercises for the F-35A, as detailed in Table 5-13, would differ from the F-15C/D, they would be similar to the F-15C/D and supersonic would only occur above 30,000 feet MSL while over land.

5.2.4 Noise Exposure (Supersonic)

Using BOOMAP2021 software the maximum CDNL would be 40 dBC, which would occur roughly in the center of the Juniper/Hart MOA complex and represents an increase in CDNL of approximately 4 dBC due primarily to the increase in operations under the proposed F-35A scenarios. The CDNL would remain relatively low due primarily to the 30,000-foot MSL minimum altitude requirement for supersonic operations within the Juniper/Hart MOA complex.

6.0 CONCLUSION

Table 6-1 presents a quantitative summary of modeled noise exposure results relative to DoD noise criteria associated with the F-35A aircraft beddown, as compared to the No Action Alternative. Noise analysis results summarized in the table include acreage, households/population within applicable noise criteria areas, the number of affected POIs, number of affected school POIs, and PA for each of the three potential afterburner usage rates considered in the DoD significance evaluation framework.

Table 6-1 Summary of Potential DoD Criteria Noise Impacts Associated with F-35A Scenarios at LMT

Category	*Condition*	*No Action Alternative*	*F-35A 5% AB*	*F-35A 50% AB*	*F-35A 95% AB*
DNL: Number of POIs	Exposed to > DNL 65 dB	3	5 (+2)	6 (+3)	6 (+3)
	Exposed to > DNL 70 dB	2	3 (+1)	3 (+1)	3 (+1)
	Exposed to > DNL 75 dB	0	2 (+2)	2 (+2)	2 (+2)
	Decrease of 1 dB or greater		0	0	0
	No change		1	1	0
	Increase of 1 dB		6	2	2
	Increase of 2 to 4 dB		16	21	21
	Increase of 5 dB or greater		3	2	3
Off-Base Exposure to DNL >65 dB	Acreage	2,177	4,164 (+1,987)	4,340 (+2,163)	4,506 (+2,329)
	Households	946	1,733 (+787)	1,800 (+854)	1,865 (+919)
	Estimated Population	2,348	4,301 (+1,953)	4,467 (+2,119)	4,629 (+2,281)
School, $L_{eq(8hr)}$: Number of School POIs	Greater than 60 dB $L_{eq(8hr)}$	7	7 (+0)	7 (+0)	7 (+0)
School, Numbers of Events per Average School Day Hour: Number of School POIs	With No Interfering Events	0	0 (+0)	0 (+0)	0 (+0)
	With 1 Interfering Event	2	1 (-1)	0 (-2)	0 (-2)
	With >1 Interfering Events	8	9 (+1)	10 (+2)	10 (+2)
School, Time Above Interior 50 dB for 8 Hour School Day: Number of School POIs	Duration of 5 min or less	5	2 (-3)	0 (-5)	0 (-5)
	Duration of >5–10 minutes	5	6 (+1)	5(0)	4 (-1)
	Duration of >10 minutes	0	2 (+2)	5 (+5)	6 (+6)
Speech Interfering Events per Average Hour, Windows Open: Number of POIs	With No Events	0	0	0	0
	With 1–2 Events	21	9 (-12)	9 (-12)	9 (-12)
	With >2 Events	5	17 (+12)	17 (+12)	17 (+12)
Speech Interfering Events per Average Hour, Windows Closed: Number of POIs	With No Events	13	3 (-10)	0 (-13)	0 (-13)
	With 1-2 Events	13	18 (+5)	21 (+8)	18 (+5)
	With >2 Events	0	5 (+5)	5 (+5)	8 (+8)
Probability of Awakening with Windows Open: Number of POIs	With <1% PA	11	2 (-9)	2 (-9)	2 (-9)
	With 1% to 10% PA	15	22 (+7)	22 (+7)	22 (+7)
	With >10% PA	0	1 (+1)	1 (+1)	1 (+1)
Probability of Awakening with Windows Closed: Number of POIs	With <1% PA	20	11 (-9)	11 (-9)	11 (-9)
	With 1% to 10% PA	6	14 (+8)	14 (+8)	14 (+8)
	With >10% PA	0	0 (+0)	0 (+0)	0 (+0)

Notes: Parenthetical represents change from No Action Alternative.
Legend: % = percent; < = less than; > = greater than; dB = decibel; DNL = Day-Night Average Sound Level; DoD = Department of Defense; LMT = Crater Lake-Klamath Regional Airport.

The DoD determination varies from the FAA determination of significance, where a significant impact would occur under the following FAA criteria: 1) noise sensitive land uses and population within the existing DNL 65 dB and greater footprint would be subject to an increase in DNL of 1.5 dB or greater; or 2) noise sensitive land uses and population would experience a DNL 1.5 dB or greater increase and be newly exposed to a DNL of 65 dB or greater. Table 6-2 highlights modeled changes in noise exposure relative to FAA noise level criteria associated with the F-35A aircraft beddown, as compared to the No Action Alternative. As detailed in Table 5-12, the modeled populations within the applicable criteria areas are 4,716, 4,779, and 4,834 people under the proposed F-35A 5 percent, 50 percent, and 95 percent afterburner scenarios, respectively. FAA criteria define a reportable change in noise exposure as a noise sensitive land use or population within the existing DNL 60–65 dB footprint that would be subject to an increase in DNL of 3.0 dB or greater. The population that would experience a reportable increase in noise would be 3,799, 3,660, and 3,549 people under the proposed F-35A 5 percent, 50 percent, and 95 percent afterburner scenarios, respectively.

Table 6-2 Change in DNL at POIs and Significant Increases Associated with the F-35A Scenarios at LMT

Map ID	*Named Point of Interest*	*No Action Alternative*	*F-35A 5% AB*	*F-35A 50% AB*	*F-35A 95% AB*
C01	Census Tract 9719	52	52 (0)	52 (0)	53 (+1)
C02	Census Tract 9717	53	54 (+1)	55 (+2)	55 (+2)
C03	Census Tract 9718	51	52 (+1)	53 (+2)	54 (+3)
C04	Census Tract 9716	56	57 (+1)	58 (+2)	58 (+2)
C05	Census Tract 9712	55	59 (+4)	58 (+3)	57 (+2)
C06	Census Tract 9713	50	54 (+4)	54 (+4)	53 (+3)
C07	Census Tract 9714	58	61 (+3)	61 (+3)	61 (+3)
H01	Sky Lakes Medical Center	55	56 (+1)	56 (+1)	57 (+2)
R01	Neighborhood	57	60 (+3)	60 (+3)	60 (+3)
R02	Anderson Avenue and Altamont Drive	73	**77 (+4)**[1]	**77 (+4)**[1]	**77 (+4)**[1]
R03	Highland Way and Summit Street	68	**72 (+4)**[1]	**72 (+4)**[1]	**73 (+5)**[1]
R04	Airway Drive and Homedale Road	61	64 (+3)	**65 (+4)**[1]	**65 (+4)**[1]
R05	Neighborhood	46	51 (+5)	51 (+5)	51 (+5)
R06	Neighborhood	54	56 (+2)	56 (+2)	56 (+2)
R07	Lombardy Lane and railroad tracks	71	**76 (+5)**[1]	**76 (+5)**[1]	**76 (+5)**[1]
R08	Neighborhood	57	59 (+2)	59 (+2)	59 (+2)
S01	Oregon Institute of Technology	53	54 (+1)	54 (+1)	54 (+1)
S02	Klamath Family Head Start	59	60 (+1)	61 (+2)	61 (+2)
S03	Triad School	57	60 (+3)	60 (+3)	59 (+2)
S04	Mazama High School	56	61 (+5)	60 (+4)	60 (+4)
S05	Stearns Elementary School	61	**65 (+4)**[1]	**65 (+4)**[1]	**65 (+4)**[1]
S06	Peterson Elementary	58	61 (+3)	61 (+3)	61 (+3)
S07	Klamath Community College	47	50 (+3)	50 (+3)	49 (+2)
S08	Brixner Junior High School	57	60 (+3)	60 (+3)	60 (+3)
S09	Hosanna Christian School	62	**65 (+3)**[1]	**66 (+4)**[1]	**66 (+4)**[1]
S10	Henley High School	52	55 (+3)	55 (+3)	55 (+3)

Notes: Parenthetical represents change from No Action Alternative.
[1]Bold represents results at noise sensitive locations that would be considered to be significant according to FAA Order 1050.1G.

Legend: % = percent; A/B = afterburner; DNL = Day-Night Average Sound Level; ID = Identification; LMT = Crater Lake-Klamath Regional Airport; POI = Point of Interest.

7.0 REFERENCES

AIRNAV. 2024. KLMT Crater Lake-Klamath Regional Airport, Klamath Falls, Oregon, USA. https://www.airnav.com/airport/KLMT. 13 June 2024.

American National Standards Institute (ANSI). 1988. Quantities and Procedures for Description and Measurement of Environmental Sound. Part 1.

American National Standards Institute (ANSI)/Acoustical Society of America (ASA). 2008. Quantities and Procedures for Description and Measurement of Environmental Sound S12.9-2008/Part 6.

ANSI/ASA. 2018. Rationale for Withdrawing ANSI/ASA S12.9-2008/Part 6 (A Technical Report prepared by ANSI-Accredited Standards Committee S12 and registered with ANSI). July.

Blue Ridge Research and Consulting. 2021. Update to BooMap: The Cumulative Sonic Boom Assessment Model, Technical Report [BRRC 21-09]. 22 October.

Crater Lake-Klamath Regional Airport (LMT). 2024. Electronic mail from Kelby Miller to Stantec. Re: Klamath Falls EIS – Civil Noise Modeling Review. 14 May.

Department of Defense (DoD). 2022. Memorandum Adopting the Advanced Acoustic Model for Assessing Community Exposure to Fixed-wing Aircraft Noise. November 28.

Department of Defense (DoD) Instruction. 2021. DoD Instruction 4165.57, Air Installations Compatible Use Zones. December 13.

Department of Defense Noise Working Group (DNWG). 2009a. *Technical Bulletin, Using Supplemental Noise Metrics and Analysis Tools*. March.

DNWG. 2009b. *Technical Bulletin: Sleep Disturbance from Aviation Noise*, December.

DNWG. 2012. *Technical Bulletin, Noise-Induced Hearing Impairment, Defense Noise Working Group*. December.

DNWG. 2013a. *Technical Bulletin: Speech Interference from Aviation Noise*. December.

DNWG. 2013b. *Noise – Induced Hearing Impairment Technical Bulletin.* December.

Department of the Air Force (DAF). 2020. Final Environmental Assessment Combat Air Forces: Adversary Air, Kingsley Field Air National Guard Base, Oregon. February.

Department of the Navy. 2021. Real-Time Aircraft Sound Monitoring Final Report, Report to Congress. November 30. https://www.navfac.navy.mil/Business-Lines/Asset-Management/Products-and-Services/Aircraft-Sound-Monitoring/.

Federal Aviation Administration (FAA). 2024a. Electronic mail from Adam Scholten to Stantec. Re: Kingsley Field EIS -- Noise Analysis Follow-up. Attachment: FAA_RadarData_LMT_Review_20240426. 26 April.

FAA. 2024b. Electronic mail from Ilon Logan to NGB. Re: Kingsley Field F35 Conversion EIS: Civilian aircraft data transmittal. Attachment: FAA_LMT_EA_CY2022_Inventory_Civilian_Fleetmix_20240328.xlsx. 29 March.

FAA. 2024c. FAA Terminal Area Forecast Data Query. http://www.TAF.FAA.gov. 05 February.

FAA. 2025. 1050.1G, FAA National Environmental Policy Act Implementing Procedures. 30 June. https://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.current/documentnumber/1050.1

Federal Interagency Committee on Noise. 1978. Environmental Protection – Planning the Noise Environment. 15 June.

National Guard Bureau (NGB). 2024a. Final Data Validation Package. Environmental Impact Statement for Basing F-35A Lighting II Formal Training Unit at Kingsley Field Air National Guard Base, Klamath Falls, Oregon.

NGB. 2024b. Final meeting minutes from site visit at 173 FW, Kingsley Field ANGB. January.

U.S. Census Bureau. 2022a. "Hispanic or Latino Origin by Race." American Community Survey, ACS 5-Year Estimates Detailed Tables, Table B03002, 2022. Accessed on June 25, 2024.

U.S. Census Bureau. 2022b. "Ratio of Income to Poverty Level in the Past 12 Months." American Community Survey, ACS 5-Year Estimates Detailed Tables, Table C17002, 2022. Accessed on June 25, 2024.

United States Environmental Protection Agency (EPA). 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, Environmental Protection Agency Report No. 550/9-74-004.

Wasmer Consulting. 2006. *BaseOps 7.3 User's Guide*, Fred Wasmer and Fiona Maunsell, Wasmer Consulting.

Wyle. 1998. *NMAP 7.0 User's Manual. Wyle Research Report WR98-13*, Czech and Plotkin. November.

This page intentionally left blank.

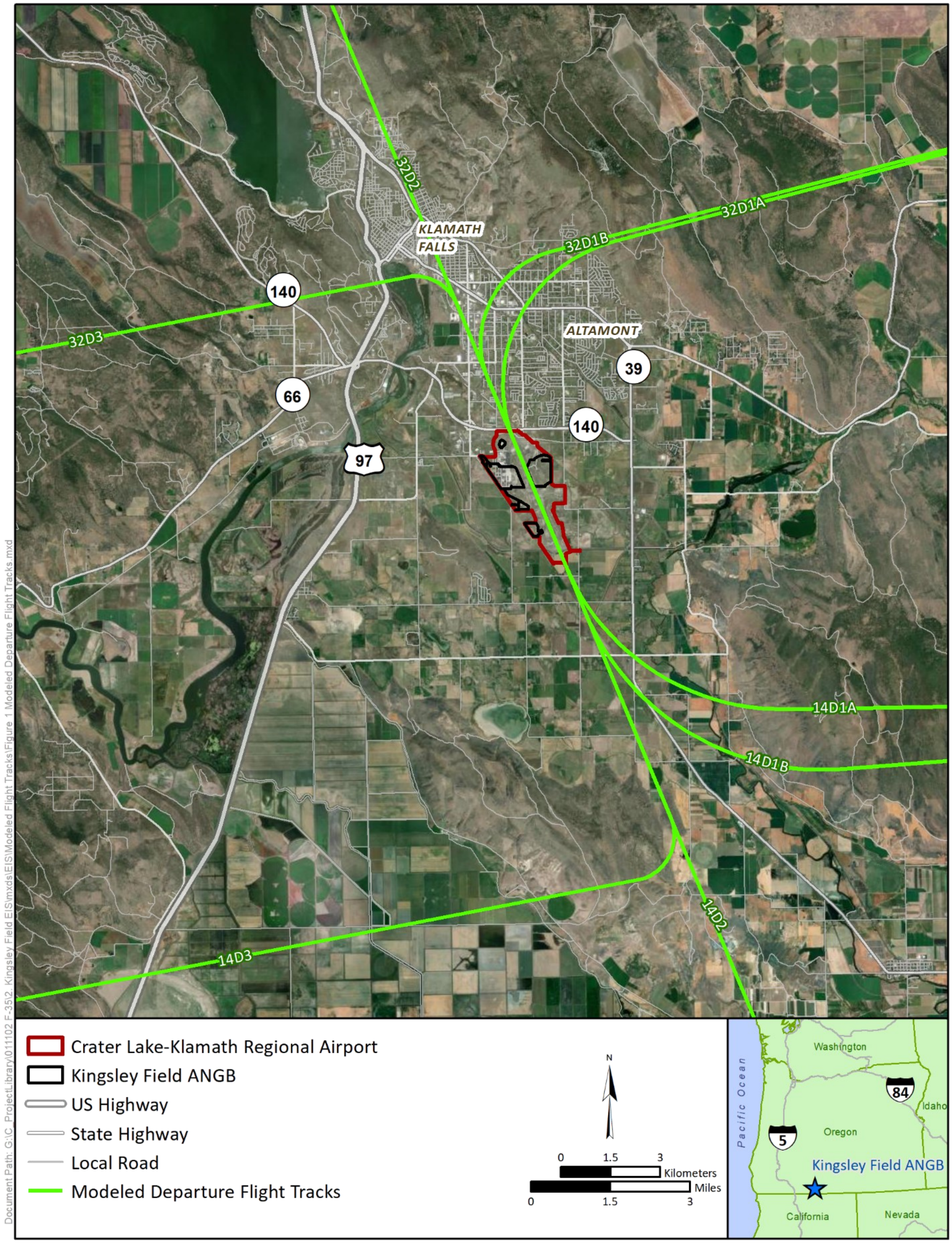
Appendix A

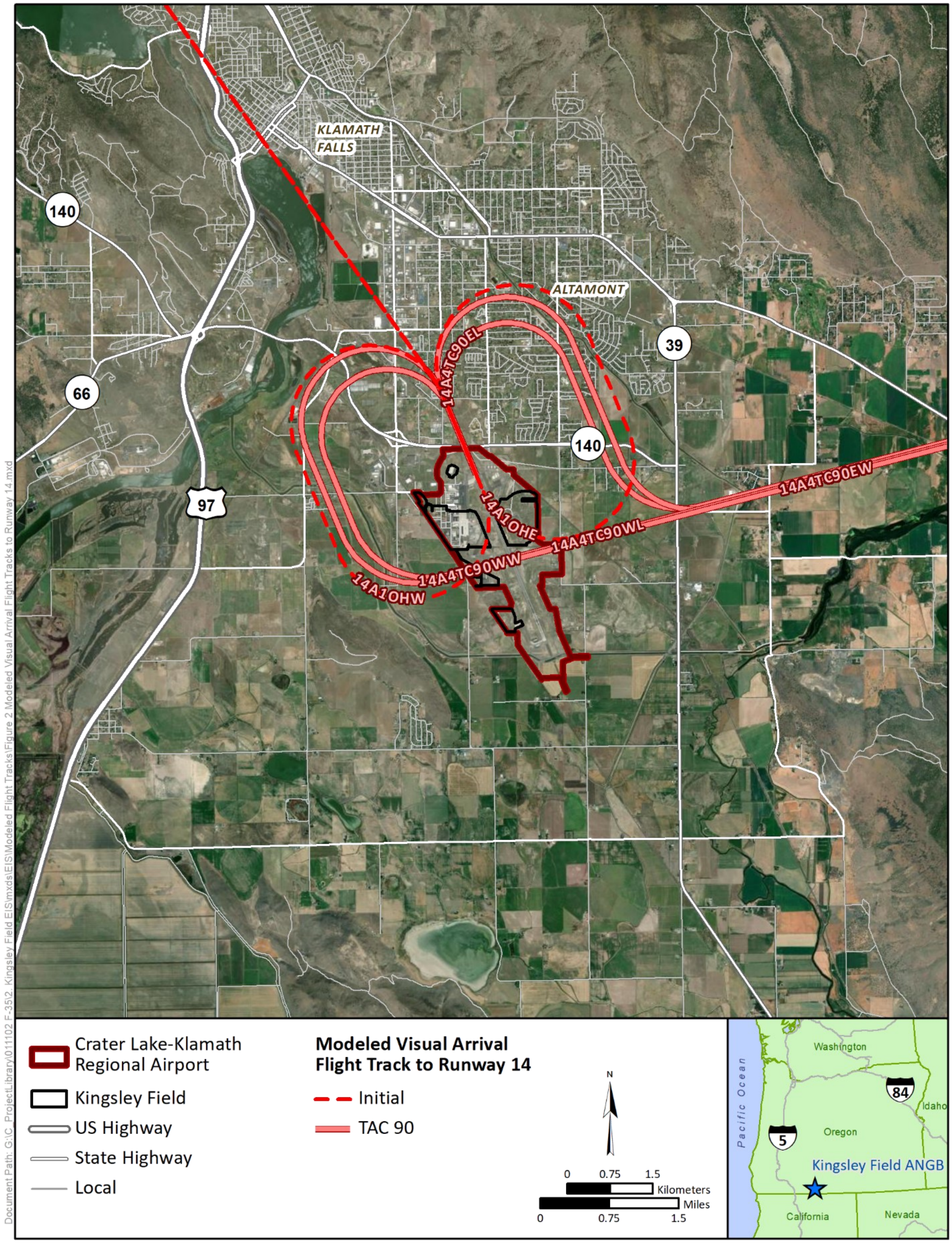
Aircraft Modeling Details

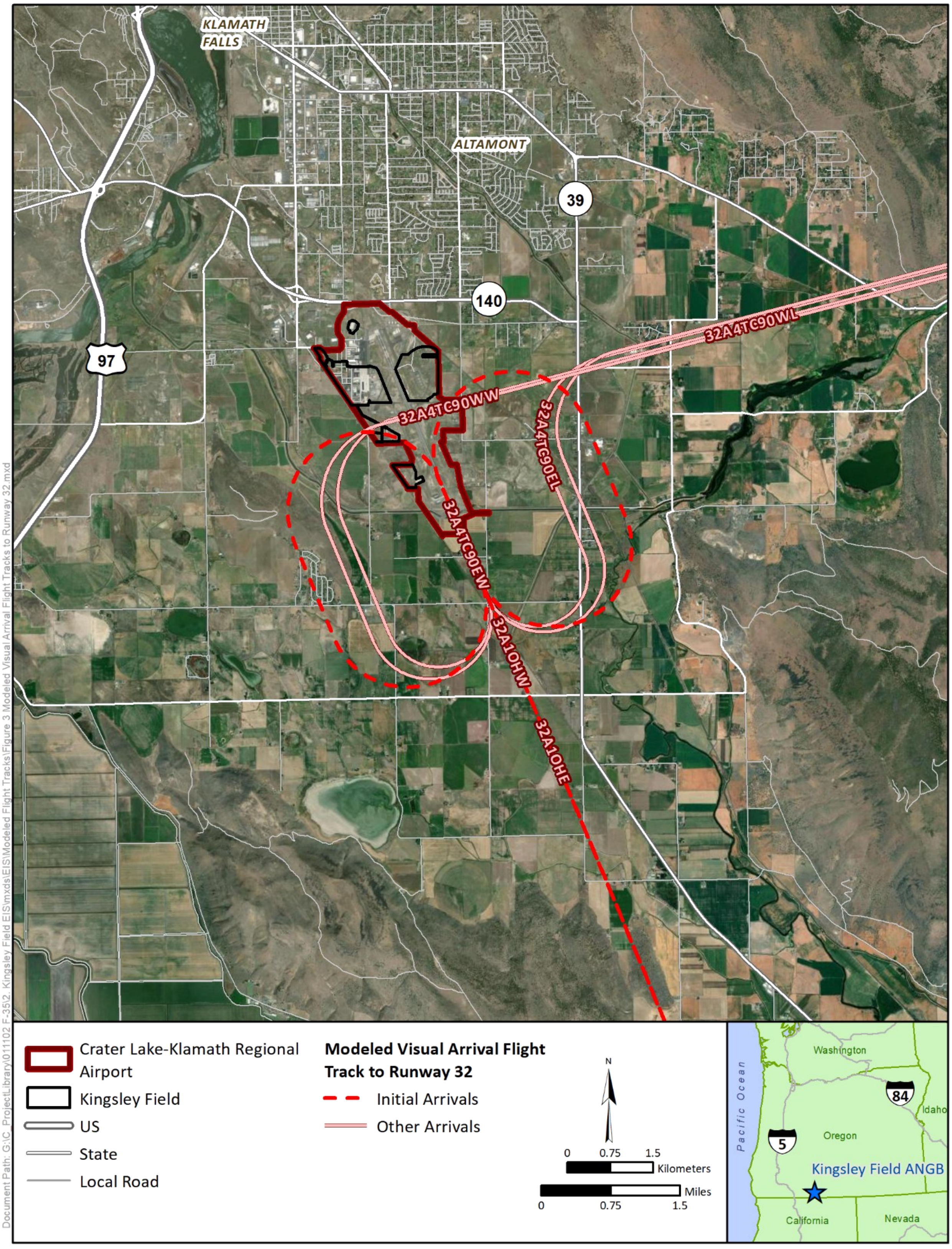
This page intentionally left blank.

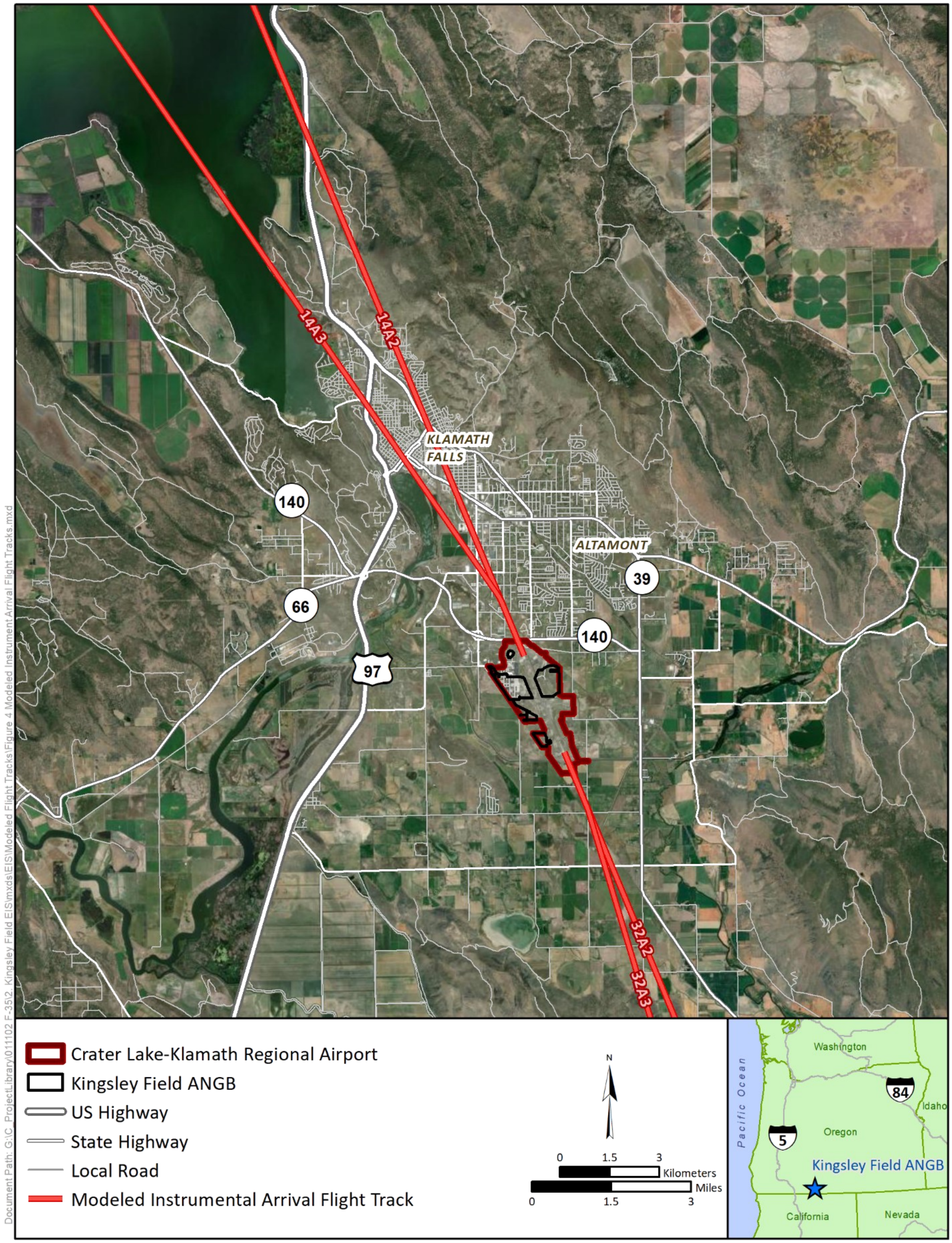
Flight Tracks

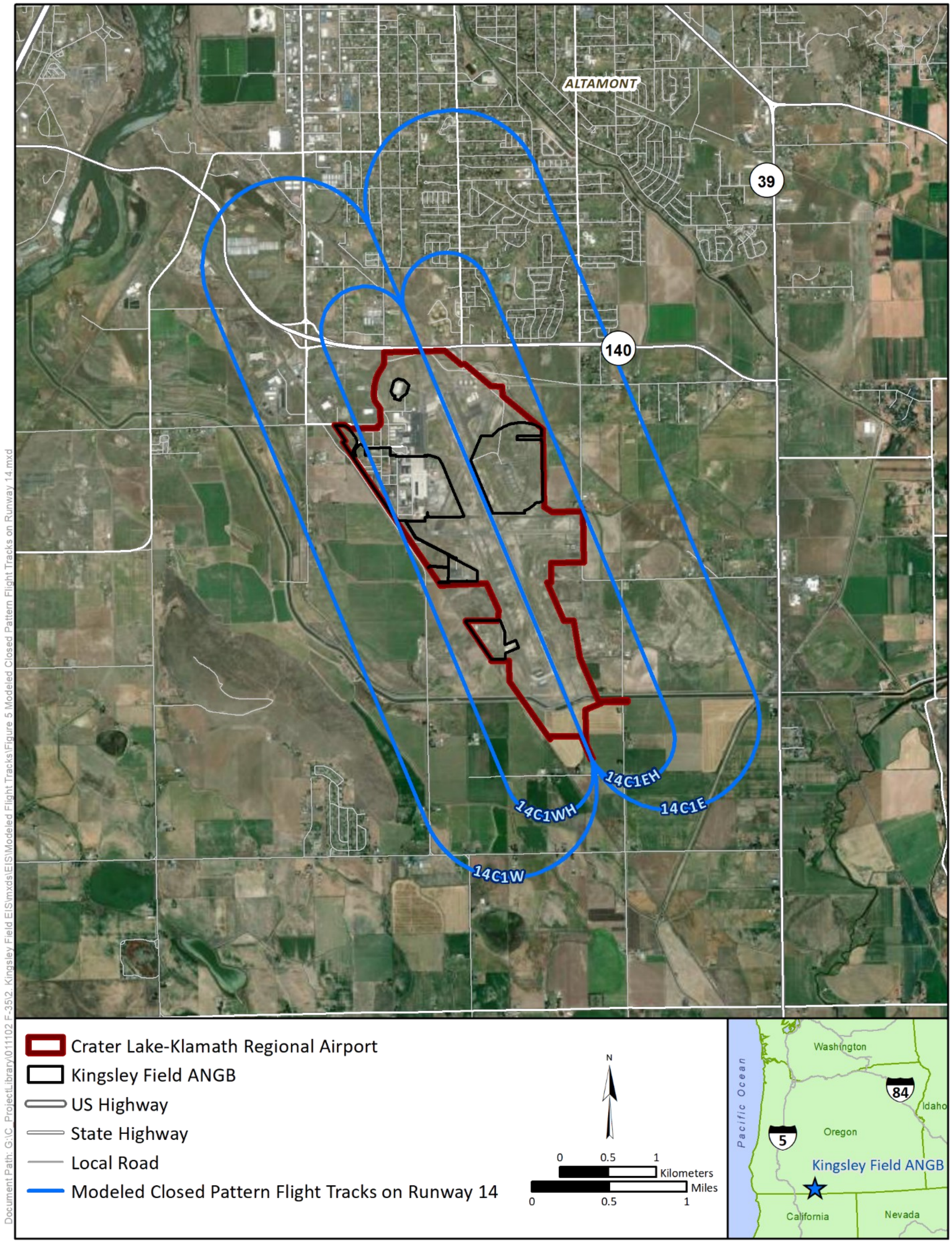
This page intentionally left blank.

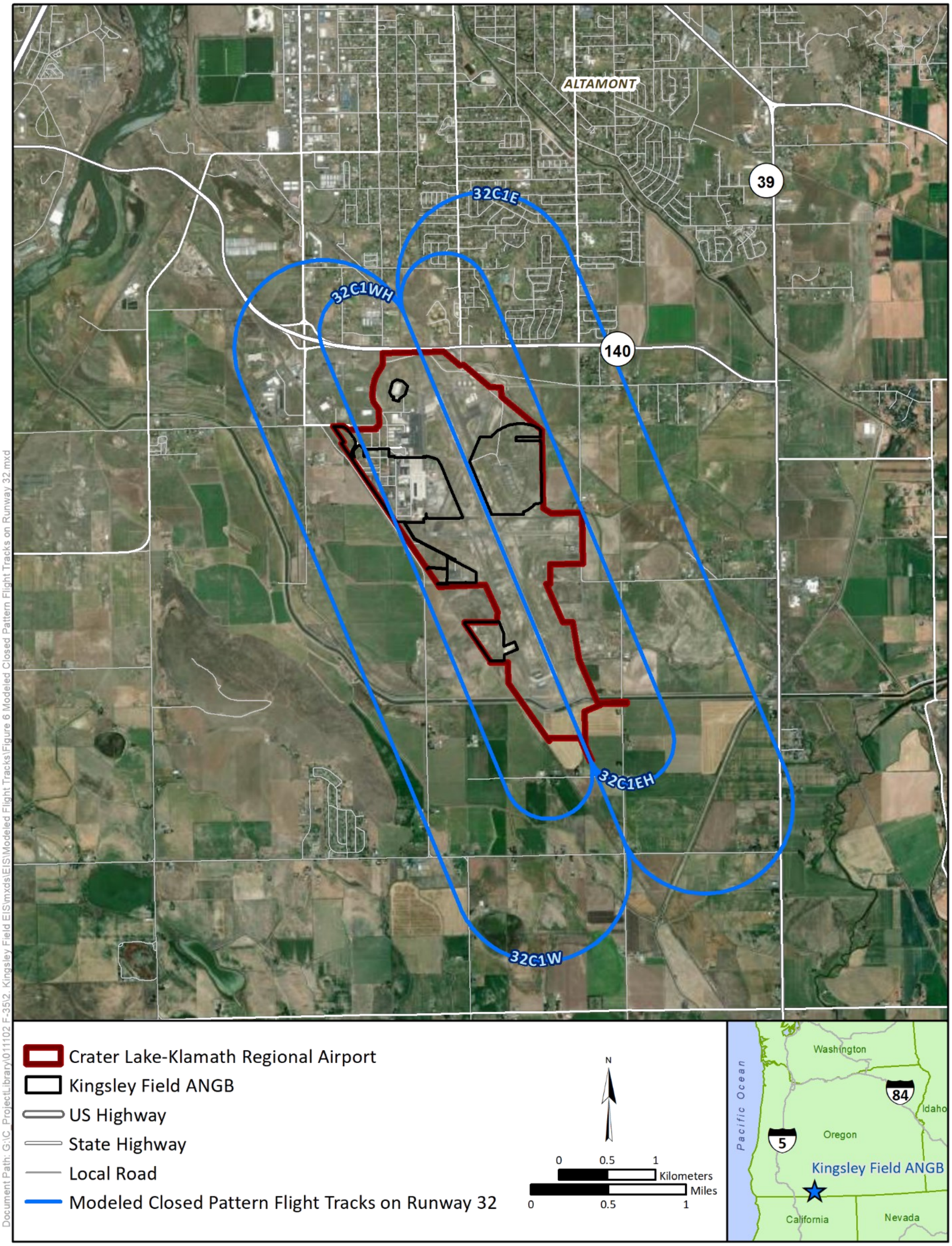

32D2
KLAMATH FALLS
32D1A
32D1B
140
32D3
ALTAMONT
39
66
140
97
14D1A
14D1B
14D2
14D3
Crater Lake-Klamath Regional Airport
Kingsley Field ANGB
US Highway
State Highway
Local Road
Modeled Departure Flight Tracks
N
0 1.5 3 Kilometers
0 1.5 3 Miles
Pacific Ocean
Washington
84
Idaho
Oregon
5
Kingsley Field ANGB
California
Nevada
Document Path: G:\C_ProjectLibrary\011102 F-35\2. Kingsley Field EIS\mxds\EIS\Modeled Flight Tracks\Figure 1 Modeled Departure Flight Tracks.mxd

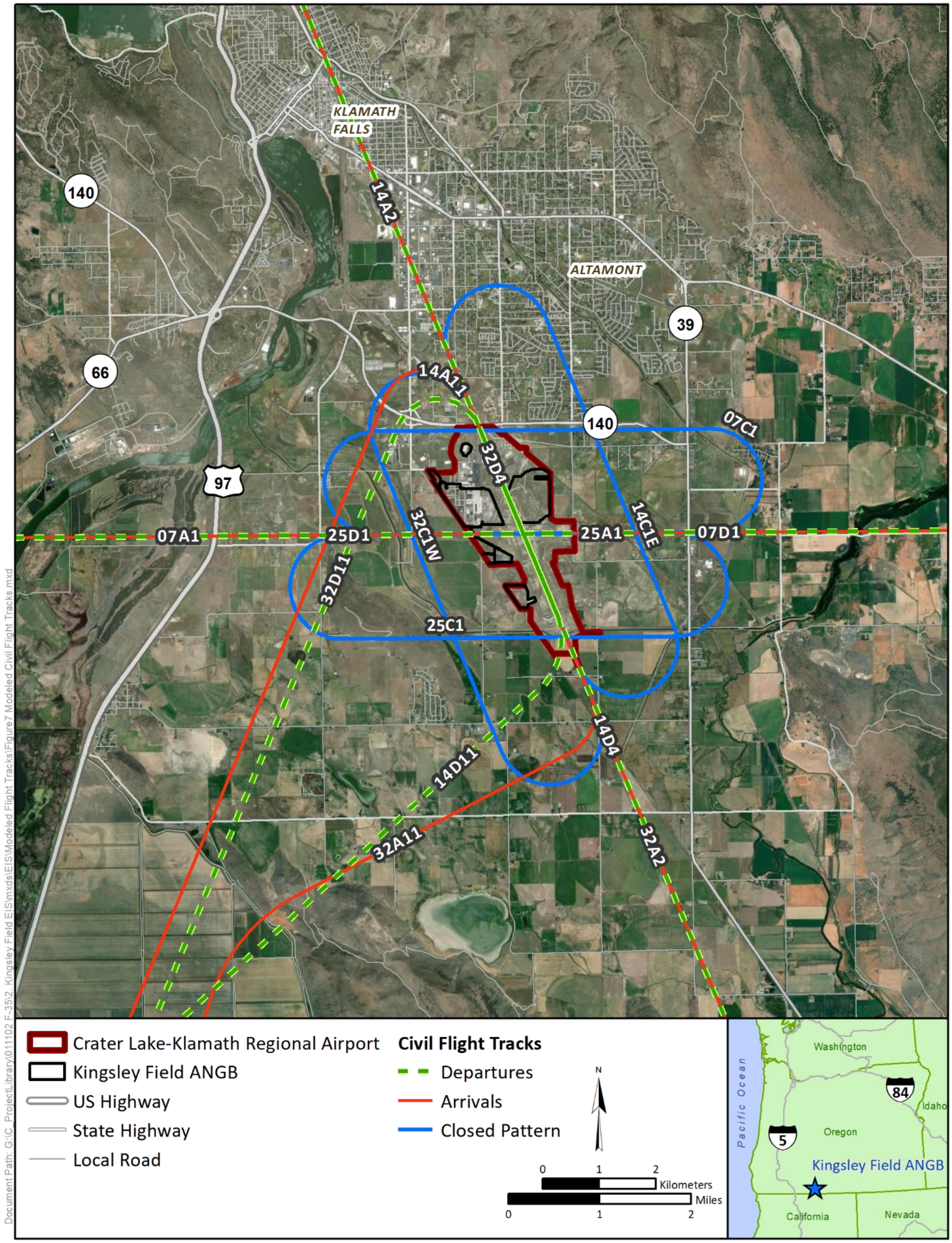

KLAMATH FALLS
ALTAMONT
140
66
97
39
14A4TC90EL
14A1OHE
14A4TC90EW
14A4TC90WL
14A4TC90WW
14A1OHW
Crater Lake-Klamath Regional Airport
Kingsley Field
US Highway
State Highway
Local
Modeled Visual Arrival Flight Track to Runway 14
Initial
TAC 90
N
0 0.75 1.5 Kilometers
0 0.75 1.5 Miles
Washington
Pacific Ocean
84
Idaho
Oregon
5
Kingsley Field ANGB
California
Nevada
Document Path: G:\C_ProjectLibrary\011102 F-35\2. Kingsley Field EIS\mxds\EIS\Modeled Flight Tracks\Figure 2 Modeled Visual Arrival Flight Tracks to Runway 14.mxd


KLAMATH FALLS
ALTAMONT
39
140
97
32A4TC90WL
32A4TC90WW
32A4TC90EL
32A4TC90EW
32A1OHW
32A1OHE
Crater Lake-Klamath Regional Airport
Kingsley Field
US
State
Local Road
Modeled Visual Arrival Flight Track to Runway 32
Initial Arrivals
Other Arrivals
N
0 0.75 1.5 Kilometers
0 0.75 1.5 Miles
Washington
Pacific Ocean
84
Idaho
Oregon
5
Kingsley Field ANGB
California
Nevada
Document Path: G:\C_ProjectLibrary\011102 F-35\2. Kingsley Field EIS\mxds\EIS\Modeled Flight Tracks\Figure 3 Modeled Visual Arrival Flight Tracks to Runway 32.mxd


14A3
14A2
KLAMATH FALLS
ALTAMONT
140
39
66
140
97
32A2
32A3
Crater Lake-Klamath Regional Airport
Kingsley Field ANGB
US Highway
State Highway
Local Road
Modeled Instrumental Arrival Flight Track
N
0 1.5 3 Kilometers
0 1.5 3 Miles
Washington
Pacific Ocean
84
Idaho
Oregon
5
Kingsley Field ANGB
California
Nevada
Document Path: G:\C_ProjectLibrary\011102 F-35\2. Kingsley Field EIS\mxds\EIS\Modeled Flight Tracks\Figure 4 Modeled Instrument Arrival Flight Tracks.mxd


ALTAMONT
39
140
14C1EH
14C1E
14C1WH
14C1W
Crater Lake-Klamath Regional Airport
Kingsley Field ANGB
US Highway
State Highway
Local Road
Modeled Closed Pattern Flight Tracks on Runway 14
N
0
0.5
1
Kilometers
Miles
Pacific Ocean
Washington
84
Idaho
Oregon
5
Kingsley Field ANGB
California
Nevada
Document Path: G:\C_ProjectLibrary\011102 F-35\2. Kingsley Field EIS\mxds\EIS\Modeled Flight Tracks\Figure 5 Modeled Closed Pattern Flight Tracks on Runway 14.mxd


ALTAMONT
39
140
32C1E
32C1WH
32C1EH
32C1W
Crater Lake-Klamath Regional Airport
Kingsley Field ANGB
US Highway
State Highway
Local Road
Modeled Closed Pattern Flight Tracks on Runway 32
N
0 0.5 1 Kilometers
0 0.5 1 Miles
Washington
Pacific Ocean
Oregon
Idaho
84
5
Kingsley Field ANGB
California
Nevada
Document Path: G:\C_ProjectLibrary\011102 F-35\2. Kingsley Field EIS\mxds\EIS\Modeled Flight Tracks\Figure 6 Modeled Closed Pattern Flight Tracks on Runway 32.mxd


KLAMATH FALLS
ALTAMONT
140
66
97
39
14A2
14A11
07C1
32D4
14C1E
07A1
25D1
32C1W
25A1
07D1
32D11
25C1
14D4
14D11
32A11
32A2
Crater Lake-Klamath Regional Airport
Kingsley Field ANGB
US Highway
State Highway
Local Road
Civil Flight Tracks
Departures
Arrivals
Closed Pattern
N
0 1 2 Kilometers
0 1 2 Miles
Washington
Pacific Ocean
84
Idaho
Oregon
5
Kingsley Field ANGB
California
Nevada
Document Path: G:\C_ProjectLibrary\011102 F-35\2. Kingsley Field EIS\mxds\EIS\Modeled Flight Tracks\Figure7 Modeled Civil Flight Tracks.mxd

This page intentionally left blank.

Flight Profiles

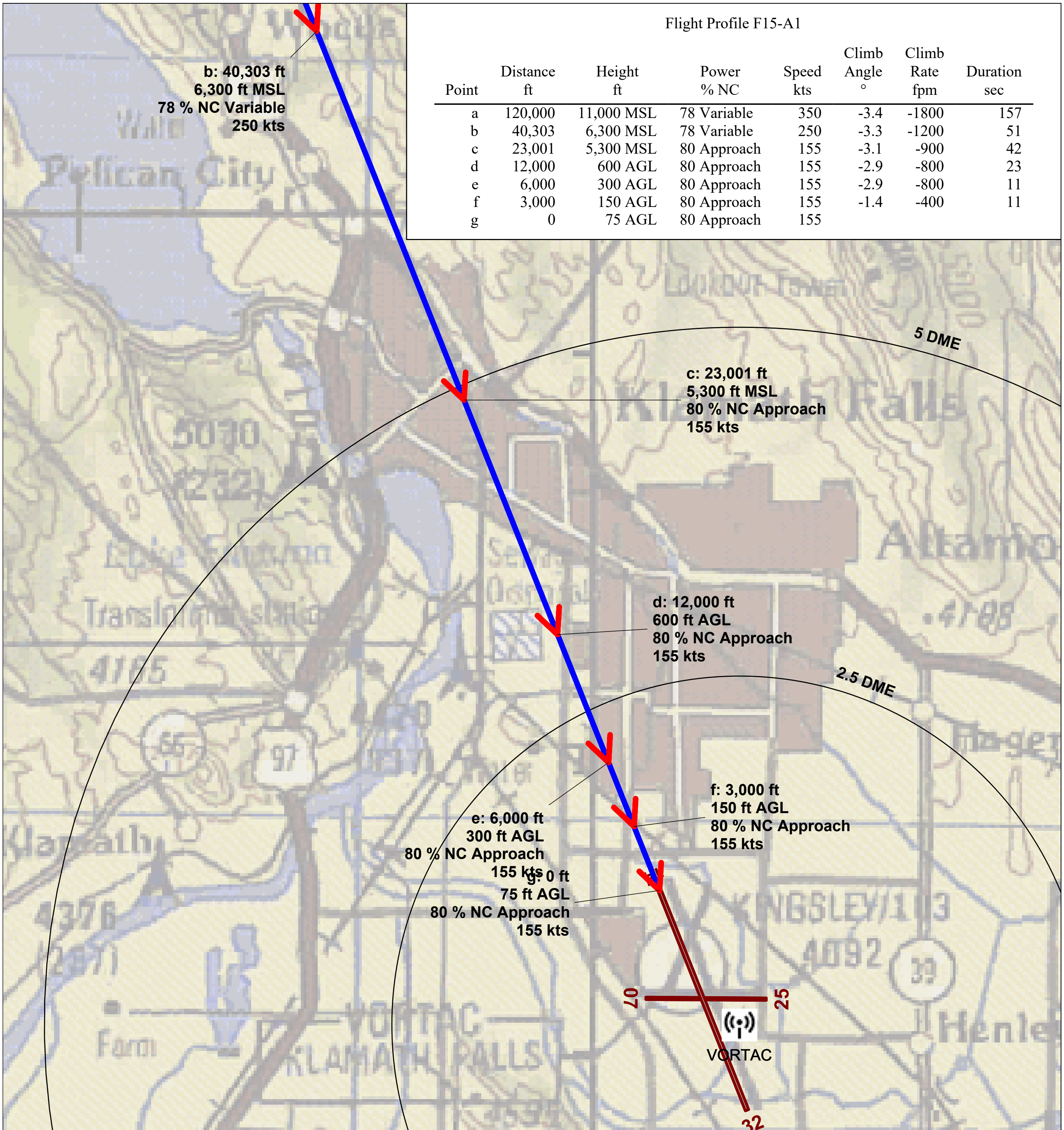
This page intentionally left blank.

Maps of F-15C/D Flight Profiles

This page intentionally left blank.

Flight Profile F15-A1

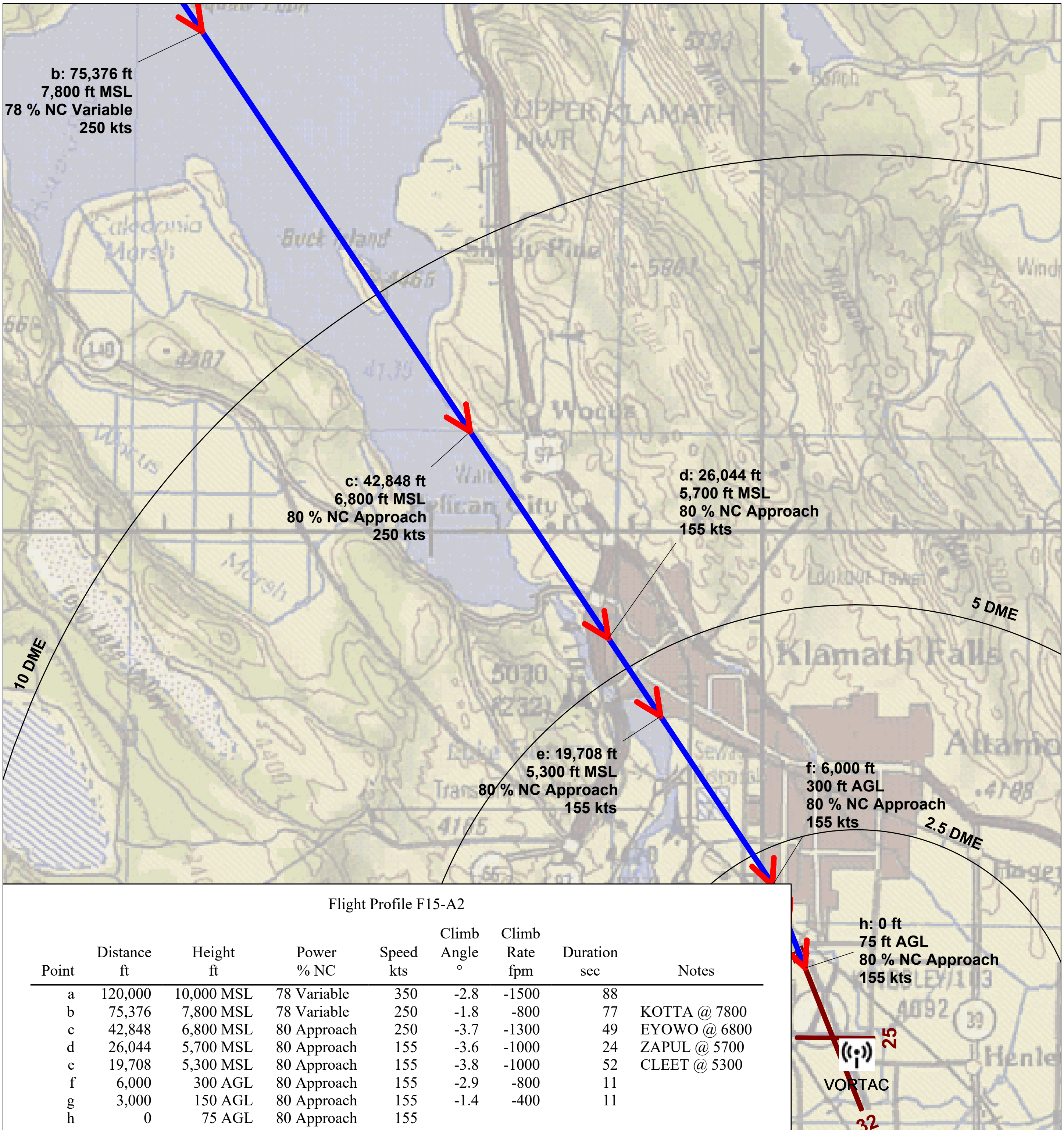
Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec
a	120,000	11,000 MSL	78 Variable	350	-3.4	-1800	157
b	40,303	6,300 MSL	78 Variable	250	-3.3	-1200	51
c	23,001	5,300 MSL	80 Approach	155	-3.1	-900	42
d	12,000	600 AGL	80 Approach	155	-2.9	-800	23
e	6,000	300 AGL	80 Approach	155	-2.9	-800	11
f	3,000	150 AGL	80 Approach	155	-1.4	-400	11
g	0	75 AGL	80 Approach	155			



Based F-15C/D Flight Profile F15-A1

ILS

Scale in Feet 1:73,900 (1 inch = 6,160 feet)



Flight Profile F15-A2

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	10,000 MSL	78 Variable	350	-2.8	-1500	88	
b	75,376	7,800 MSL	78 Variable	250	-1.8	-800	77	KOTTA @ 7800
c	42,848	6,800 MSL	80 Approach	250	-3.7	-1300	49	EYOWO @ 6800
d	26,044	5,700 MSL	80 Approach	155	-3.6	-1000	24	ZAPUL @ 5700
e	19,708	5,300 MSL	80 Approach	155	-3.8	-1000	52	CLEET @ 5300
f	6,000	300 AGL	80 Approach	155	-2.9	-800	11	
g	3,000	150 AGL	80 Approach	155	-1.4	-400	11	
h	0	75 AGL	80 Approach	155				

Based F-15C/D Flight Profile F15-A2

TACAN or VOR

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000

Scale in Feet 1:115,000 (1 inch = 9,550 feet)

Flight Profile F15-A3

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	11,000 MSL	78 Variable	350	-3.4	-1800	157	
b	40,303	6,300 MSL	78 Variable	250	-3.0	-1100	51	MZAMA @ 6300
c	23,001	5,380 MSL	80 Approach	155	-3.6	-1000	42	SRCUS @ 5380
d	12,000	600 AGL	80 Approach	155	-2.9	-800	23	
e	6,000	300 AGL	80 Approach	155	-2.9	-800	11	
f	3,000	150 AGL	80 Approach	155	-1.4	-400	11	
g	0	75 AGL	80 Approach	155				

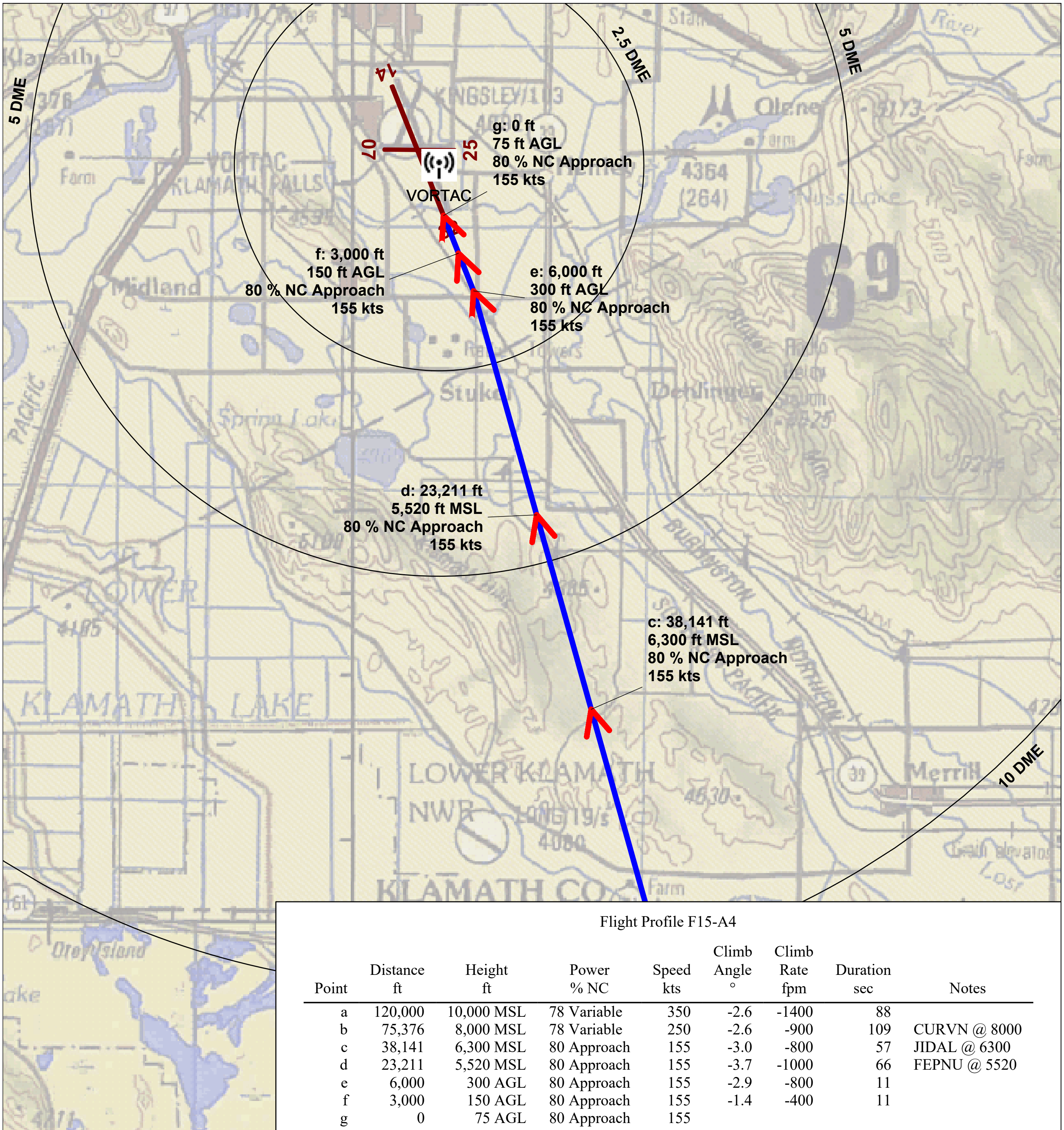
Based F-15C/D Flight Profile F15-A3

ILS

0 4,000 8,000 12,000 16,000 20,000 24,000

Scale in Feet 1:73,900 (1 inch = 6,160 feet)

N



Flight Profile F15-A4

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	10,000 MSL	78 Variable	350	-2.6	-1400	88	
b	75,376	8,000 MSL	78 Variable	250	-2.6	-900	109	CURVN @ 8000
c	38,141	6,300 MSL	80 Approach	155	-3.0	-800	57	JIDAL @ 6300
d	23,211	5,520 MSL	80 Approach	155	-3.7	-1000	66	FEPNU @ 5520
e	6,000	300 AGL	80 Approach	155	-2.9	-800	11	
f	3,000	150 AGL	80 Approach	155	-1.4	-400	11	
g	0	75 AGL	80 Approach	155				

Based F-15C/D Flight Profile F15-A4

TACAN or VOR

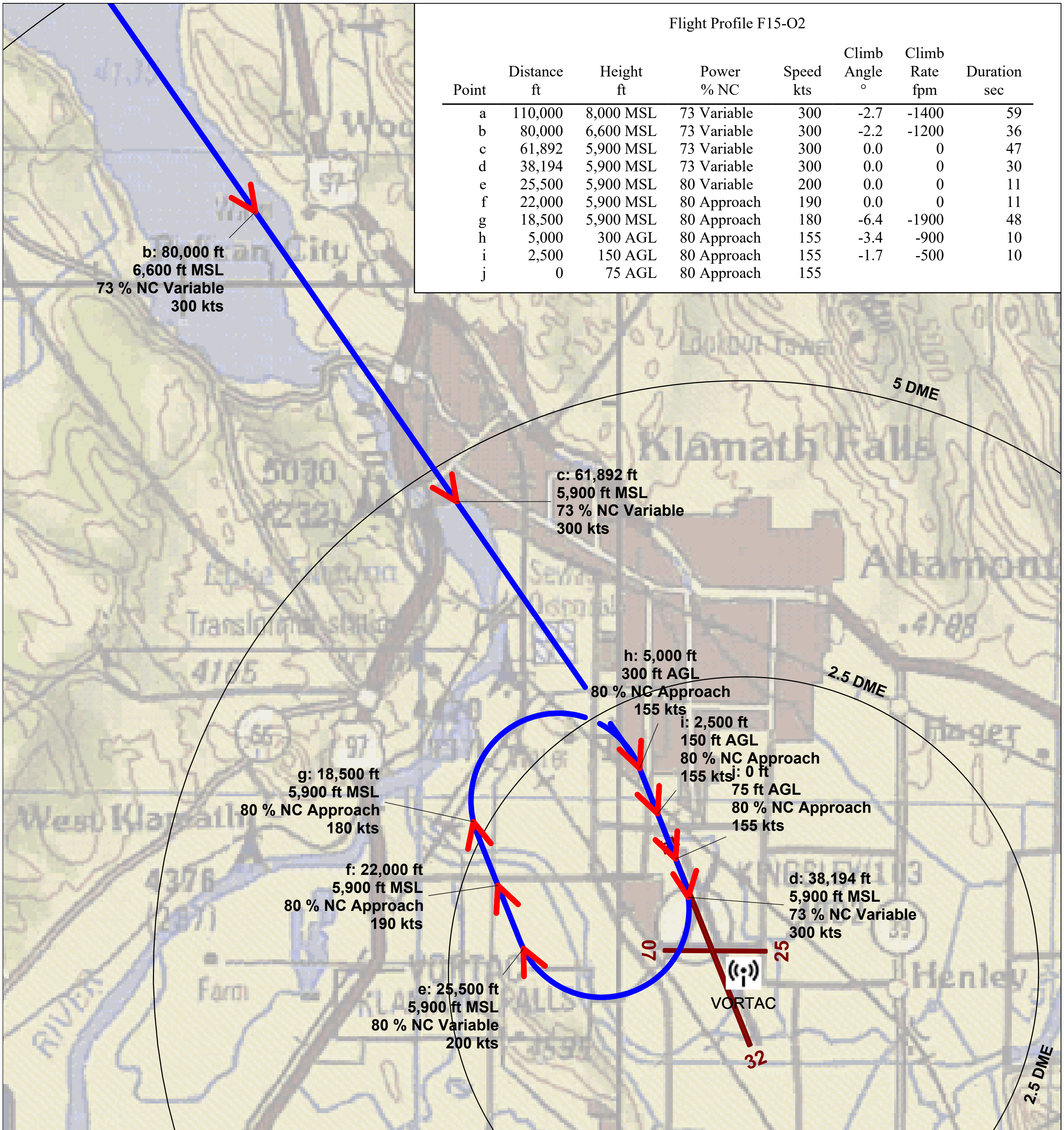
0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000

Scale in Feet 1:125,000 (1 inch = 10,500 feet)

N

Flight Profile F15-O2

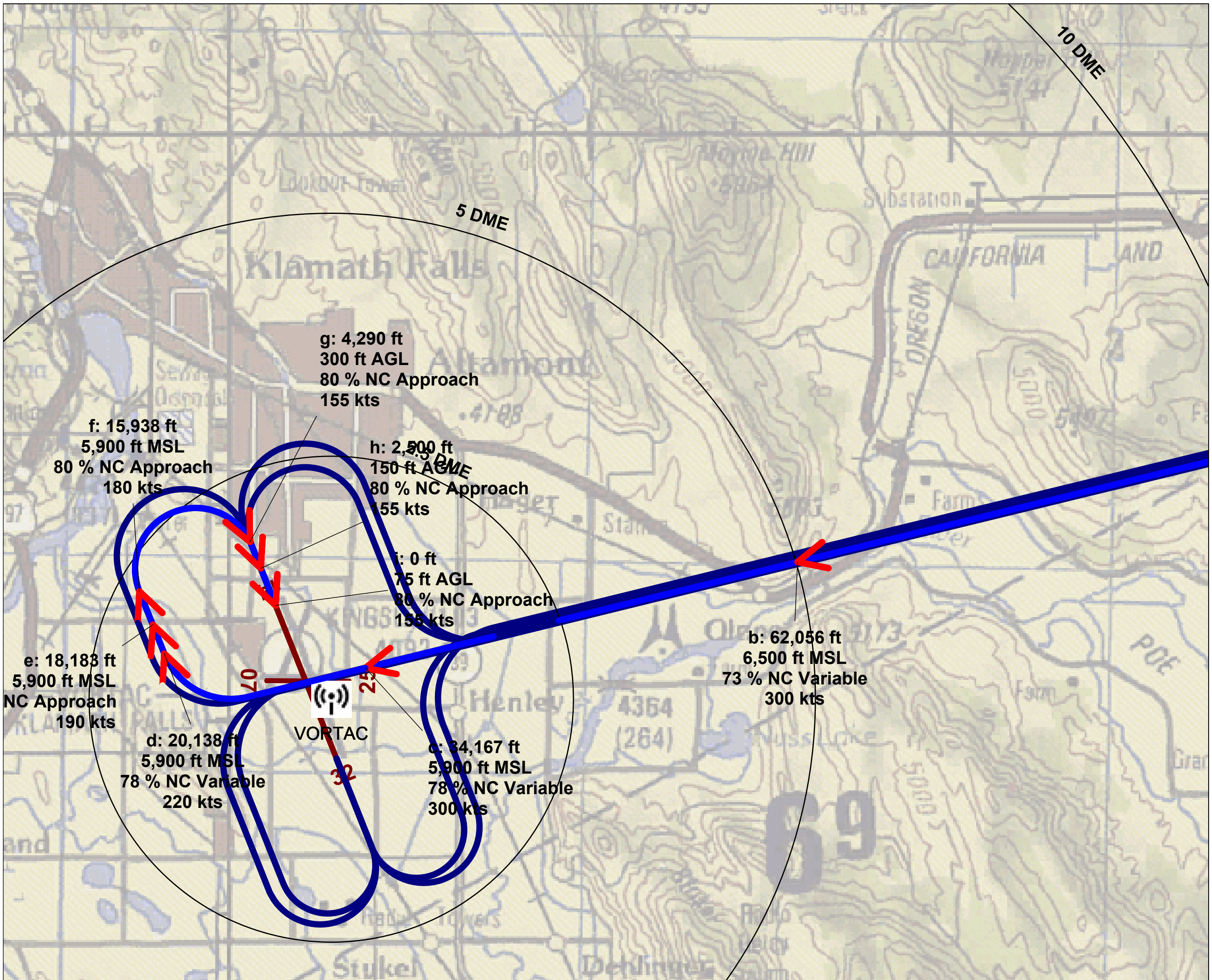
Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec
a	110,000	8,000 MSL	73 Variable	300	-2.7	-1400	59
b	80,000	6,600 MSL	73 Variable	300	-2.2	-1200	36
c	61,892	5,900 MSL	73 Variable	300	0.0	0	47
d	38,194	5,900 MSL	73 Variable	300	0.0	0	30
e	25,500	5,900 MSL	80 Variable	200	0.0	0	11
f	22,000	5,900 MSL	80 Approach	190	0.0	0	11
g	18,500	5,900 MSL	80 Approach	180	-6.4	-1900	48
h	5,000	300 AGL	80 Approach	155	-3.4	-900	10
i	2,500	150 AGL	80 Approach	155	-1.7	-500	10
j	0	75 AGL	80 Approach	155			



Based F-15C/D Flight Profile F15-O2
OVERHEAD WEST

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000

Scale in Feet 1:87,100 (1 inch = 7,250 feet)



Flight Profile F15-T3

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec
a	92,932	8,500 MSL	73 Variable	300	-3.7	-2000	61
b	62,056	6,500 MSL	73 Variable	300	-1.2	-700	55
c	34,167	5,900 MSL	78 Variable	300	0.0	0	32
d	20,138	5,900 MSL	78 Variable	220	0.0	0	6
e	18,183	5,900 MSL	80 Approach	190	0.0	0	7
f	15,938	5,900 MSL	80 Approach	180	-7.4	-2200	41
g	4,290	300 AGL	80 Approach	155	-4.8	-1300	7
h	2,500	150 AGL	80 Approach	155	-1.7	-500	10
i	0	75 AGL	80 Approach	155			

Based F-15C/D Flight Profile F15-T3

TAC 90 WEST LEAD

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000

Scale in Feet 1:121,000 (1 inch = 10,100 feet)

N

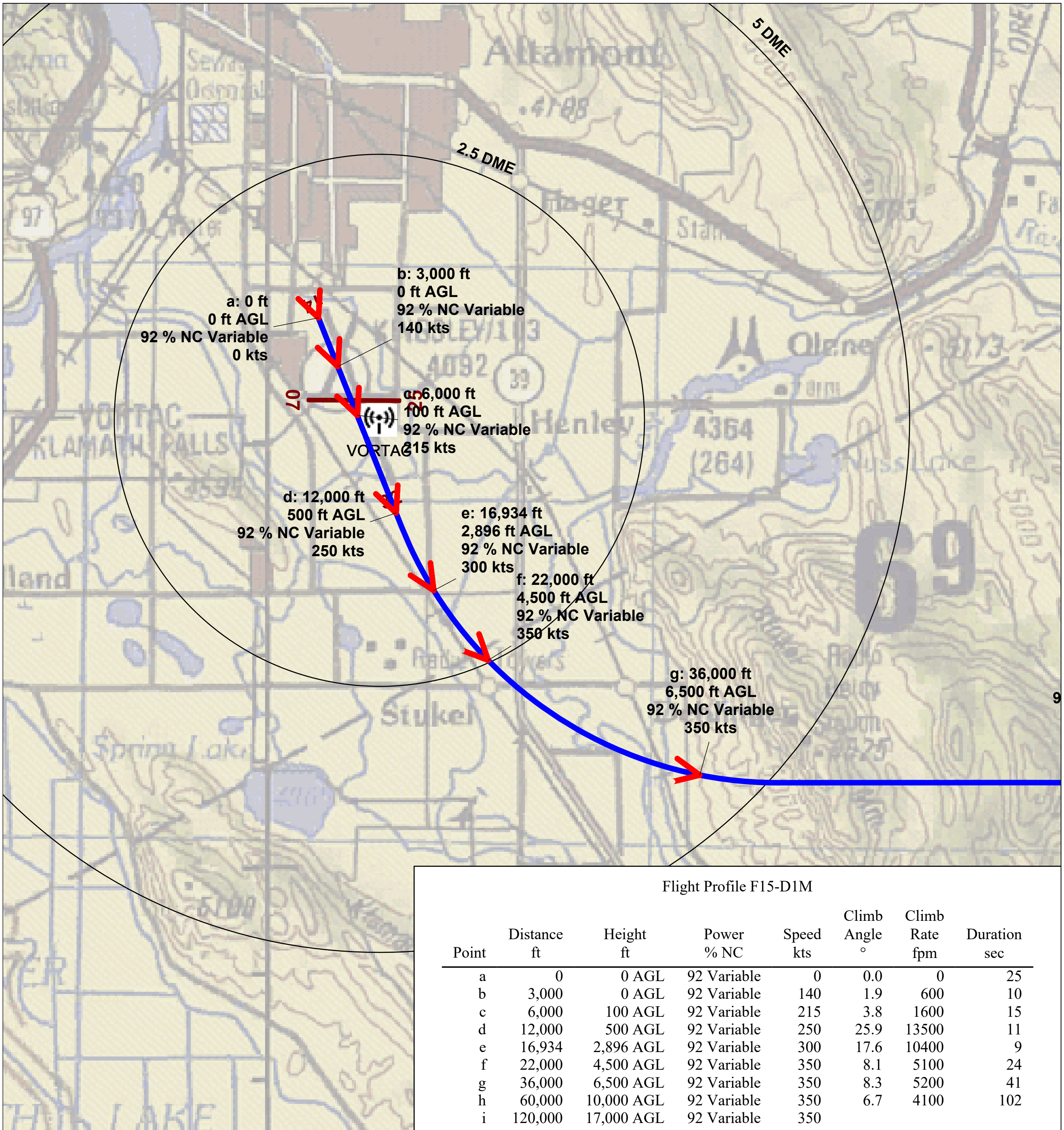
Flight Profile F15-D1A

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec
a	0	0 AGL	90 Max Zone 5 A/B	0	0.0	0	25
b	3,000	0 AGL	91 Afterburner	140	1.9	700	9
c	6,000	100 AGL	91 Afterburner	250	5.7	2800	13
d	12,000	700 AGL	92 Variable	300	13.7	8000	16
e	21,000	2,896 AGL	92 Variable	350	10.5	6600	15
f	29,680	4,500 AGL	92 Variable	350	3.4	2100	58
g	63,790	6,500 AGL	92 Variable	350	4.7	2900	72
h	106,433	10,000 AGL	92 Variable	350	18.5	11800	35
i	127,397	17,000 AGL	92 Variable	350			

Based F-15C/D Flight Profile F15-D1A

AB SID - HVY/HOT REPRESENTATIVE

Scale in Feet 1:61,100 (1 inch = 5,090 feet)



Flight Profile F15-D1M

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec
a	0	0 AGL	92 Variable	0	0.0	0	25
b	3,000	0 AGL	92 Variable	140	1.9	600	10
c	6,000	100 AGL	92 Variable	215	3.8	1600	15
d	12,000	500 AGL	92 Variable	250	25.9	13500	11
e	16,934	2,896 AGL	92 Variable	300	17.6	10400	9
f	22,000	4,500 AGL	92 Variable	350	8.1	5100	24
g	36,000	6,500 AGL	92 Variable	350	8.3	5200	41
h	60,000	10,000 AGL	92 Variable	350	6.7	4100	102
i	120,000	17,000 AGL	92 Variable	350			

Based F-15C/D Flight Profile F15-D1M

MILPOWER SID - REPRESENTATIVE

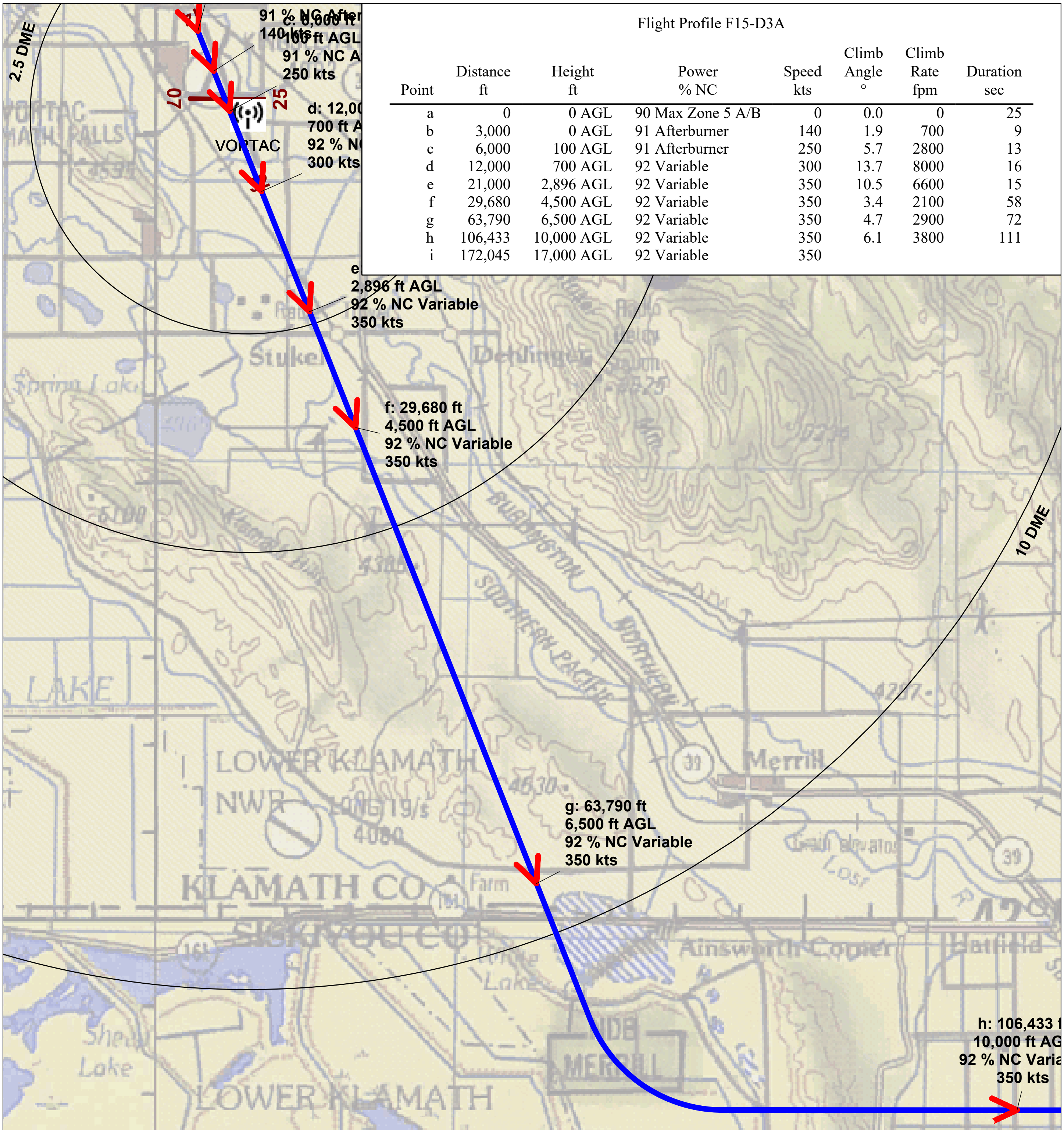
0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000

Scale in Feet 1:96,900 (1 inch = 8,080 feet)

N

Flight Profile F15-D3A

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec
a	0	0 AGL	90 Max Zone 5 A/B	0	0.0	0	25
b	3,000	0 AGL	91 Afterburner	140	1.9	700	9
c	6,000	100 AGL	91 Afterburner	250	5.7	2800	13
d	12,000	700 AGL	92 Variable	300	13.7	8000	16
e	21,000	2,896 AGL	92 Variable	350	10.5	6600	15
f	29,680	4,500 AGL	92 Variable	350	3.4	2100	58
g	63,790	6,500 AGL	92 Variable	350	4.7	2900	72
h	106,433	10,000 AGL	92 Variable	350	6.1	3800	111
i	172,045	17,000 AGL	92 Variable	350			

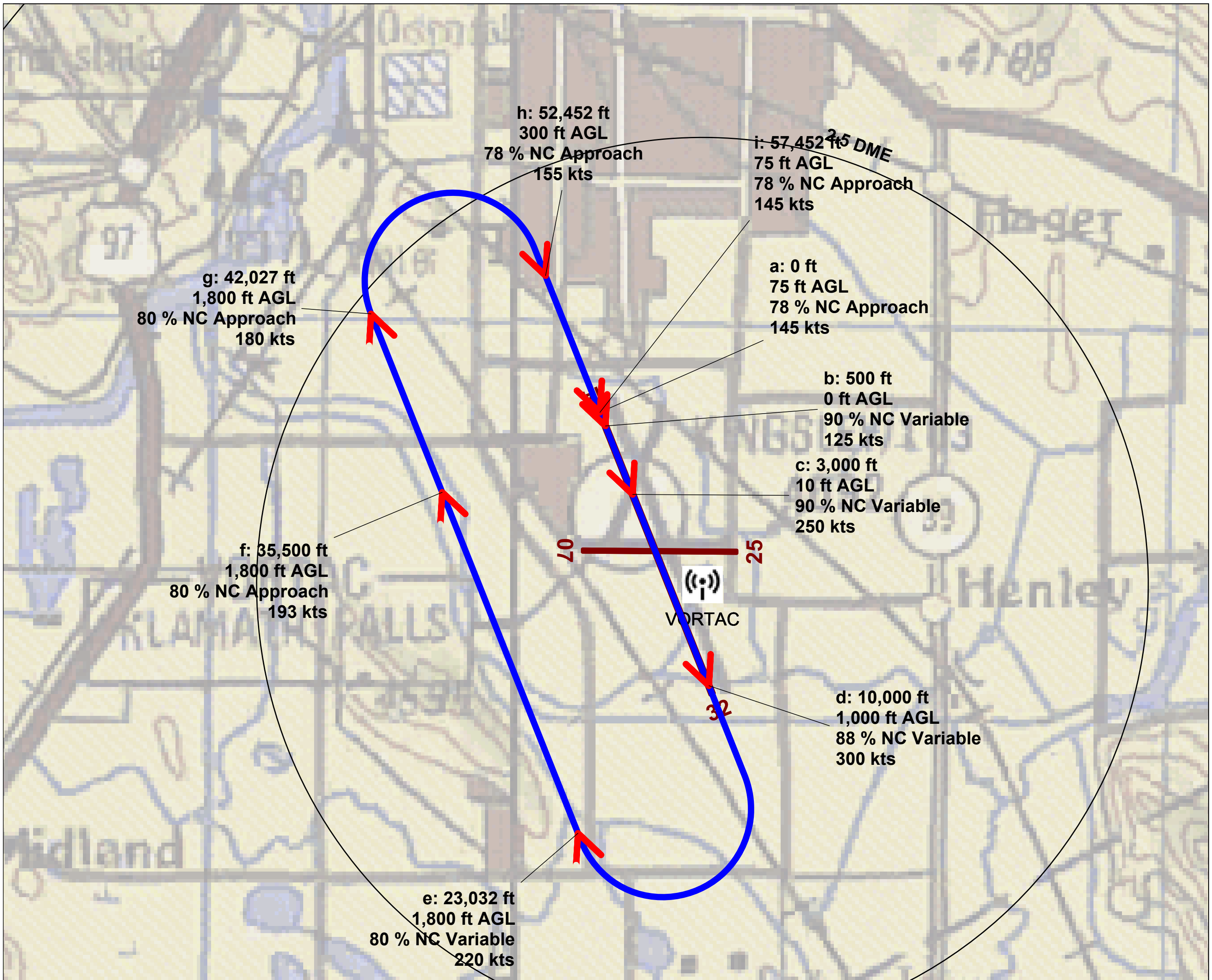


Based F-15C/D Flight Profile F15-D3A
AB SID - HVY/HOT REPRESENTATIVE

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000

Scale in Feet 1:118,000 (1 inch = 9,830 feet)

N



Flight Profile F15-C2

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	75 AGL	78 Approach	145	-8.5	-2100	2	
b	500	0 AGL	90 Variable	125	0.2	100	8	
c	3,000	10 AGL	90 Variable	250	8.0	3900	15	
d	10,000	1,000 AGL	88 Variable	300	3.5	1600	30	
e	23,032	1,800 AGL	80 Variable	220	0.0	0	36	
f	35,500	1,800 AGL	80 Approach	193	0.0	0	21	Using variable due to extrapolation limit
g	42,027	1,800 AGL	80 Approach	180	-8.2	-2400	37	Using variable due to extrapolation limit
h	52,452	300 AGL	78 Approach	155	-2.6	-700	20	
i	57,452	75 AGL	78 Approach	145				

Based F-15C/D Flight Profile F15-C2

CLOSED PATTERN RUNWAY 14 WEST

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:65,600 (1 inch = 5,470 feet)

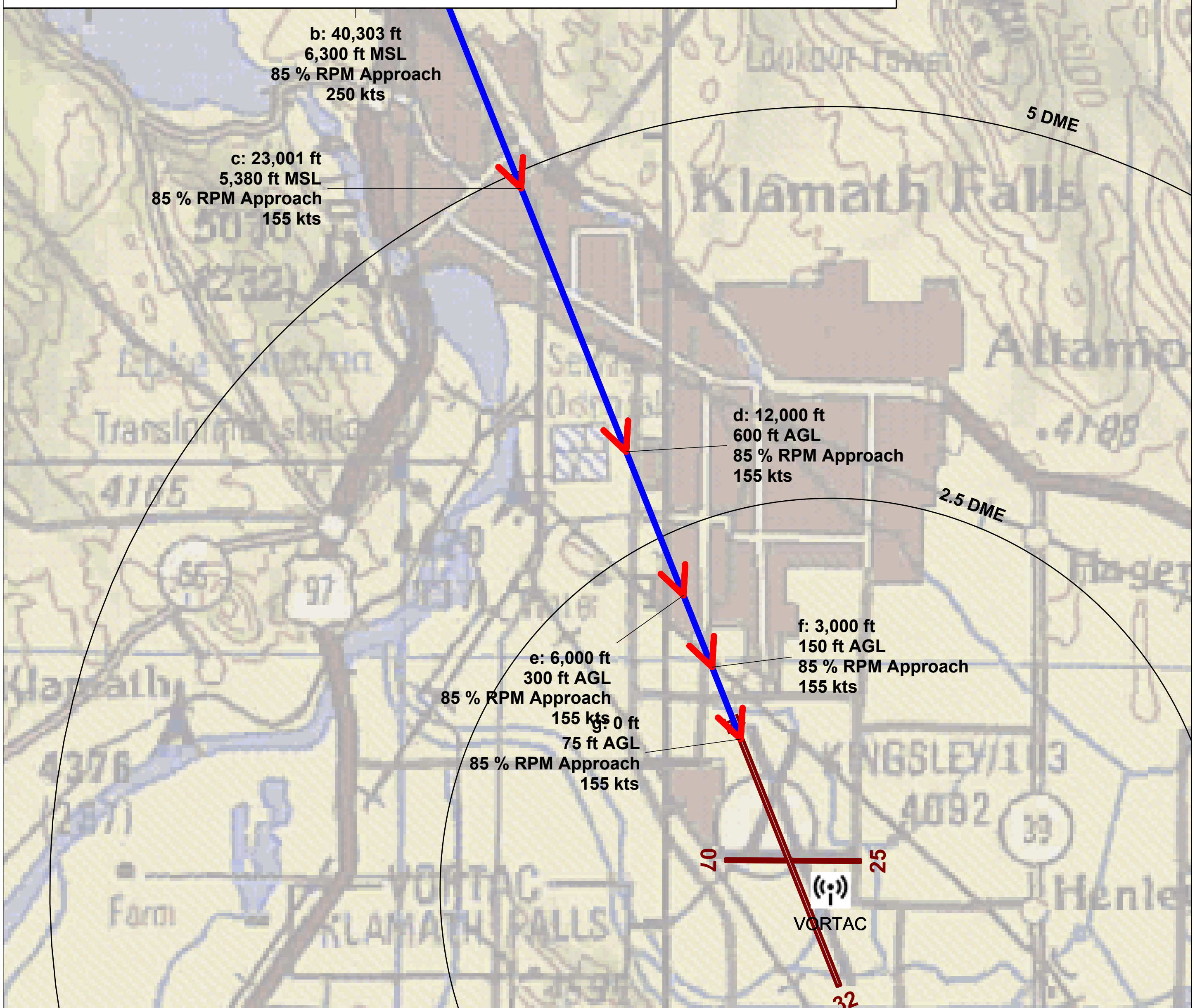
N

F-5E Adversary Air

This page intentionally left blank.

Flight Profile F5-A1

Point	Distance ft	Height ft	Power % RPM	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	11,000 MSL	85 Variable	350	-3.4	-1800	157	
b	40,303	6,300 MSL	85 Approach	250	-3.0	-1100	51	MZAMA @ 6300
c	23,001	5,380 MSL	85 Approach	155	-3.6	-1000	42	SRCUS @ 5380
d	12,000	600 AGL	85 Approach	155	-2.9	-800	23	
e	6,000	300 AGL	85 Approach	155	-2.9	-800	11	
f	3,000	150 AGL	85 Approach	155	-1.4	-400	11	
g	0	75 AGL	85 Approach	155				

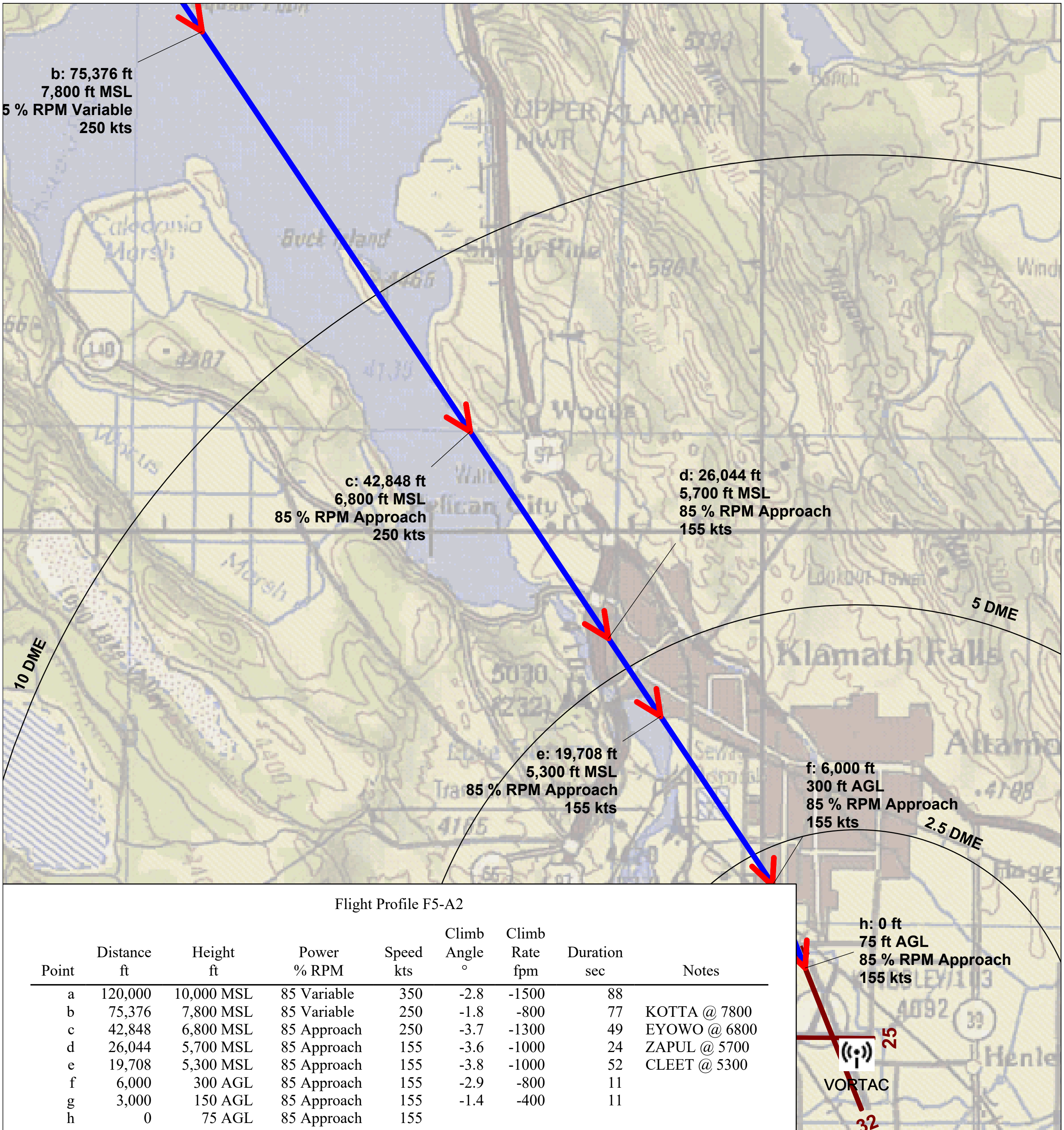


Based F-5E Flight Profile F5-A1
ILS

0 4,000 8,000 12,000 16,000 20,000 24,000

Scale in Feet 1:73,900 (1 inch = 6,160 feet)

N



Flight Profile F5-A2

Point	Distance ft	Height ft	Power % RPM	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	10,000 MSL	85 Variable	350	-2.8	-1500	88	
b	75,376	7,800 MSL	85 Variable	250	-1.8	-800	77	KOTTA @ 7800
c	42,848	6,800 MSL	85 Approach	250	-3.7	-1300	49	EYOWO @ 6800
d	26,044	5,700 MSL	85 Approach	155	-3.6	-1000	24	ZAPUL @ 5700
e	19,708	5,300 MSL	85 Approach	155	-3.8	-1000	52	CLEET @ 5300
f	6,000	300 AGL	85 Approach	155	-2.9	-800	11	
g	3,000	150 AGL	85 Approach	155	-1.4	-400	11	
h	0	75 AGL	85 Approach	155				

Based F-5E Flight Profile F5-A2

TACAN or VOR

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000

Scale in Feet 1:115,000 (1 inch = 9,550 feet)

N

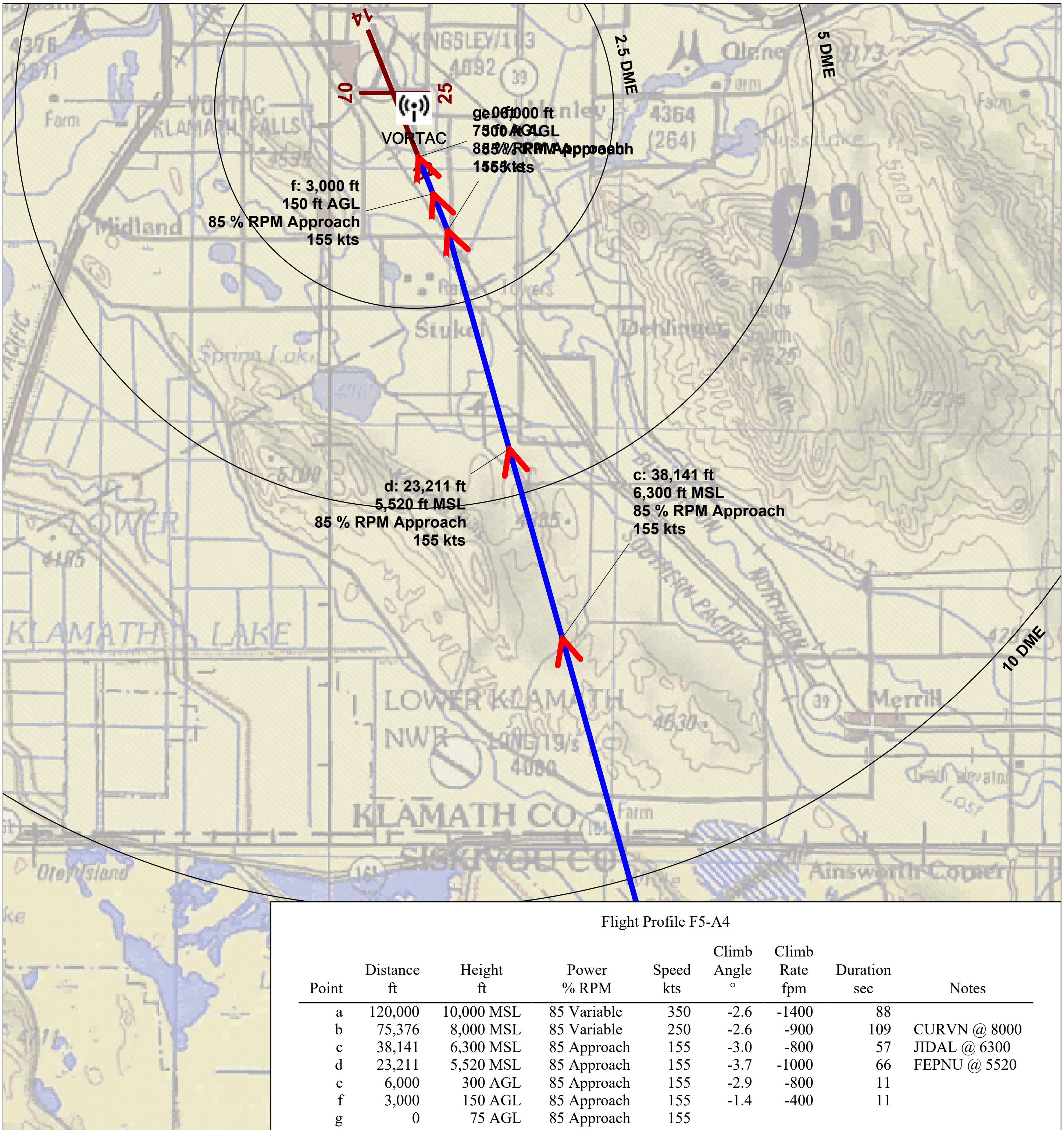
Flight Profile F5-A3

Point	Distance ft	Height ft	Power % RPM	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	11,000 MSL	85 Variable	350	-3.4	-1800	157	
b	40,303	6,300 MSL	85 Approach	250	-3.0	-1100	51	MZAMA @ 6300
c	23,001	5,380 MSL	85 Approach	155	-3.6	-1000	42	SRCUS @ 5380
d	12,000	600 AGL	85 Approach	155	-2.9	-800	23	
e	6,000	300 AGL	85 Approach	155	-2.9	-800	11	
f	3,000	150 AGL	85 Approach	155	-1.4	-400	11	
g	0	75 AGL	85 Approach	155				

Based F-5E Flight Profile F5-A3

ILS

Scale in Feet 1:73,900 (1 inch = 6,160 feet)



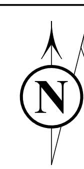
Flight Profile F5-A4

Point	Distance ft	Height ft	Power % RPM	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	10,000 MSL	85 Variable	350	-2.6	-1400	88	
b	75,376	8,000 MSL	85 Variable	250	-2.6	-900	109	CURVN @ 8000
c	38,141	6,300 MSL	85 Approach	155	-3.0	-800	57	JIDAL @ 6300
d	23,211	5,520 MSL	85 Approach	155	-3.7	-1000	66	FEPNU @ 5520
e	6,000	300 AGL	85 Approach	155	-2.9	-800	11	
f	3,000	150 AGL	85 Approach	155	-1.4	-400	11	
g	0	75 AGL	85 Approach	155				

Based F-5E Flight Profile F5-A4

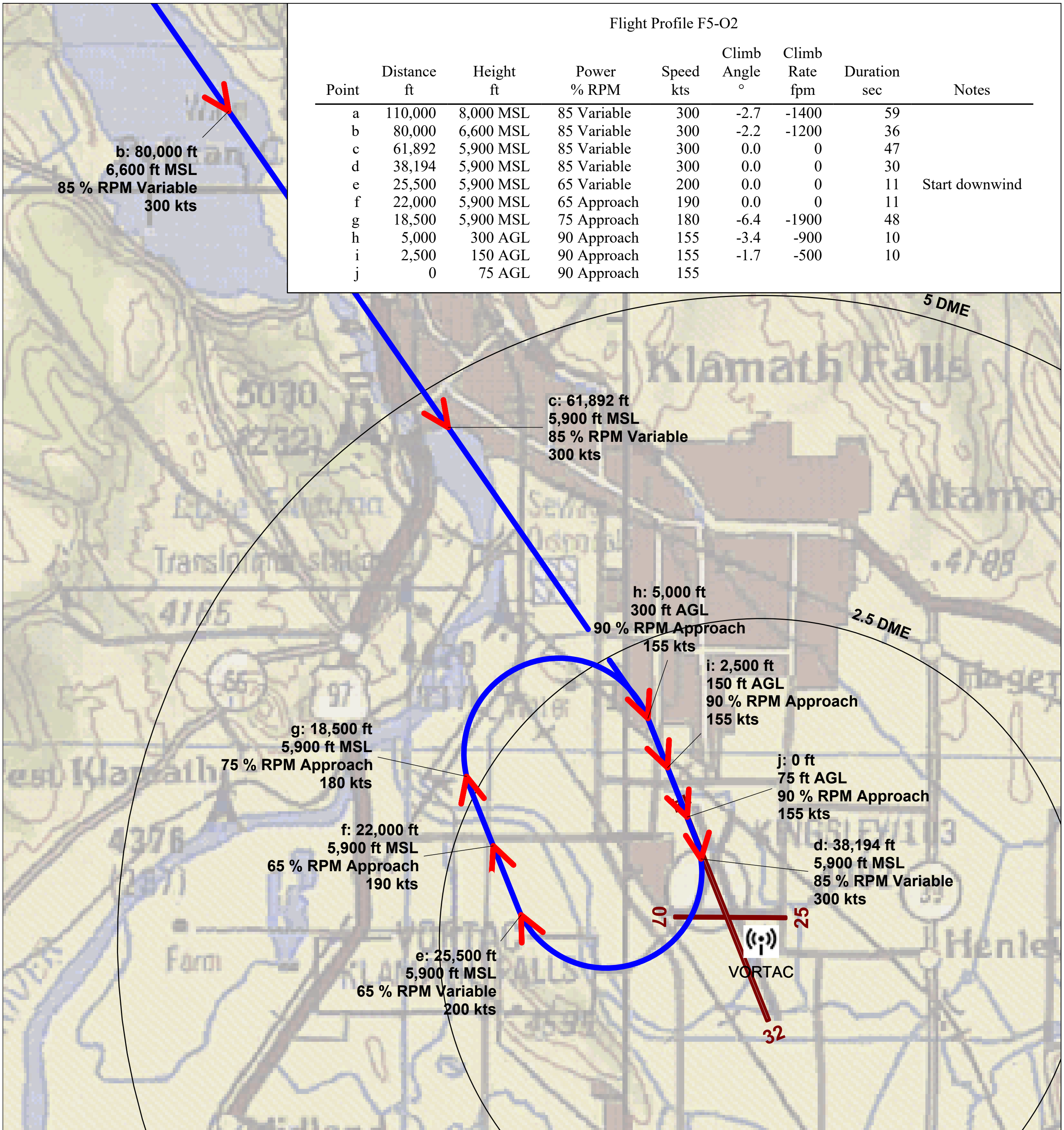
TACAN or VOR

Scale in Feet 1:129,000 (1 inch = 10,700 feet)



Flight Profile F5-O2

Point	Distance ft	Height ft	Power % RPM	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	110,000	8,000 MSL	85 Variable	300	-2.7	-1400	59	
b	80,000	6,600 MSL	85 Variable	300	-2.2	-1200	36	
c	61,892	5,900 MSL	85 Variable	300	0.0	0	47	
d	38,194	5,900 MSL	85 Variable	300	0.0	0	30	
e	25,500	5,900 MSL	65 Variable	200	0.0	0	11	Start downwind
f	22,000	5,900 MSL	65 Approach	190	0.0	0	11	
g	18,500	5,900 MSL	75 Approach	180	-6.4	-1900	48	
h	5,000	300 AGL	90 Approach	155	-3.4	-900	10	
i	2,500	150 AGL	90 Approach	155	-1.7	-500	10	
j	0	75 AGL	90 Approach	155				



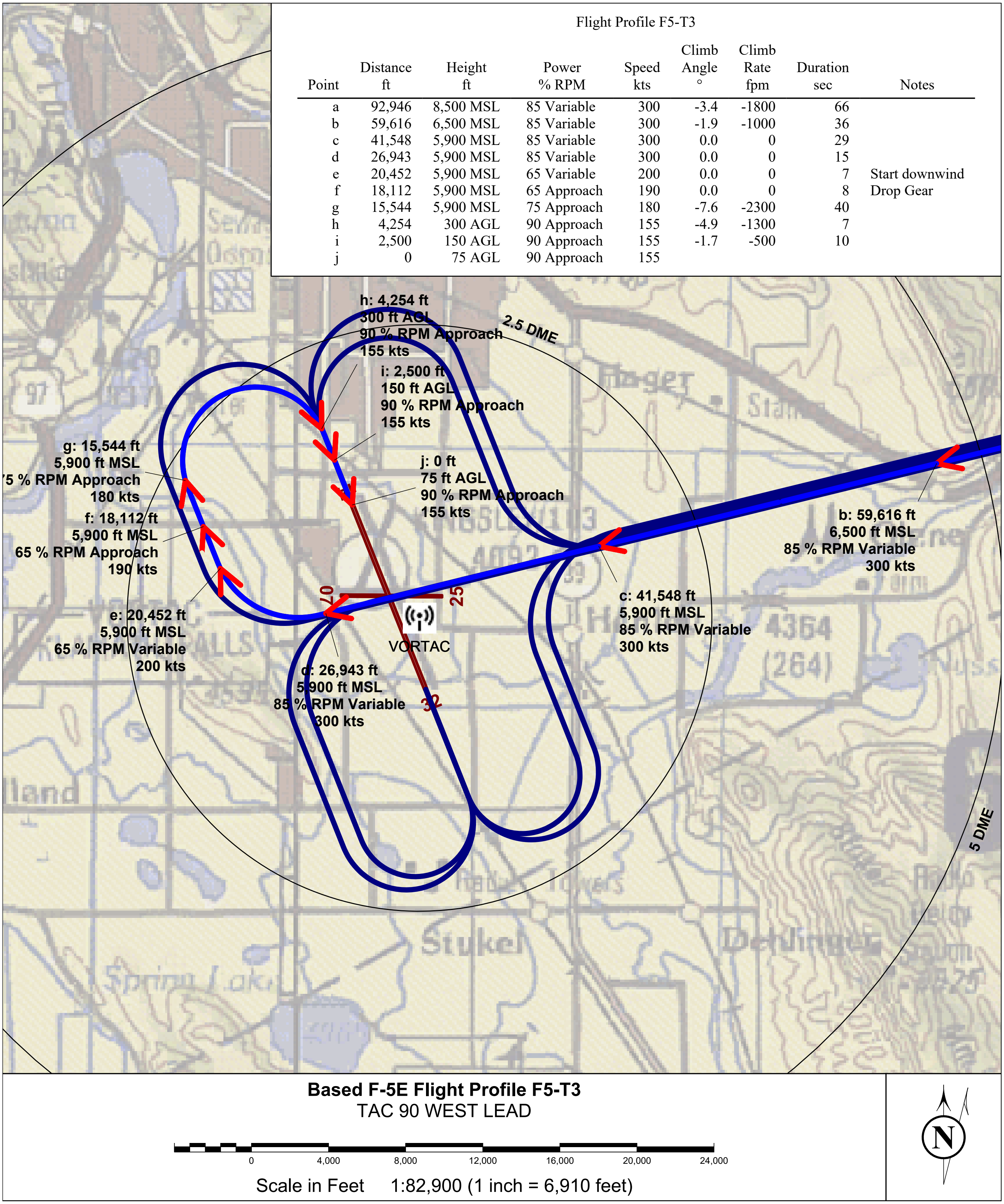
Based F-5E Flight Profile F5-O2

OVERHEAD WEST

Scale in Feet 1:79,800 (1 inch = 6,650 feet)

Flight Profile F5-T3

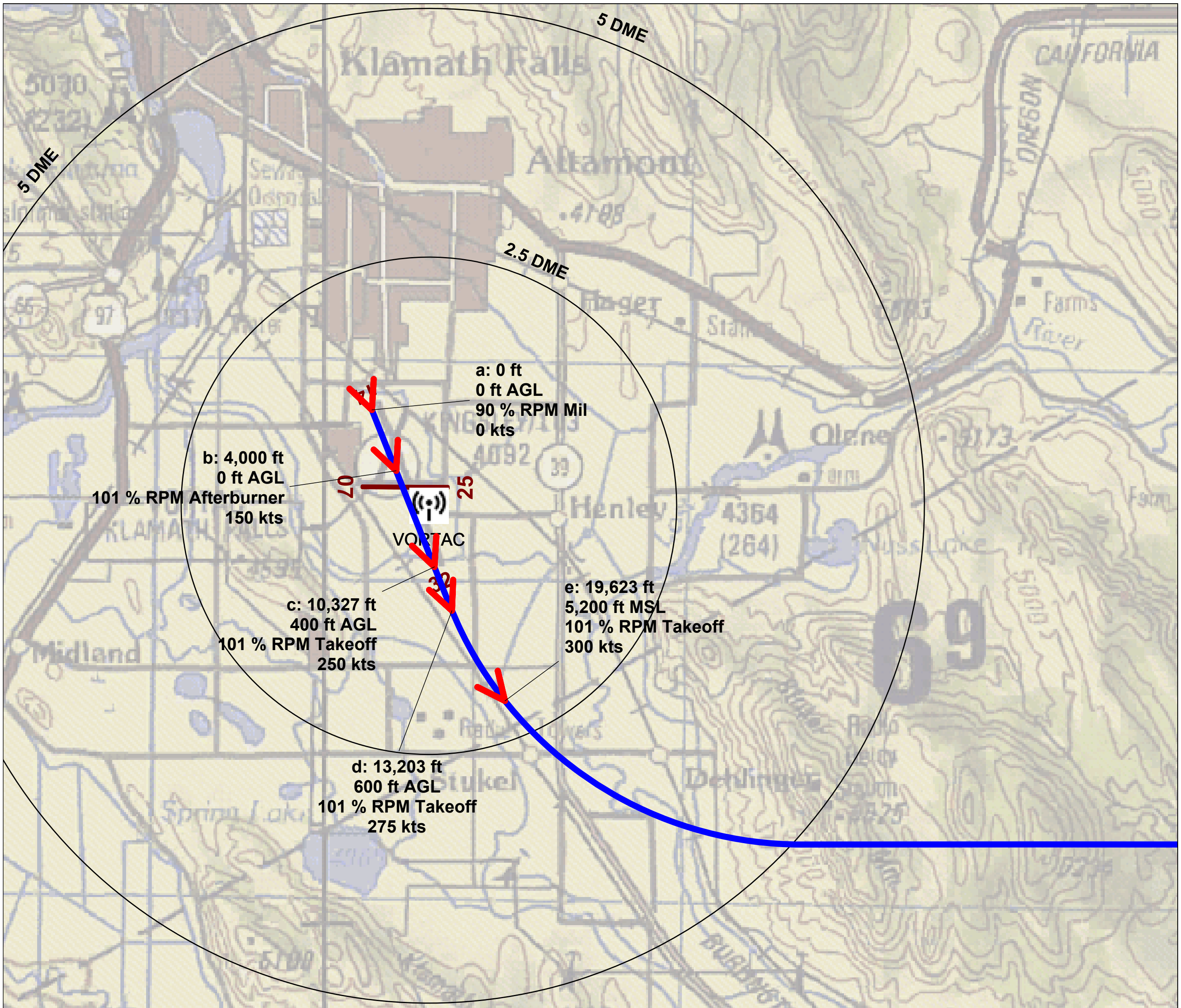
Point	Distance ft	Height ft	Power % RPM	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	92,946	8,500 MSL	85 Variable	300	-3.4	-1800	66	
b	59,616	6,500 MSL	85 Variable	300	-1.9	-1000	36	
c	41,548	5,900 MSL	85 Variable	300	0.0	0	29	
d	26,943	5,900 MSL	85 Variable	300	0.0	0	15	
e	20,452	5,900 MSL	65 Variable	200	0.0	0	7	Start downwind
f	18,112	5,900 MSL	65 Approach	190	0.0	0	8	Drop Gear
g	15,544	5,900 MSL	75 Approach	180	-7.6	-2300	40	
h	4,254	300 AGL	90 Approach	155	-4.9	-1300	7	
i	2,500	150 AGL	90 Approach	155	-1.7	-500	10	
j	0	75 AGL	90 Approach	155				



Based F-5E Flight Profile F5-T3

TAC 90 WEST LEAD

Scale in Feet 1:82,900 (1 inch = 6,910 feet)



Flight Profile F5-D1A

Point	Distance ft	Height ft	Power % RPM	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	90 Mil	0	0.0	0	32	
b	4,000	0 AGL	101 Afterburner	150	3.6	1300	19	
c	10,327	400 AGL	101 Takeoff	250	4.0	1800	6	cut A/B by end or Rwy most of the time
d	13,203	600 AGL	101 Takeoff	275	4.5	2300	13	
e	19,623	5,200 MSL	101 Takeoff	300	5.0	2700	107	reach climb speed, 5 deg climb
f	73,948	10,000 MSL	90 Takeoff	300	0.0	0	94	
g	121,479	10,000 MSL	85 Takeoff	300				

Based F-5E Flight Profile F5-D1A

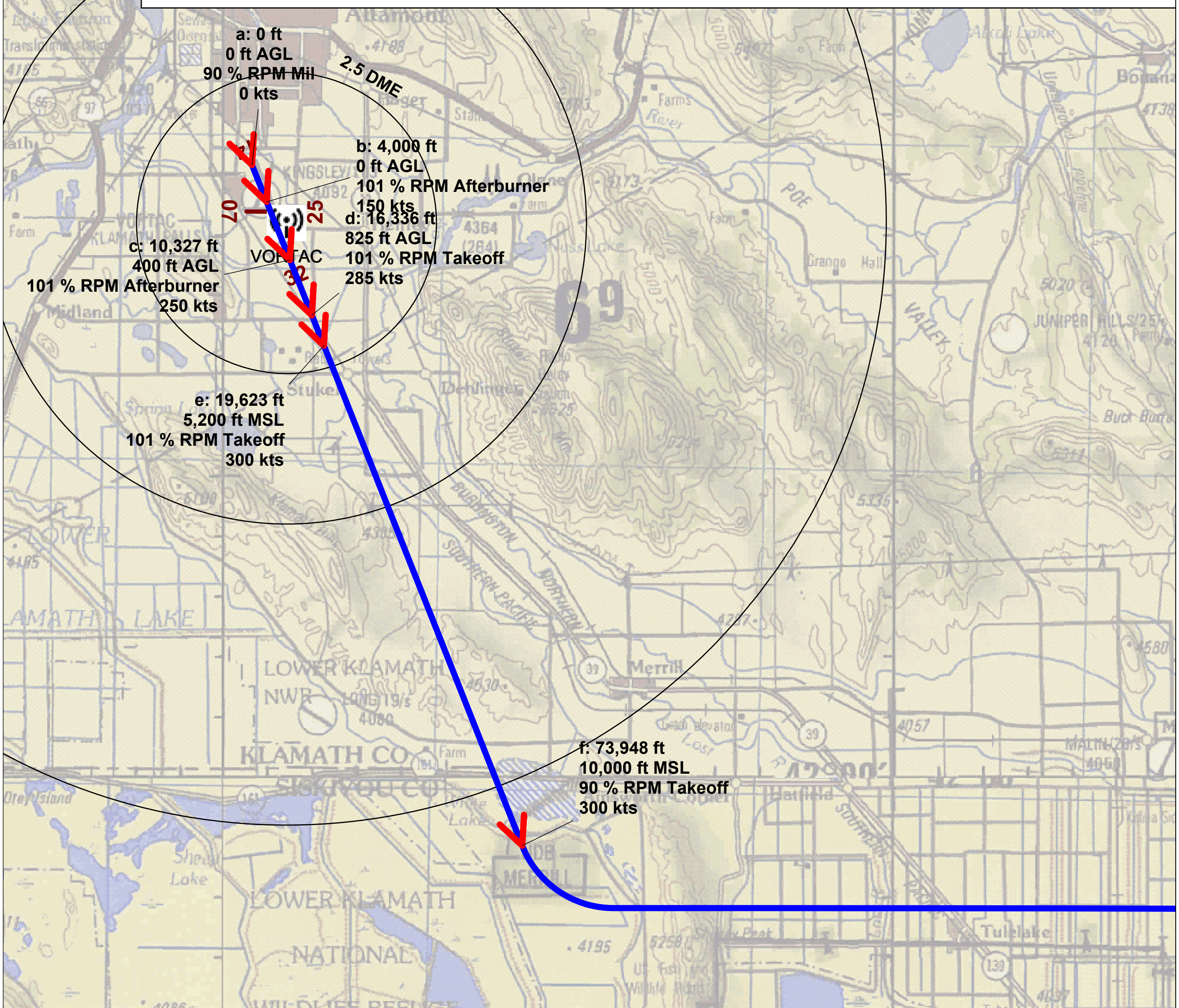
0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000

Scale in Feet 1:115,000 (1 inch = 9,590 feet)

N

Flight Profile F5-D3A

Point	Distance ft	Height ft	Power % RPM	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	90 Mil	0	0.0	0	32	
b	4,000	0 AGL	101 Afterburner	150	3.6	1300	19	
c	10,327	400 AGL	101 Afterburner	250	4.0	1900	13	
d	16,336	825 AGL	101 Takeoff	285	4.9	2500	7	hold A/B as late as 1nm after rwy end
e	19,623	5,200 MSL	101 Takeoff	300	5.0	2700	107	reach climb speed, 5 deg climb
f	73,948	10,000 MSL	90 Takeoff	300	0.0	0	150	
g	150,000	10,000 MSL	85 Takeoff	300				



Based F-5E Flight Profile F5-D3A

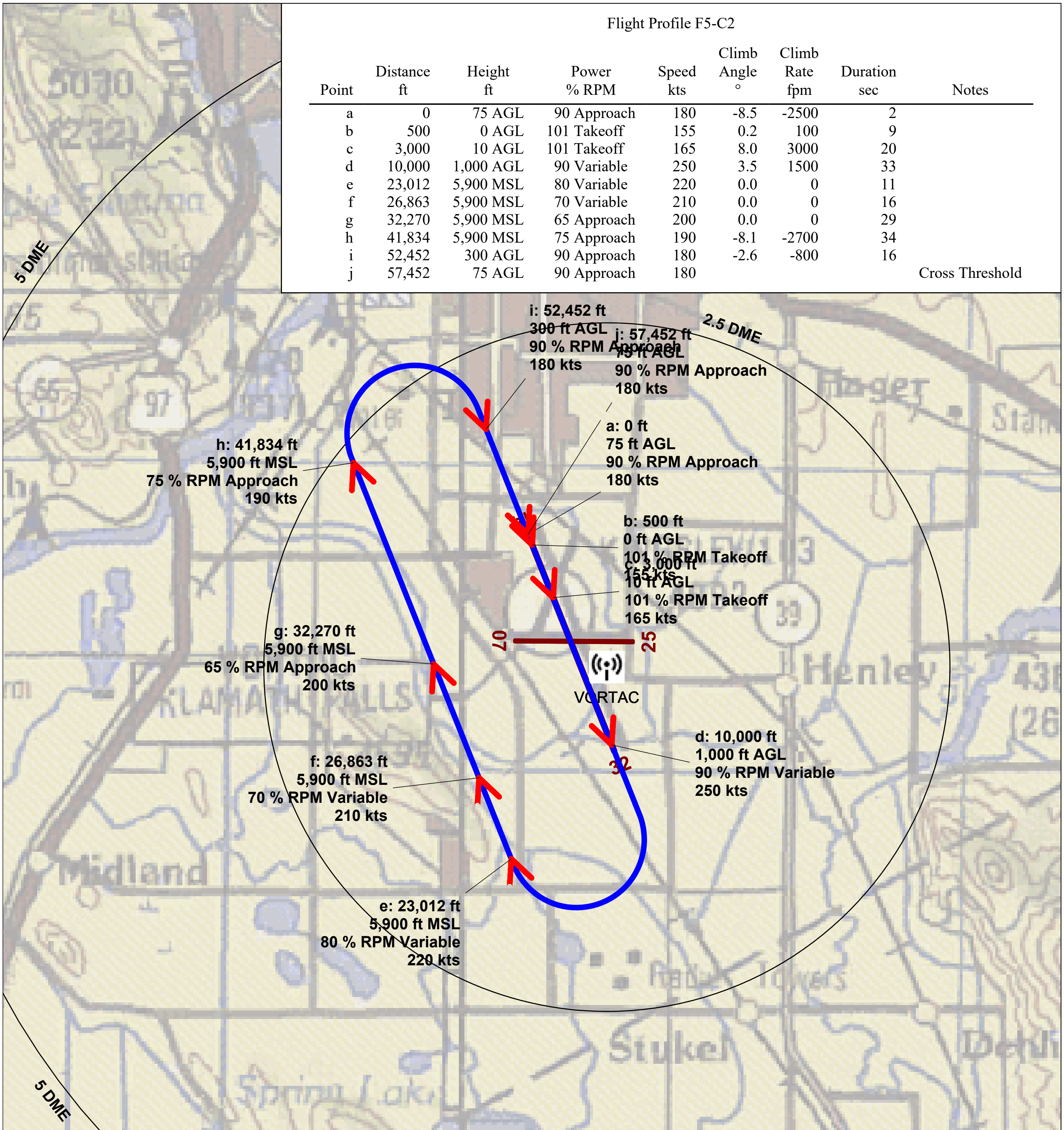
0 10,000 20,000 30,000 40,000 50,000 60,000

Scale in Feet 1:190,000 (1 inch = 15,800 feet)

N

Flight Profile F5-C2

Point	Distance ft	Height ft	Power % RPM	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	75 AGL	90 Approach	180	-8.5	-2500	2	
b	500	0 AGL	101 Takeoff	155	0.2	100	9	
c	3,000	10 AGL	101 Takeoff	165	8.0	3000	20	
d	10,000	1,000 AGL	90 Variable	250	3.5	1500	33	
e	23,012	5,900 MSL	80 Variable	220	0.0	0	11	
f	26,863	5,900 MSL	70 Variable	210	0.0	0	16	
g	32,270	5,900 MSL	65 Approach	200	0.0	0	29	
h	41,834	5,900 MSL	75 Approach	190	-8.1	-2700	34	
i	52,452	300 AGL	90 Approach	180	-2.6	-800	16	
j	57,452	75 AGL	90 Approach	180				Cross Threshold



Based F-5E Flight Profile F5-C2

F-15 CLOSED PATTERN RUNWAY 14 WEST-REPRESENTATIVE

0 4,000 8,000 12,000 16,000 20,000 24,000

Scale in Feet 1:74,900 (1 inch = 6,240 feet)

N

This page intentionally left blank.

Maps of F-35A Flight Profiles

This page intentionally left blank.

Flight Profile F35-A1

Point	Distance ft	Height ft	Power % ETR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	11,000 MSL	15 Variable	350	-3.4	-1700	164	Begin descent from 10000 ft MSL, 350 kts; approx 20nm out
b	40,303	6,300 MSL	40 Parallel	225	-2.6	-900	51	MZAMA @ 6300
c	23,001	5,500 MSL	40 Parallel	180	-3.4	-1100	77	SRCUS @ 5380
d	0	50 AGL	40 Parallel	175				Assume cross threashold at 50 ft AGL

Based F-35A Flight Profile F35-A1

ILS

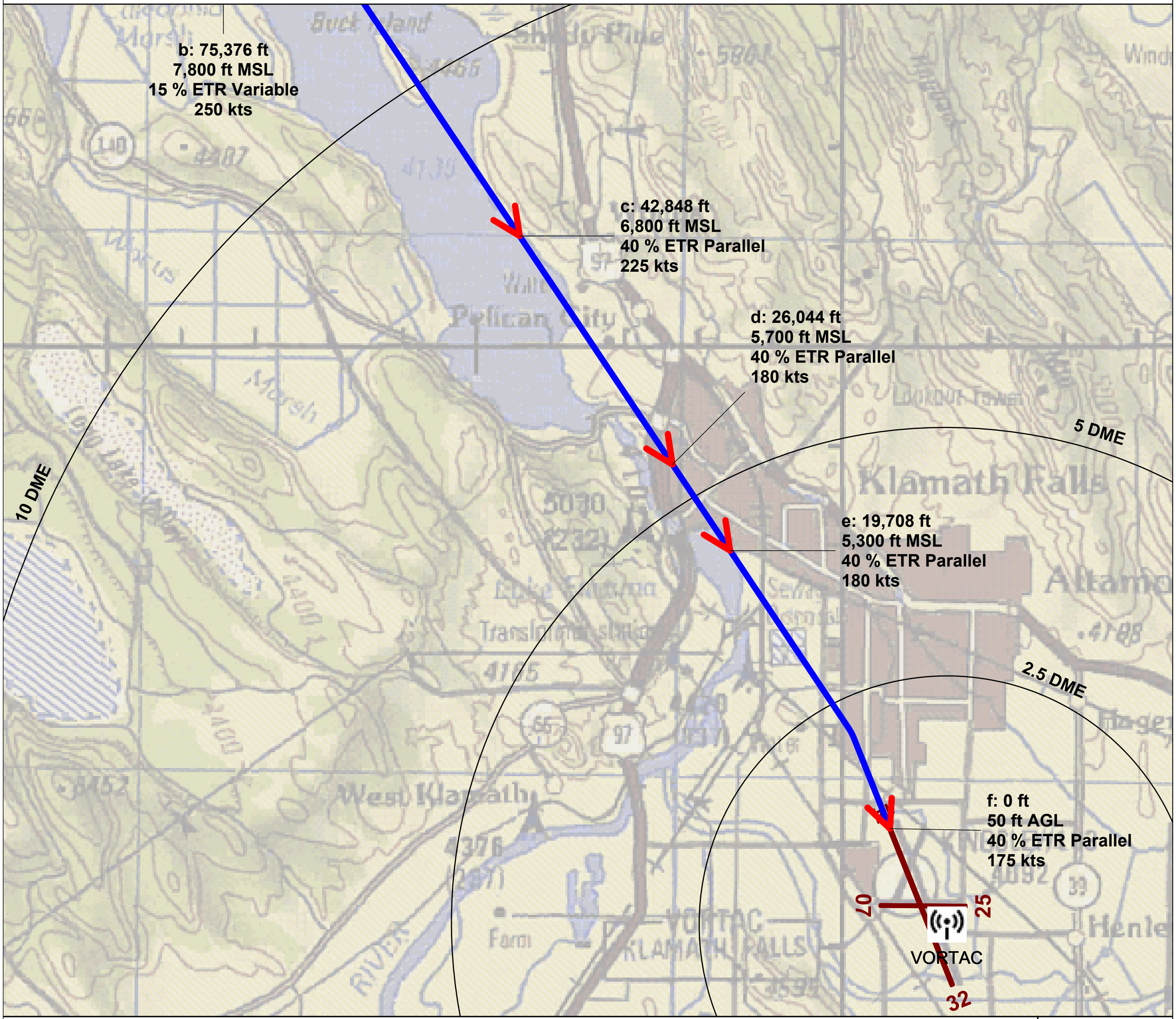
0 4,000 8,000 12,000 16,000 20,000 24,000

Scale in Feet 1:73,900 (1 inch = 6,160 feet)

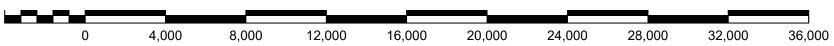
N

Flight Profile F35-A2

Point	Distance ft	Height ft	Power % ETR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	10,000 MSL	15 Variable	350	-2.8	-1500	88	Begin descent from 10000 ft MSL, 350 kts; approx 20nm out
b	75,376	7,800 MSL	15 Variable	250	-1.8	-700	81	KOTTA @ 7800; Reduce speed to match existing F-15C profile
c	42,848	6,800 MSL	40 Parallel	225	-3.7	-1300	49	EYOWO @ 6800; Gear down
d	26,044	5,700 MSL	40 Parallel	180	-3.6	-1200	21	ZAPUL @ 5700
e	19,708	5,300 MSL	40 Parallel	180	-3.4	-1100	66	CLEET @ 5300
f	0	50 AGL	40 Parallel	175				Assume cross threashold at 50 ft AGL



Based F-35A Flight Profile F35-A2
TACAN or VOR



Scale in Feet 1:115,000 (1 inch = 9,550 feet)

Flight Profile F35-A3

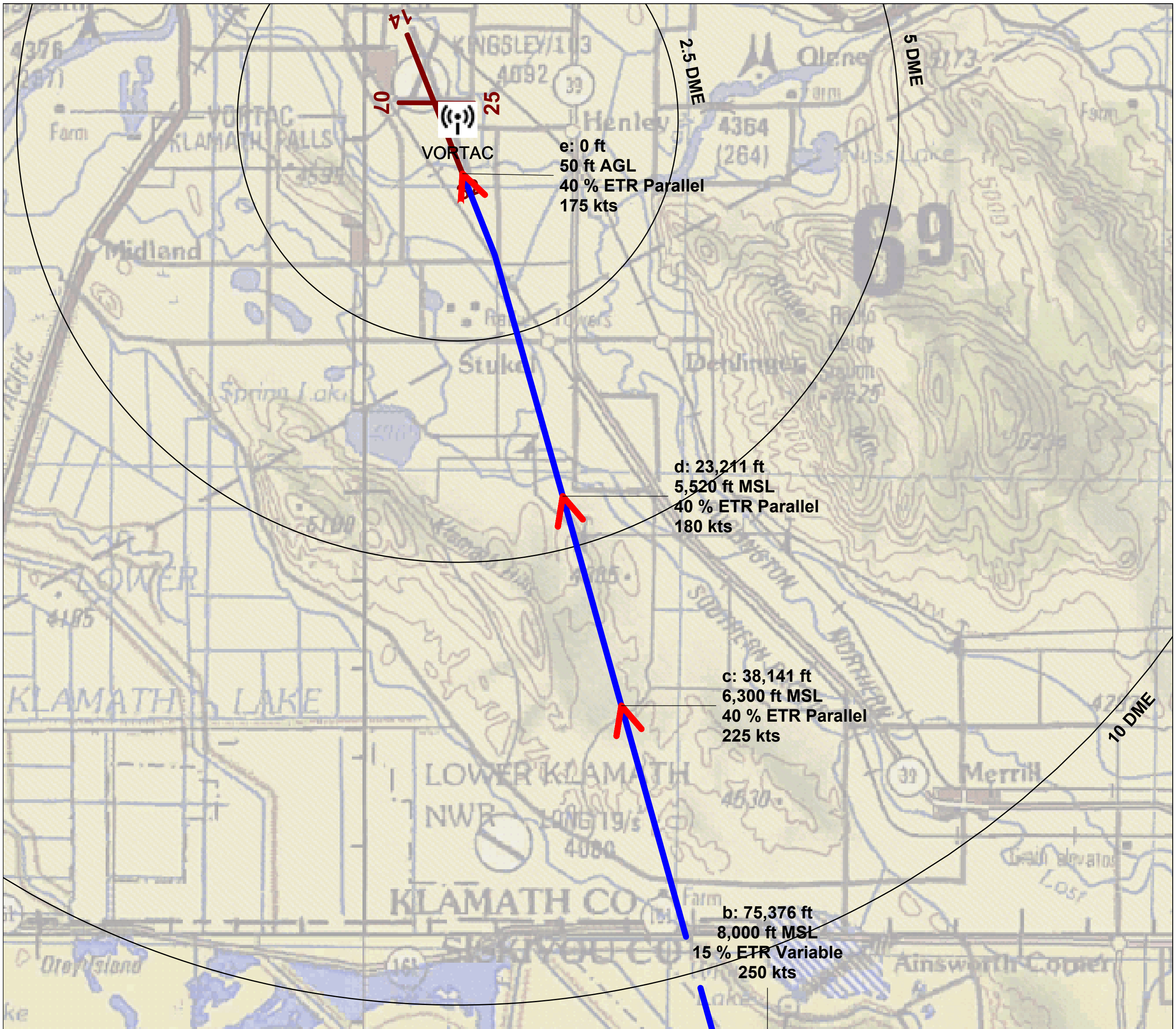
Point	Distance ft	Height ft	Power % ETR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	11,000 MSL	15 Variable	350	-3.4	-1700	164	Begin descent from 10000 ft MSL, 350 kts; approx 20nm out
b	40,303	6,300 MSL	40 Parallel	225	-2.6	-900	51	MZAMA @ 6300
c	23,001	5,520 MSL	40 Parallel	180	-3.4	-1100	77	SRCUS @ 5380
d	0	50 AGL	40 Parallel	175				Assume cross threashold at 50 ft AGL

Based F-35A Flight Profile F35-A3
ILS

0 4,000 8,000 12,000 16,000 20,000 24,000

Scale in Feet 1:73,900 (1 inch = 6,160 feet)

N



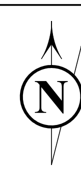
Flight Profile F35-A4

Point	Distance ft	Height ft	Power % ETR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	10,000 MSL	15 Variable	350	-2.6	-1400	88	Begin descent from 10000 ft MSL, 350 kts; approx 20nm out
b	75,376	8,000 MSL	15 Variable	250	-2.6	-1100	93	CURVN @ 8000
c	38,141	6,300 MSL	40 Parallel	225	-3.0	-1100	44	JIDAL @ 6300
d	23,211	5,520 MSL	40 Parallel	180	-3.4	-1100	77	FEPNU @ 5520
e	0	50 AGL	40 Parallel	175				Assume cross threashold at 50 ft AGL

Based F-35A Flight Profile F35-A4

TACAN or VOR

Scale in Feet 1:129,000 (1 inch = 10,700 feet)



Flight Profile F35-O2

Point	Distance ft	Height ft	Power % ETR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	110,000	8,000 MSL	15 Variable	300	-1.7	-900	95	begin descent from 10,000 ft MSL; approx 20 nm out
b	61,891	6,600 MSL	35 Variable	300	-1.8	-900	45	Initial Point; level off at 1800 ft AGL; increase power
c	39,274	5,900 MSL	15 Variable	300	0.0	0	33	begin break
d	25,137	5,900 MSL	15 Variable	210	0.0	0	9	wings level, begin downwind
e	22,000	5,900 MSL	40 Parallel	200	0.0	0	9	gear down; increase power
f	19,137	5,900 MSL	40 Parallel	190	-6.1	-2000	44	begin descent
g	5,000	300 AGL	40 Parallel	190	-2.9	-900	16	wings level, begin 1 nm final
h	0	50 AGL	40 Parallel	175				Assume cross threshold at 50 ft AGL

Based F-35A Flight Profile F35-O2

OVERHEAD WEST

0 4,000 8,000 12,000 16,000 20,000 24,000

Scale in Feet 1:76,400 (1 inch = 6,370 feet)

N

Flight Profile F35-PFO1

Point	Distance ft	Height ft	Power % ETR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	200,000	20,000 MSL	15 Variable	350	-3.7	-2000	335	Assume descent from 20000 ft MSL, 350 kts
b	30,380	5,000 AGL	15 Parallel	250	-9.7	-4300	38	Gear down
c	14,327	2,250 AGL	15 Parallel	250	-10.3	-4600	6	start to arrest the descent
d	11,971	1,820 AGL	15 Parallel	250	-9.9	-4400	4	start decreasing aoa
e	10,132	1,500 AGL	15 Parallel	250	-8.1	-3400	25	start increasing the aoa and further arrest descent
f	0	50 AGL	15 Parallel	225				Assume cross threshold at 50 ft AGL; Mil power applied later for a

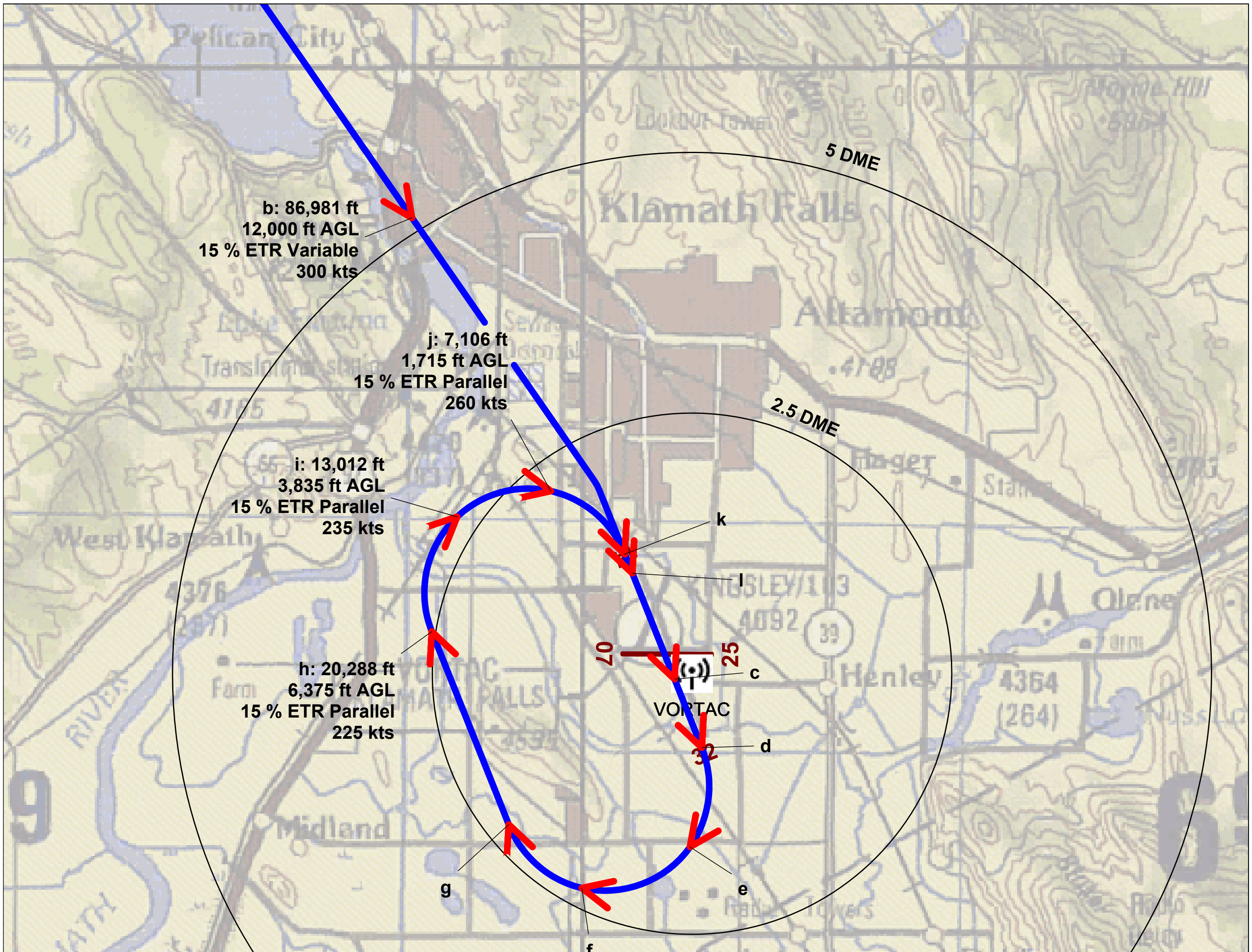
Based F-35A Flight Profile F35-PFO1

Precautionary Flame-out (PFO) Arrival (Straight-in) to a Go-Around

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000

Scale in Feet 1:59,400 (1 inch = 4,950 feet)

N



Flight Profile F35-PFO3

Point	Distance ft	Height ft	Power % ETR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	200,000	20,000 MSL	15 Variable	350	-2.0	-1100	206	Assume descent from 20000MSL, 350 knots
b	86,981	12,000 AGL	15 Variable	300	0.0	0	65	3-5 nm from break
c	55,829	12,000 AGL	30 Variable	270	0.0	0	10	4,300 ft from break
d	51,529	12,000 AGL	30 Variable	260	-13.9	-6400	14	begin descent and begin roll
e	45,453	10,500 AGL	15 Parallel	250	-9.7	-4100	18	reach max roll angle, gear down
f	38,285	9,275 AGL	15 Parallel	225	-11.3	-4500	15	begin roll to wings level
g	32,400	8,100 AGL	15 Parallel	225	-8.1	-3200	32	wings level
h	20,288	6,375 AGL	15 Parallel	225	-19.2	-8100	19	begin roll
i	13,012	3,835 AGL	15 Parallel	235	-19.7	-9000	14	reach roll angle
j	7,106	1,715 AGL	15 Parallel	260	-15.1	-7000	14	begin rolling to wings level
k	1,200	125 AGL	15 Parallel	250	-3.6	-1500	3	wings level
l	0	50 AGL	15 Parallel	225				Assume cross threshold at 50 ft AGL; Mil power applied later for a

Based F-35A Flight Profile F35-PFO3

Precautionary Flame-out (PFO) Arrival (Overhead Break)

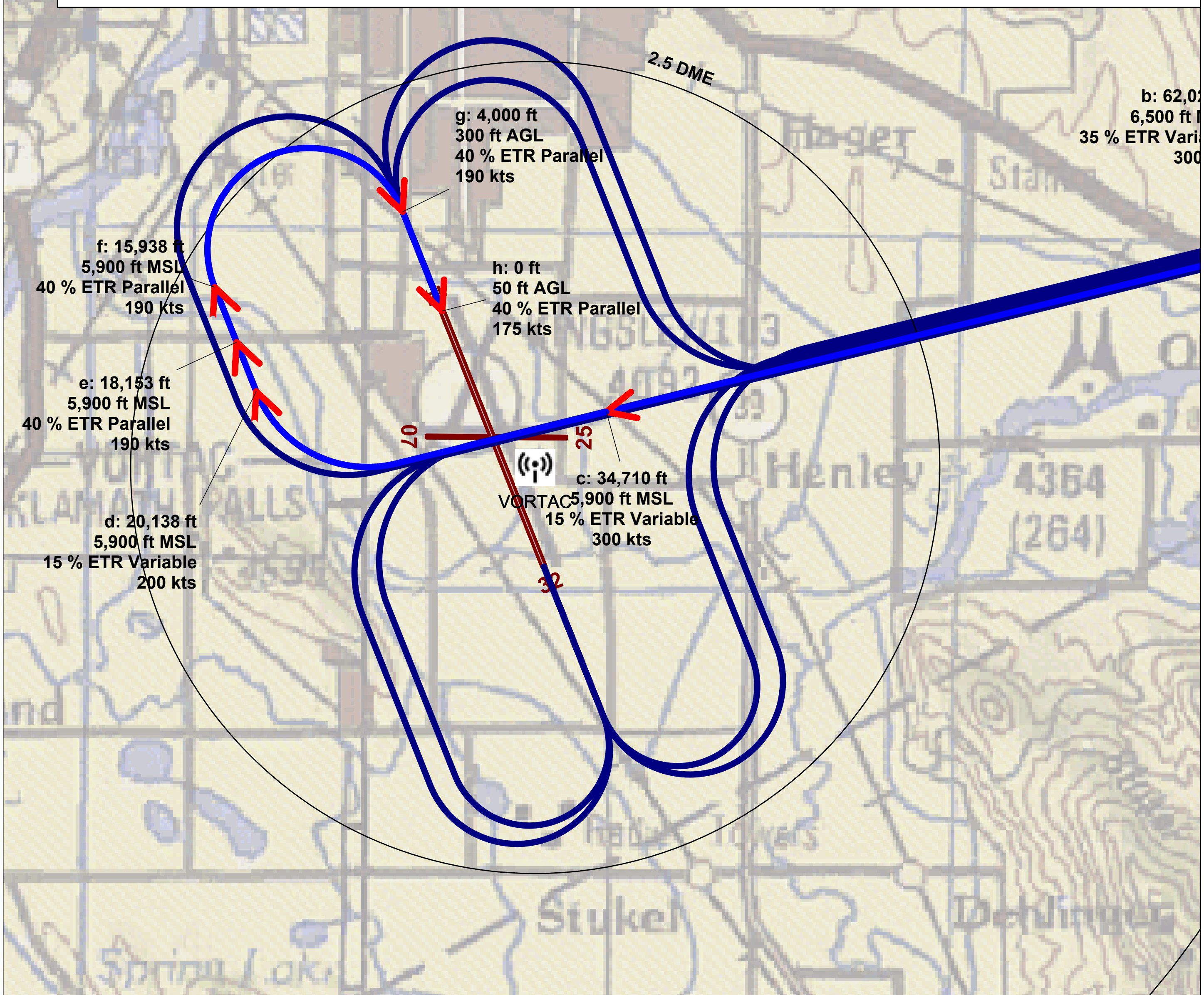
0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000

Scale in Feet 1:116,000 (1 inch = 9,700 feet)

N

Flight Profile F35-T3

Point	Distance ft	Height ft	Power % ETR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	153,134	10,000 MSL	15 Variable	300	-2.2	-1200	180	begin descent from 10,000 ft MSL; approx 20 nm out
b	62,022	6,500 MSL	35 Variable	300	-1.3	-700	54	Initial Point; level off at 1800 ft AGL; increase power
c	34,710	5,900 MSL	15 Variable	300	0.0	0	35	begin break
d	20,138	5,900 MSL	15 Variable	200	0.0	0	6	gear down; increase power
e	18,153	5,900 MSL	40 Parallel	190	0.0	0	7	gear down
f	15,938	5,900 MSL	40 Parallel	190	-7.2	-2400	37	end downwind
g	4,000	300 AGL	40 Parallel	190	-3.6	-1200	13	wings level, begin 1 nm final
h	0	50 AGL	40 Parallel	175				Assume cross threshold at 50 ft AGL



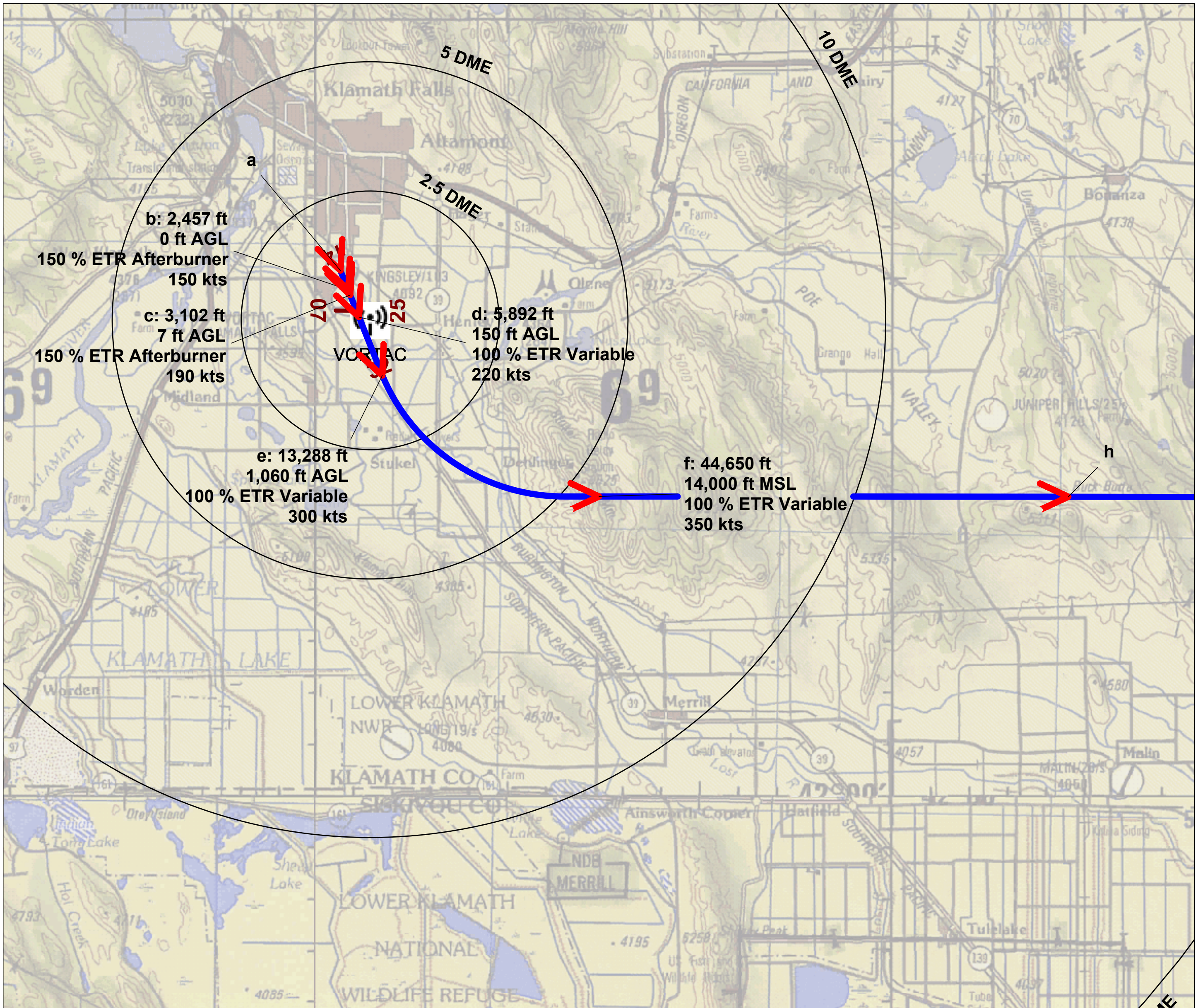
Based F-35A Flight Profile F35-T3

TAC 90 WEST LEAD

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:71,900 (1 inch = 5,990 feet)

N



Flight Profile F35-D1A

Point	Distance ft	Height ft	Power % ETR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	50 Variable	0	0.0	0	19	Assume 1 second @ 50%ETR before brake release
b	2,457	0 AGL	150 Afterburner	150	0.6	200	2	Rotate
c	3,102	7 AGL	150 Afterburner	190	2.9	1100	8	Mil power
d	5,892	150 AGL	100 Variable	220	7.0	3200	17	Gear up
e	13,288	1,060 AGL	100 Variable	300	15.8	9300	57	
f	44,650	14,000 MSL	100 Variable	350	0.0	0	94	
g	100,000	14,000 MSL	40 Variable	350				

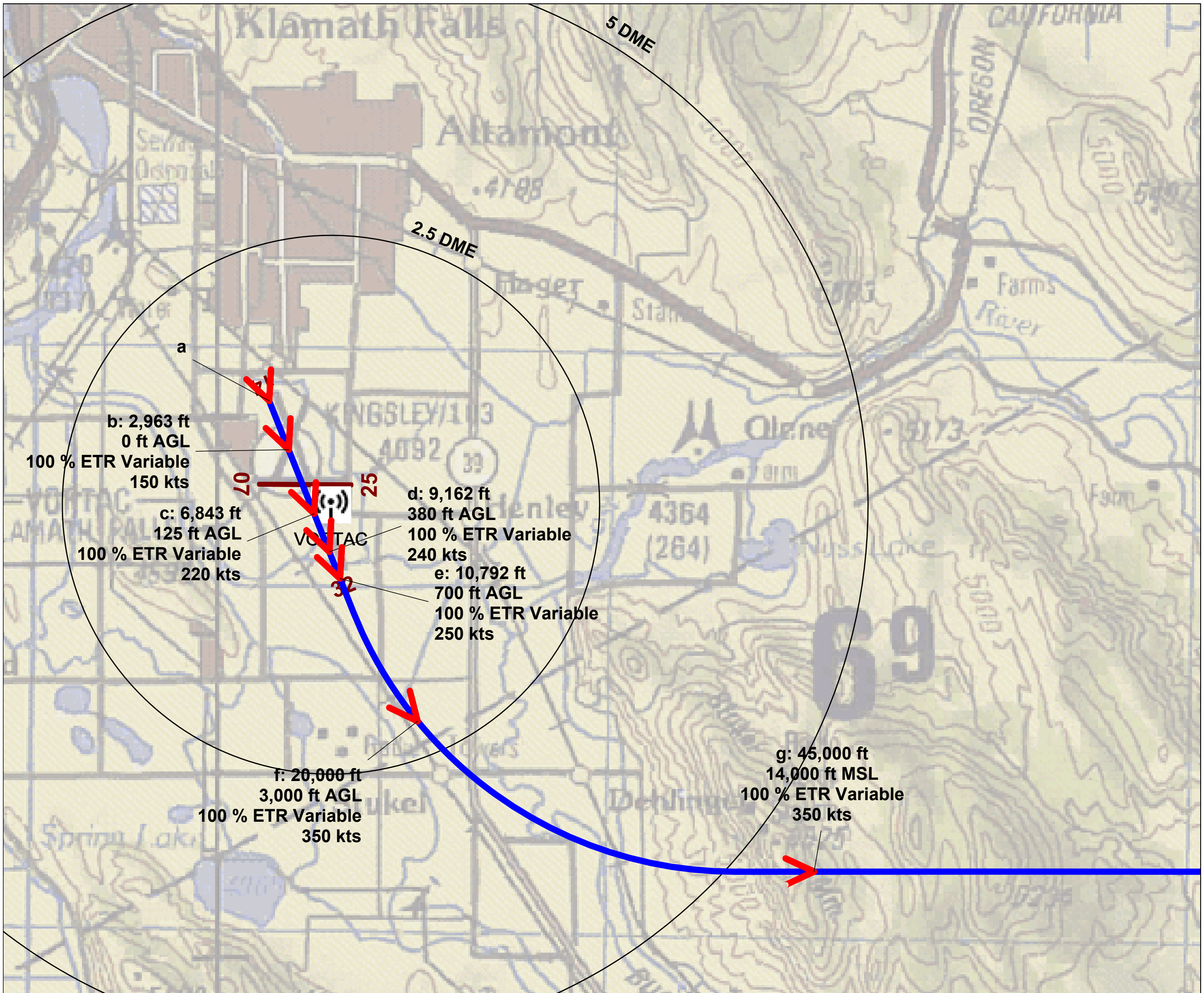
Based F-35A Flight Profile F35-D1A

AB takeoff, Mil Climb

0 10,000 20,000 30,000 40,000 50,000 60,000 70,000

Scale in Feet 1:224,000 (1 inch = 18,700 feet)

N



Flight Profile F35-D1M

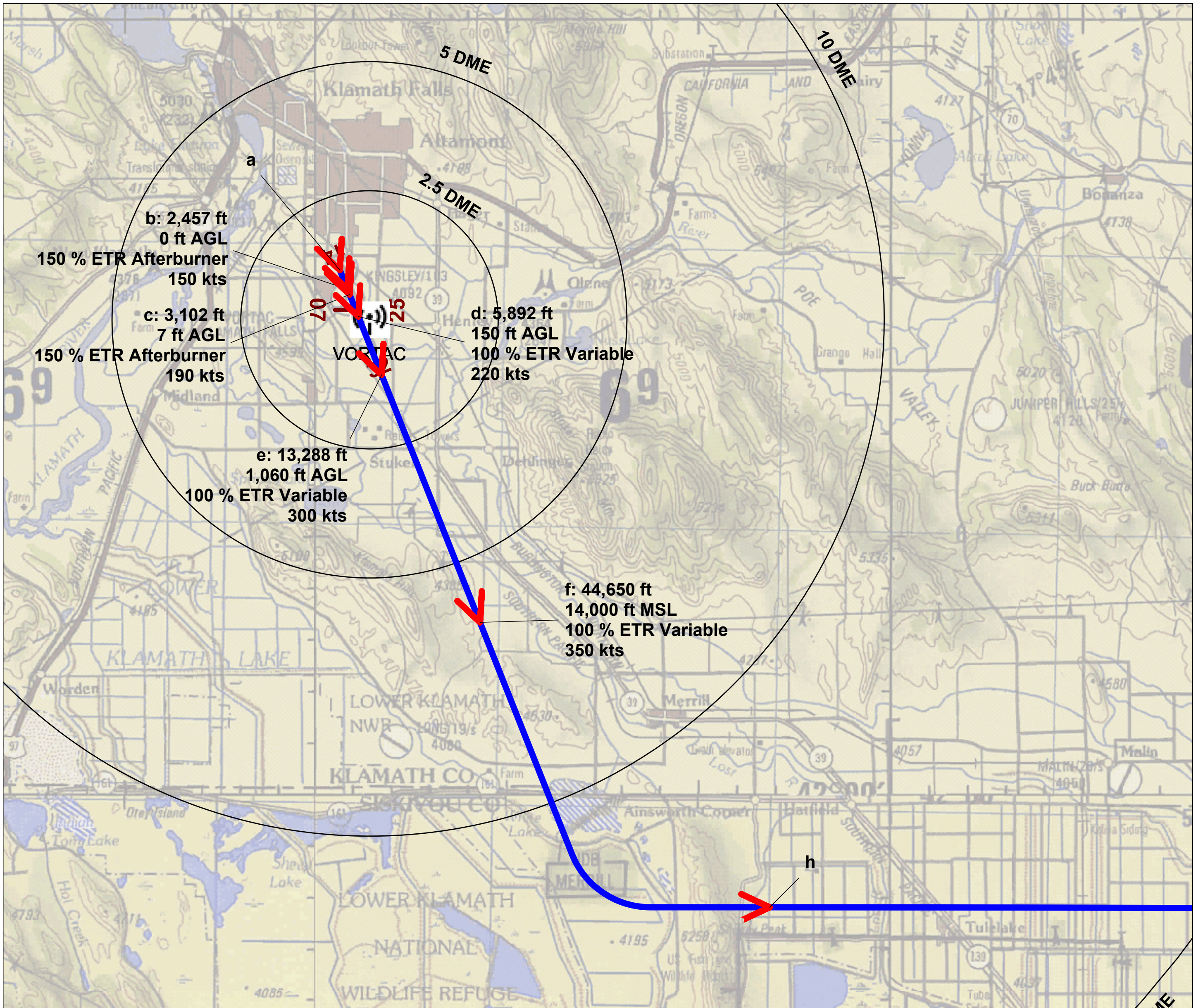
Point	Distance ft	Height ft	Power % ETR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	50 Variable	0	0.0	0	23	Assume 1 second @ 50% ETR before brake release
b	2,963	0 AGL	100 Variable	150	1.8	600	12	Rotate
c	6,843	125 AGL	100 Variable	220	6.3	2600	6	Gear up
d	9,162	380 AGL	100 Variable	240	11.1	4900	4	Speed slope change
e	10,792	700 AGL	100 Variable	250	14.0	7600	18	approx 7k fpm climb
f	20,000	3,000 AGL	100 Variable	350	15.4	9800	42	
g	45,000	14,000 MSL	100 Variable	350	0.0	0	93	
h	100,000	14,000 MSL	40 Variable	350				

Based F-35A Flight Profile F35-D1M

Mil Takeoff, Mil Climb

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000

Scale in Feet 1:108,000 (1 inch = 9,020 feet)



Flight Profile F35-D3A

Point	Distance ft	Height ft	Power % ETR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	50 Variable	0	0.0	0	19	Assume 1 second @ 50%ETR before brake release
b	2,457	0 AGL	150 Afterburner	150	0.6	200	2	Rotate
c	3,102	7 AGL	150 Afterburner	190	2.9	1100	8	Mil power
d	5,892	150 AGL	100 Variable	220	7.0	3200	17	Gear up
e	13,288	1,060 AGL	100 Variable	300	15.8	9300	57	
f	44,650	14,000 MSL	100 Variable	350	0.0	0	94	
g	100,000	14,000 MSL	40 Variable	350				

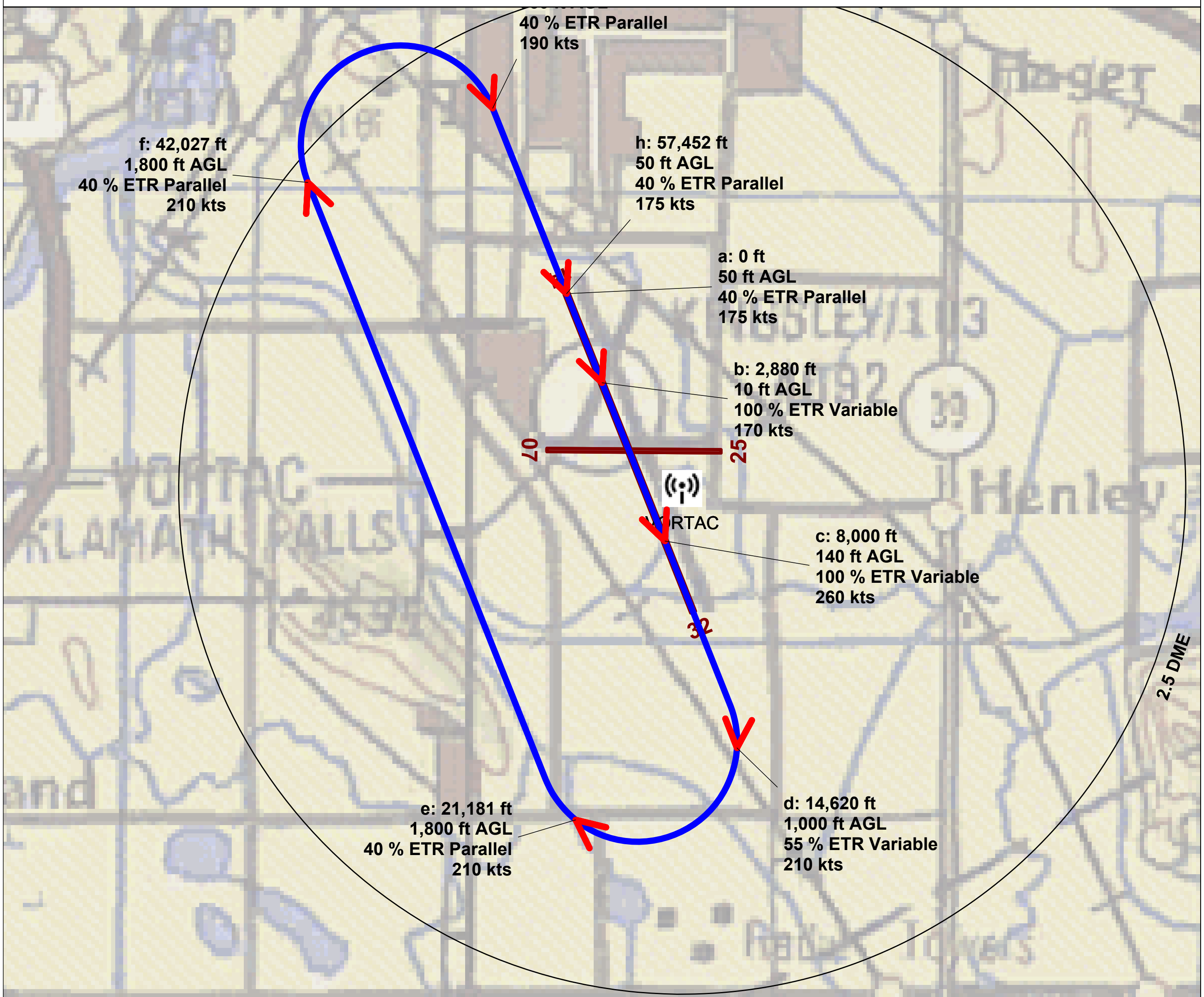
Based F-35A Flight Profile F35-D3A

AB takeoff, Mil Climb

Scale in Feet 1:224,000 (1 inch = 18,700 feet)

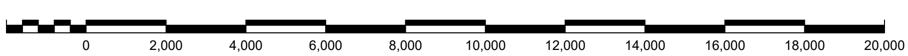
Flight Profile F35-C2

Point	Distance ft	Height ft	Power % ETR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	50 AGL	40 Parallel	175	-0.8	-200	10	Assume cross threshold at 50 ft AGL
b	2,880	10 AGL	100 Variable	170	1.5	600	14	low approach; no touch; use Variable due to limited gear-down data
c	8,000	140 AGL	100 Variable	260	7.4	3100	17	gear up; reduce power
d	14,620	1,000 AGL	55 Variable	210	7.0	2600	19	reach pattern altitude and speed
e	21,181	1,800 AGL	40 Parallel	210	0.0	0	59	gear down
f	42,027	1,800 AGL	40 Parallel	210	-8.7	-3100	28	begin descent
g	51,452	350 AGL	40 Parallel	190	-2.9	-900	19	wings level; 1nm final
h	57,452	50 AGL	40 Parallel	175				Assume cross threshold at 50 ft AGL

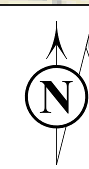


Based F-35A Flight Profile F35-C2

touch and go



Scale in Feet 1:57,700 (1 inch = 4,810 feet)



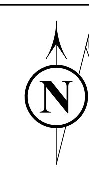
Flight Profile F35-PFO5

Point	Distance ft	Height ft	Power % ETR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	100 AGL	100 Variable	225	8.1	3600	8	Climbing
b	3,500	600 AGL	100 Variable	275	15.1	7500	75	
c	38,228	10,000 AGL	35 Variable	275	0.0	0	1	
d	38,633	10,000 AGL	15 Parallel	250	-14.4	-6500	81	High Key. Flight Idle at end of first loop, Gear Down
e	72,688	1,240 AGL	15 Parallel	250	-14.0	-6000	11	
f	77,265	100 AGL	15 Parallel	225				End of second loop; Mil power applied later for a go-around

Based F-35A Flight Profile F35-PFO5

Go-Around to an Overhead Precautionary Flame-out (PFO)

Scale in Feet 1:47,200 (1 inch = 3,940 feet)



This page intentionally left blank.

Maps of Flight Profiles

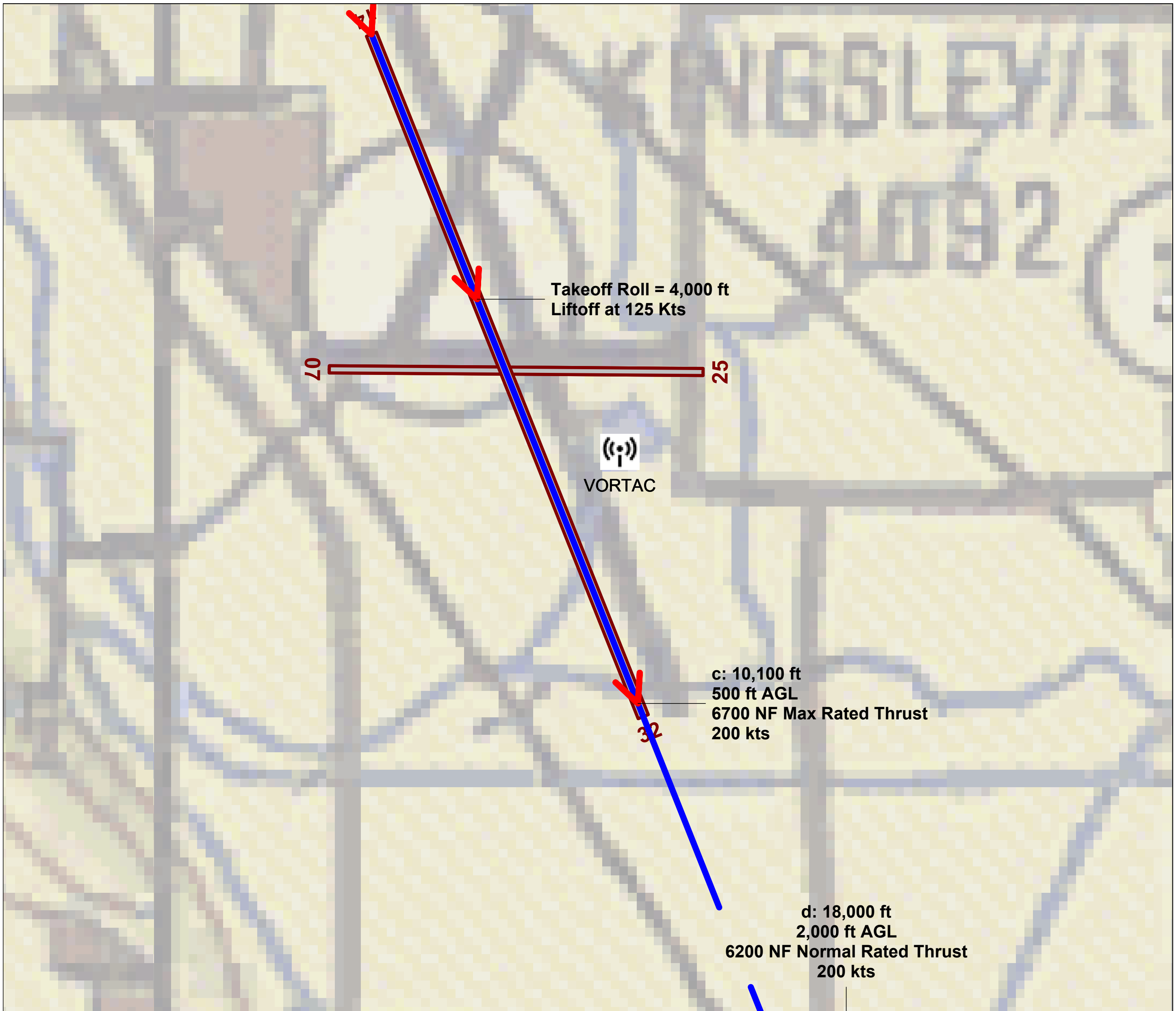
This page intentionally left blank.

Flight Profile 237

Point	Distance ft	Height ft	Power NF	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	10,500 AGL	5800 Normal Rated Thrust	300	-5.7	-2200	250	-5.7 deg, -2150 fpm, 250 sec
b	30,400	1,500 AGL	5300 Approach	125	-2.7	-600	144	-2.7 deg, -600 fpm, 144 sec
c	0	50 AGL	5300 Approach	125				

Transient A-10A Flight Profile 237
Transient

Scale in Feet 1:59,400 (1 inch = 4,950 feet)



Flight Profile 235

Point	Distance ft	Height ft	Power NF	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	5970 Takeoff	0	0.0	0	38	0.0 deg, 0 fpm, 38 sec
b	4,000	0 AGL	6700 Max Rated Thrust	125	4.7	1300	22	4.7 deg, 1340 fpm, 22 sec
c	10,100	500 AGL	6700 Max Rated Thrust	200	10.8	3800	23	10.8 deg, 3780 fpm, 23 sec
d	18,000	2,000 AGL	6200 Normal Rated Thrust	200	8.7	3500	131	8.7 deg, 3440 fpm, 131 sec
e	67,720	9,600 AGL	6200 Normal Rated Thrust	250	5.9	2900	113	5.9 deg, 2860 fpm, 113 sec
f	120,000	15,000 AGL	6200 Normal Rated Thrust	300				

Transient A-10A Flight Profile 235

Transient

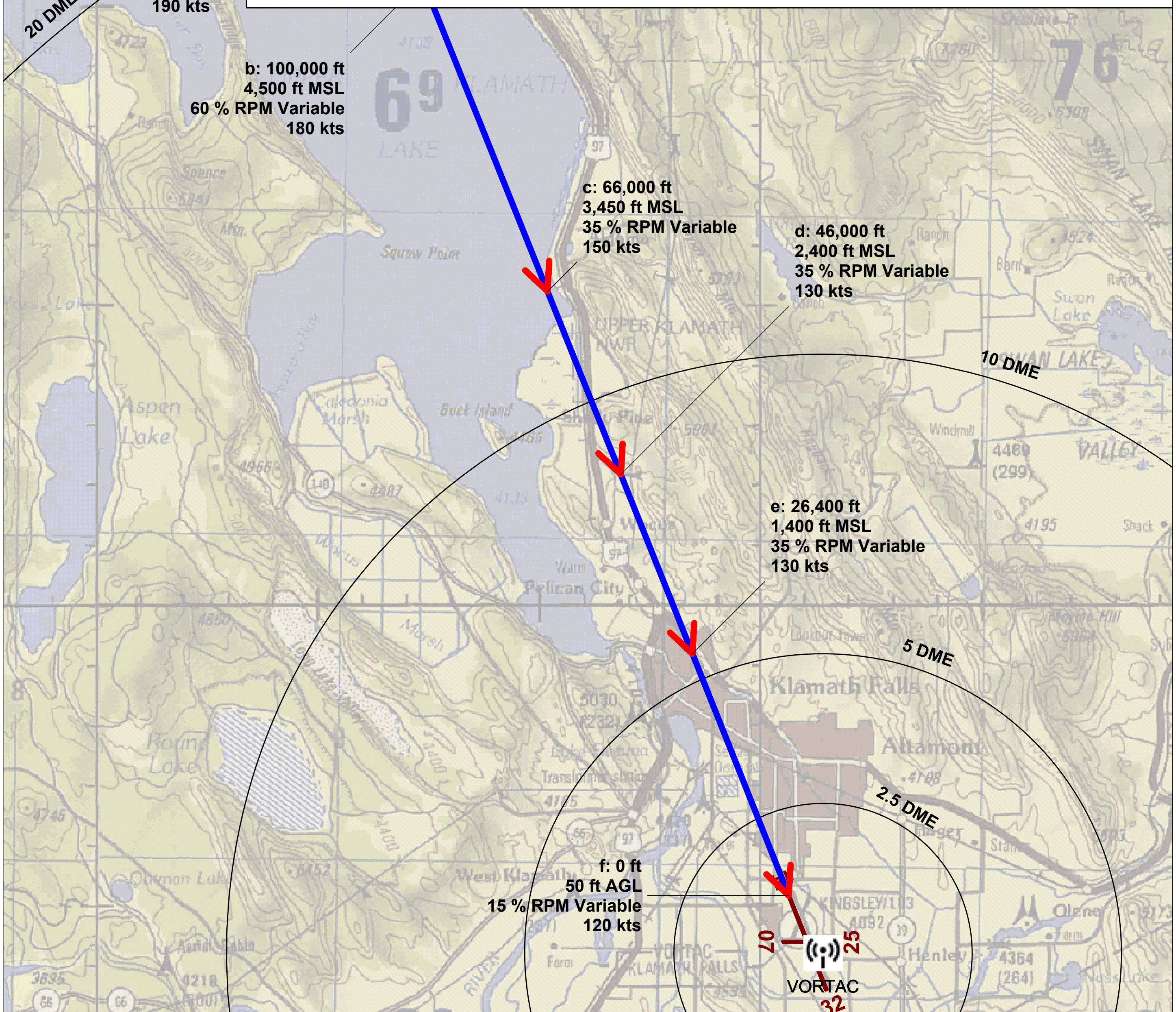
0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000 9,000

Scale in Feet 1:26,300 (1 inch = 2,190 feet)

N

Flight Profile 241

Point	Distance ft	Height ft	Power % RPM	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	8,000 MSL	70 Variable	190	-9.9	-3300	64	-9.9 deg, -3230 fpm, 64 sec
b	100,000	4,500 MSL	60 Variable	180	-1.8	-500	122	-1.8 deg, -520 fpm, 122 sec
c	66,000	3,450 MSL	35 Variable	150	-3.0	-700	85	-3.0 deg, -740 fpm, 85 sec
d	46,000	2,400 MSL	35 Variable	130	-2.9	-700	89	-2.9 deg, -670 fpm, 89 sec
e	26,400	1,400 MSL	35 Variable	130	5.9	1300	125	5.9 deg, 1310 fpm, 125 sec
f	0	50 AGL	15 Variable	120				



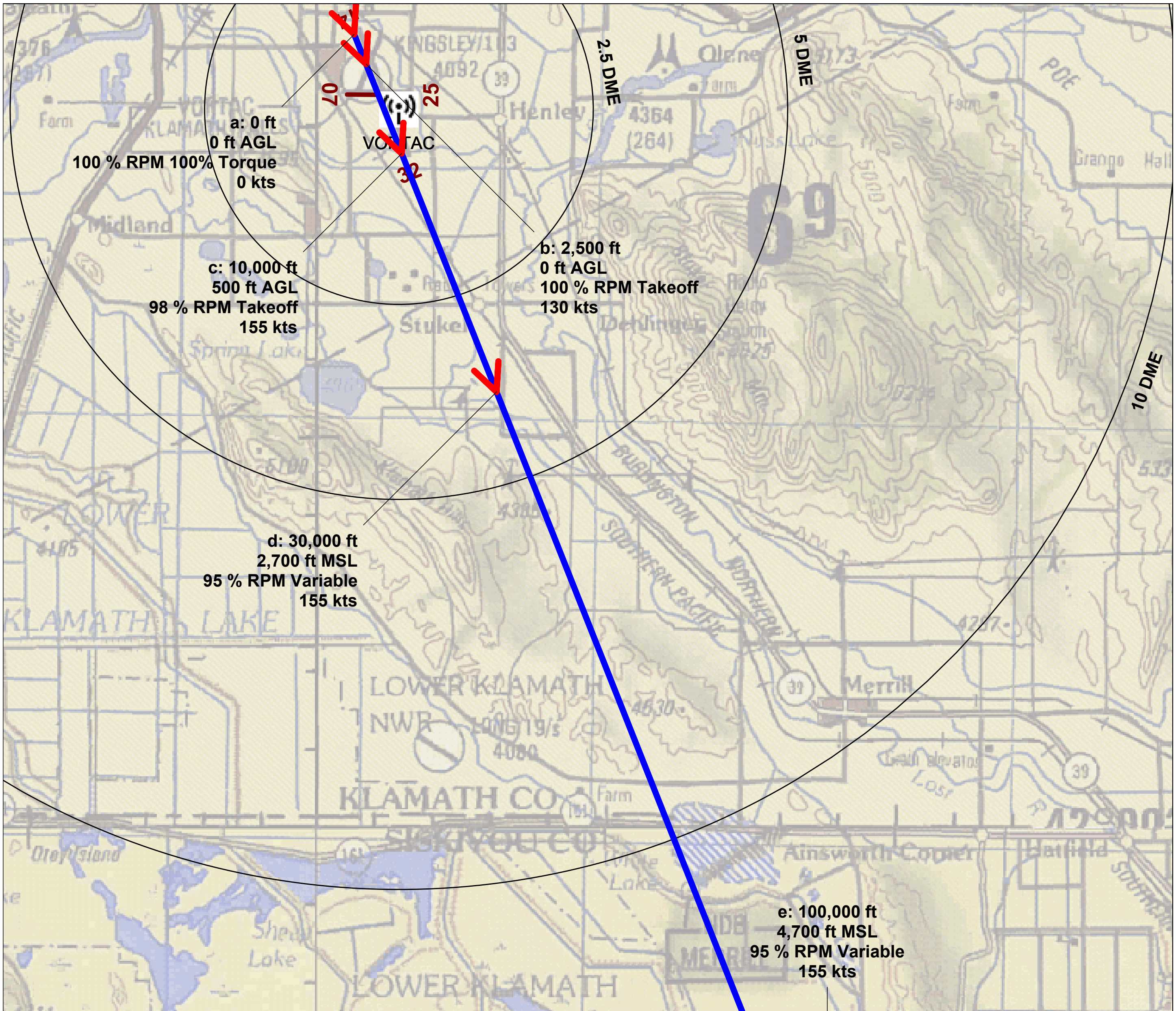
Transient C-12 Flight Profile 241

Transient

0 10,000 20,000 30,000 40,000 50,000 60,000

Scale in Feet 1:190,000 (1 inch = 15,900 feet)

N



Flight Profile 239

Point	Distance ft	Height ft	Power % RPM	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	100 100% Torque	0	0.0	0	23	0.0 deg, 0 fpm, 23 sec
b	2,500	0 AGL	100 Takeoff	130	3.8	1000	31	3.8 deg, 960 fpm, 31 sec
c	10,000	500 AGL	98 Takeoff	155	-5.4	-1500	76	-5.4 deg, -1480 fpm, 76 sec
d	30,000	2,700 MSL	95 Variable	155	1.6	400	268	1.6 deg, 450 fpm, 268 sec
e	100,000	4,700 MSL	95 Variable	155	14.8	4200	76	14.8 deg, 4020 fpm, 76 sec
f	120,000	10,000 MSL	95 Variable	155				

Transient C-12 Flight Profile 239

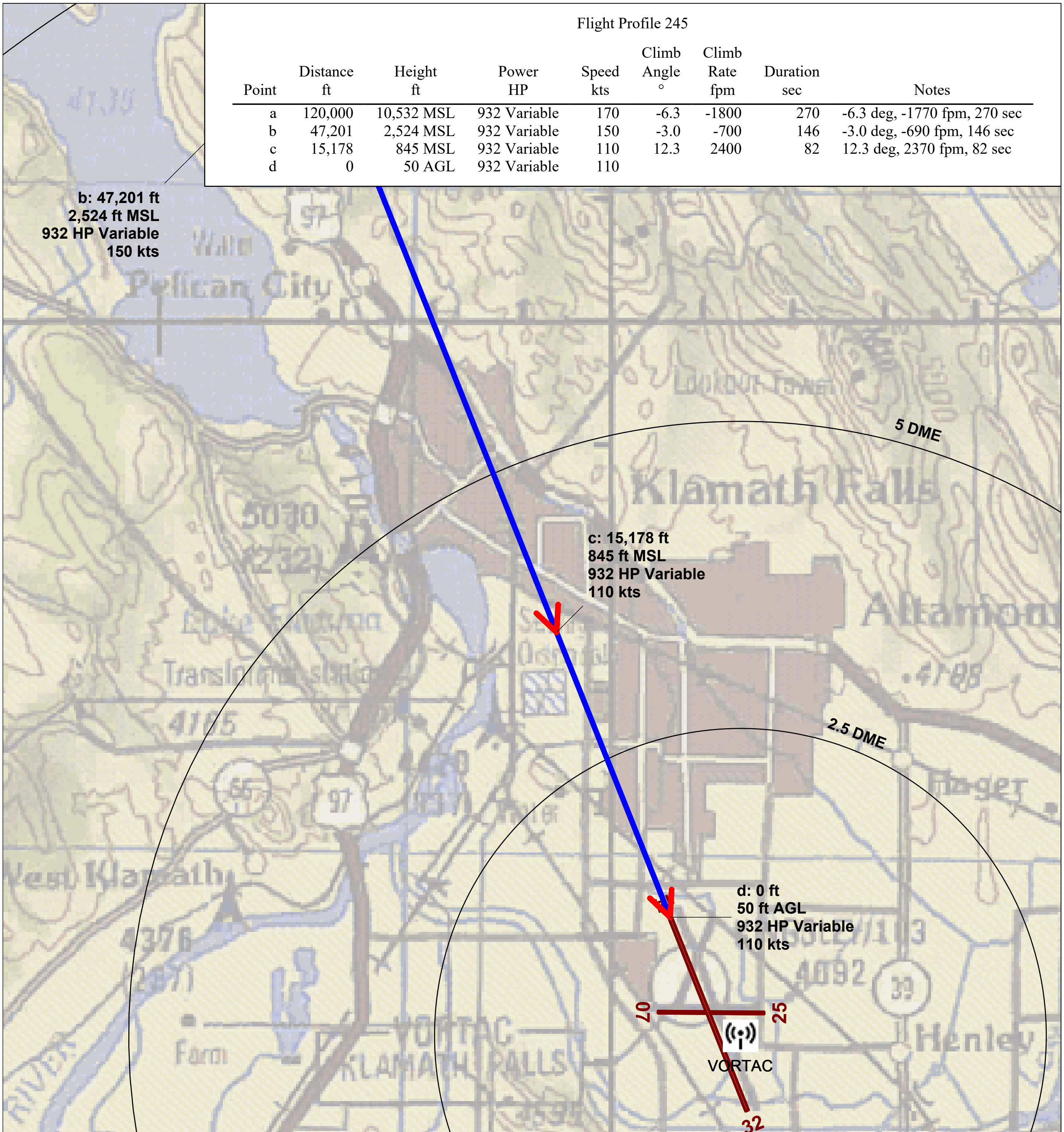
Transient

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000 48,000 52,000

Scale in Feet 1:146,000 (1 inch = 12,200 feet)

Flight Profile 245

Point	Distance ft	Height ft	Power HP	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	10,532 MSL	932 Variable	170	-6.3	-1800	270	-6.3 deg, -1770 fpm, 270 sec
b	47,201	2,524 MSL	932 Variable	150	-3.0	-700	146	-3.0 deg, -690 fpm, 146 sec
c	15,178	845 MSL	932 Variable	110	12.3	2400	82	12.3 deg, 2370 fpm, 82 sec
d	0	50 AGL	932 Variable	110				



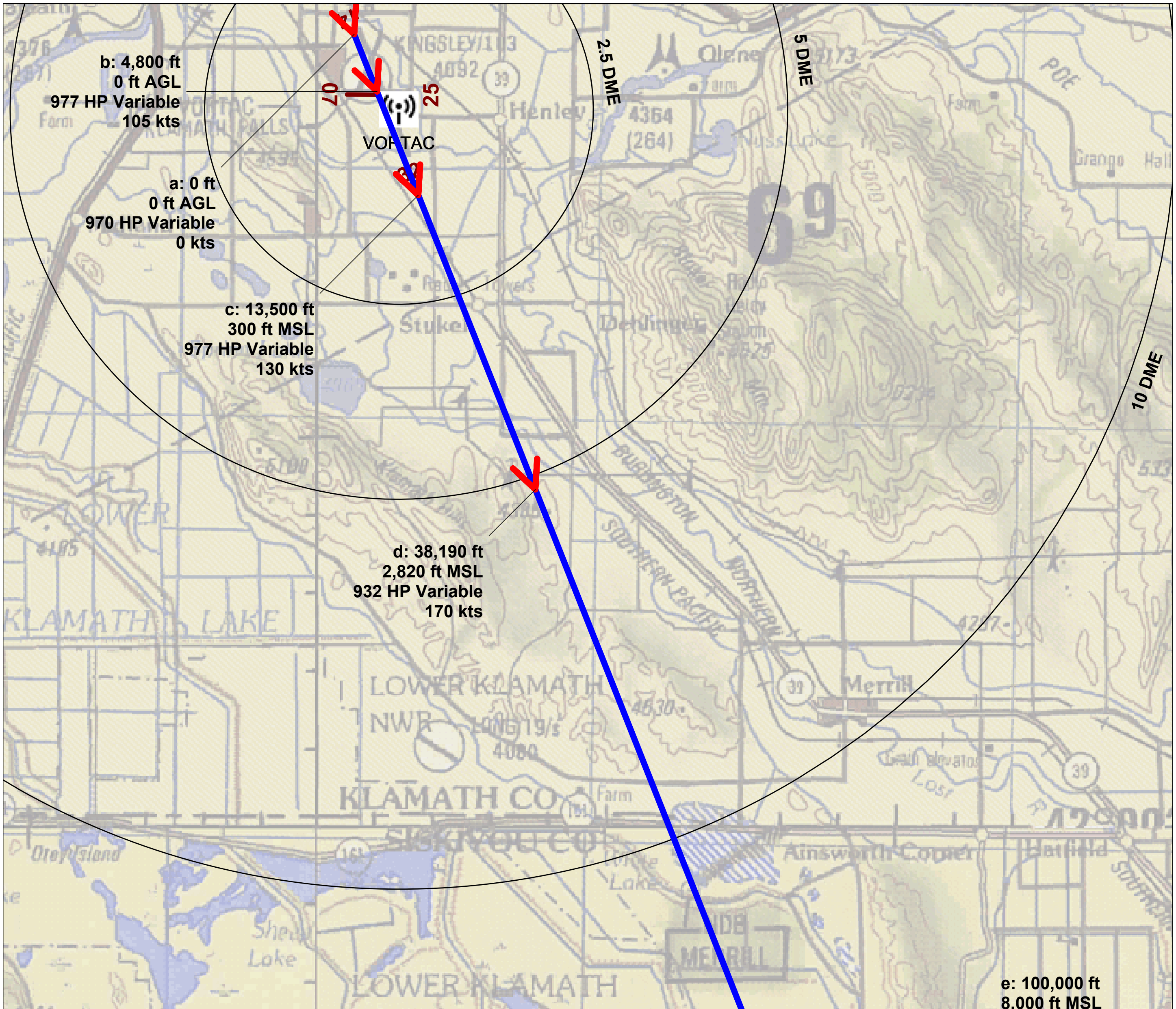
Transient C-130J Flight Profile 245

Transient

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000

Scale in Feet 1:84,000 (1 inch = 7,000 feet)

N



Flight Profile 243

Point	Distance ft	Height ft	Power HP	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	970 Variable	0	0.0	0	54	0.0 deg, 0 fpm, 54 sec
b	4,800	0 AGL	977 Variable	105	-23.6	-5200	44	-23.6 deg, -4760 fpm, 44 sec
c	13,500	300 MSL	977 Variable	130	5.8	1600	98	5.8 deg, 1540 fpm, 98 sec
d	38,190	2,820 MSL	932 Variable	170	4.8	1400	215	4.8 deg, 1440 fpm, 215 sec
e	100,000	8,000 MSL	932 Variable	170	5.7	1700	70	5.7 deg, 1710 fpm, 70 sec
f	120,000	10,000 MSL	932 Variable	170				

Transient C-130J Flight Profile 243

Transient

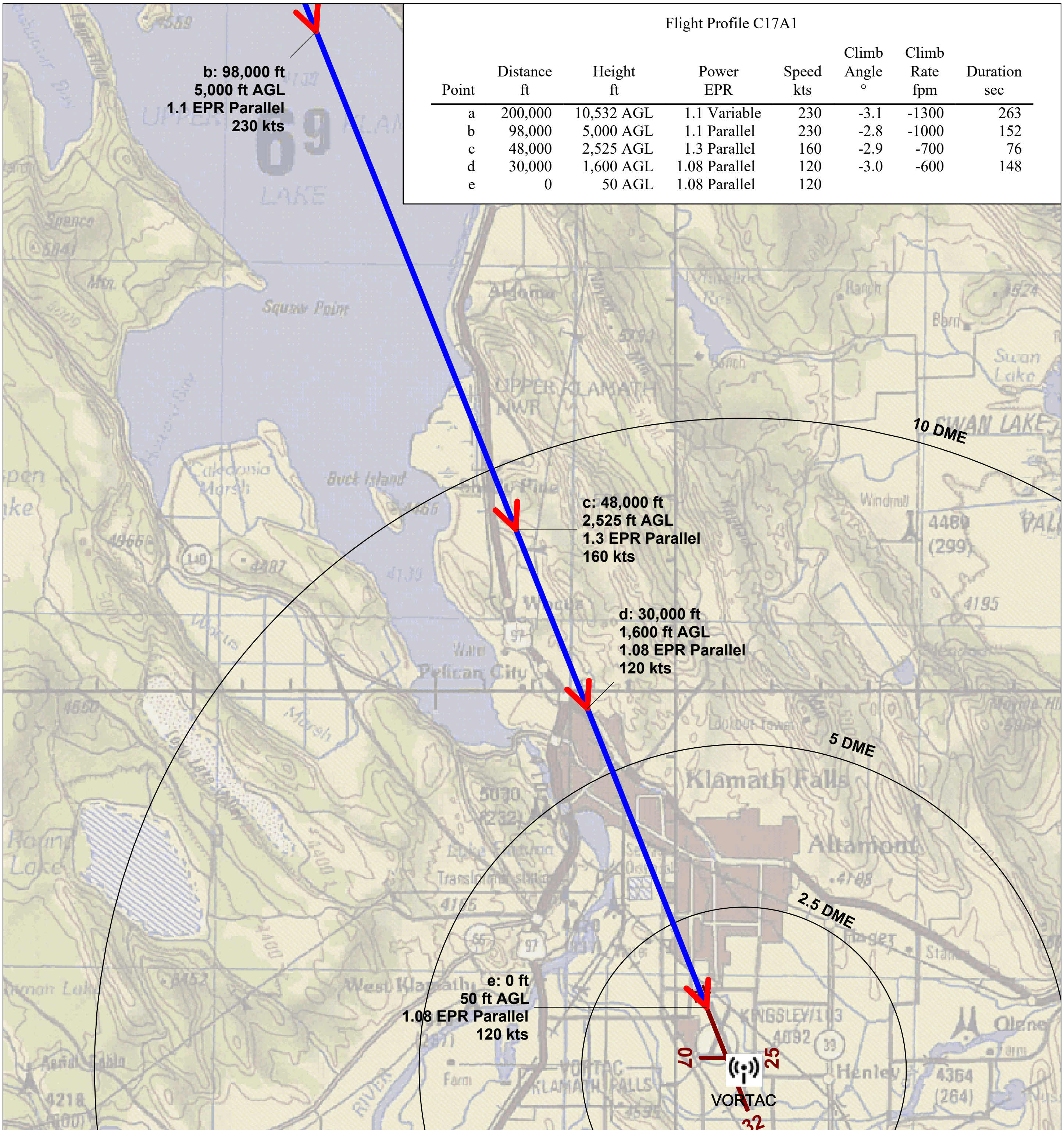
0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000 48,000 52,000

Scale in Feet 1:146,000 (1 inch = 12,200 feet)

N

Flight Profile C17A1

Point	Distance ft	Height ft	Power EPR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec
a	200,000	10,532 AGL	1.1 Variable	230	-3.1	-1300	263
b	98,000	5,000 AGL	1.1 Parallel	230	-2.8	-1000	152
c	48,000	2,525 AGL	1.3 Parallel	160	-2.9	-700	76
d	30,000	1,600 AGL	1.08 Parallel	120	-3.0	-600	148
e	0	50 AGL	1.08 Parallel	120			

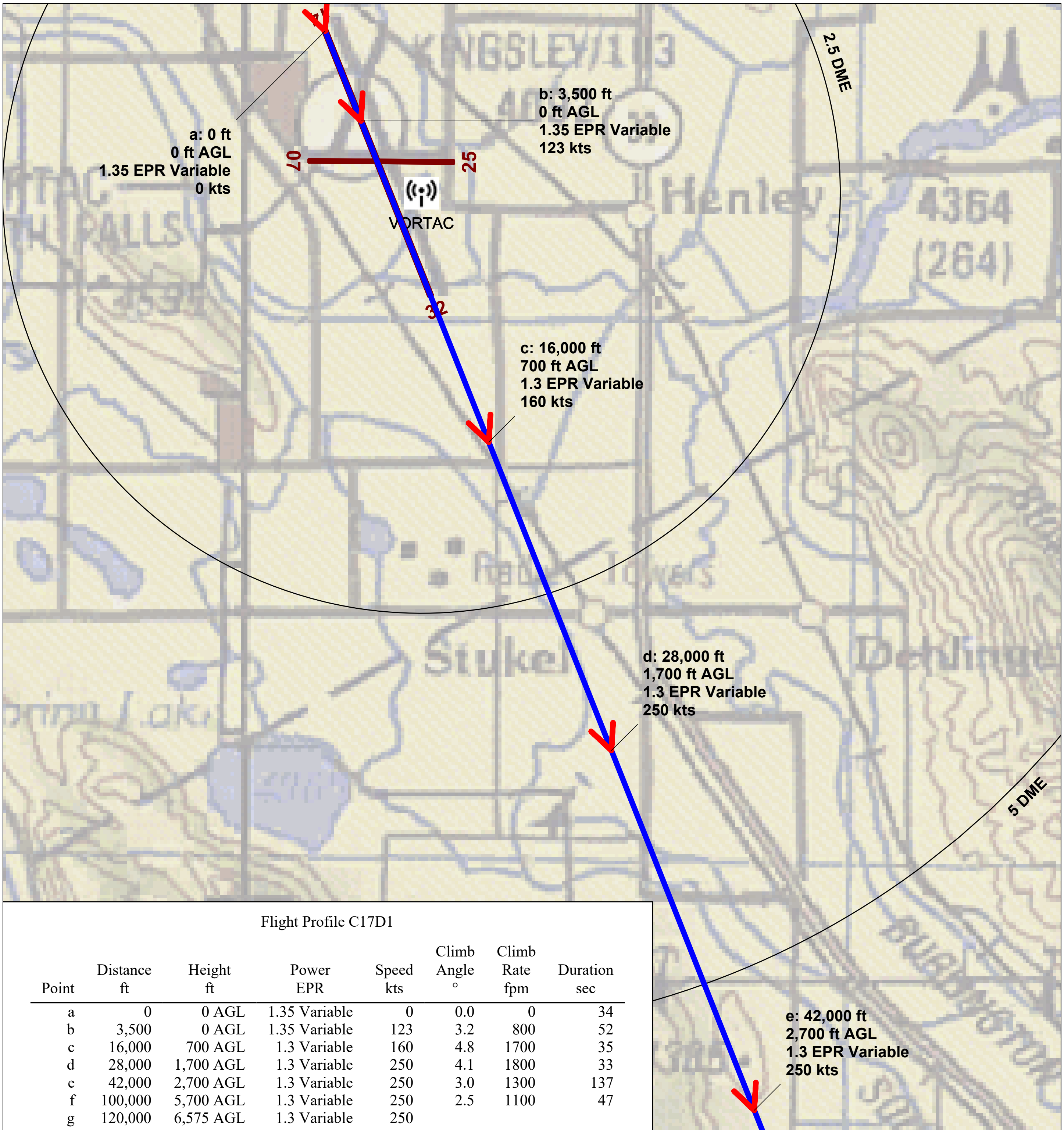


Transient C-17 Flight Profile C17A1

Arrival

0 10,000 20,000 30,000 40,000 50,000

Scale in Feet 1:158,000 (1 inch = 13,200 feet)



Flight Profile C17D1

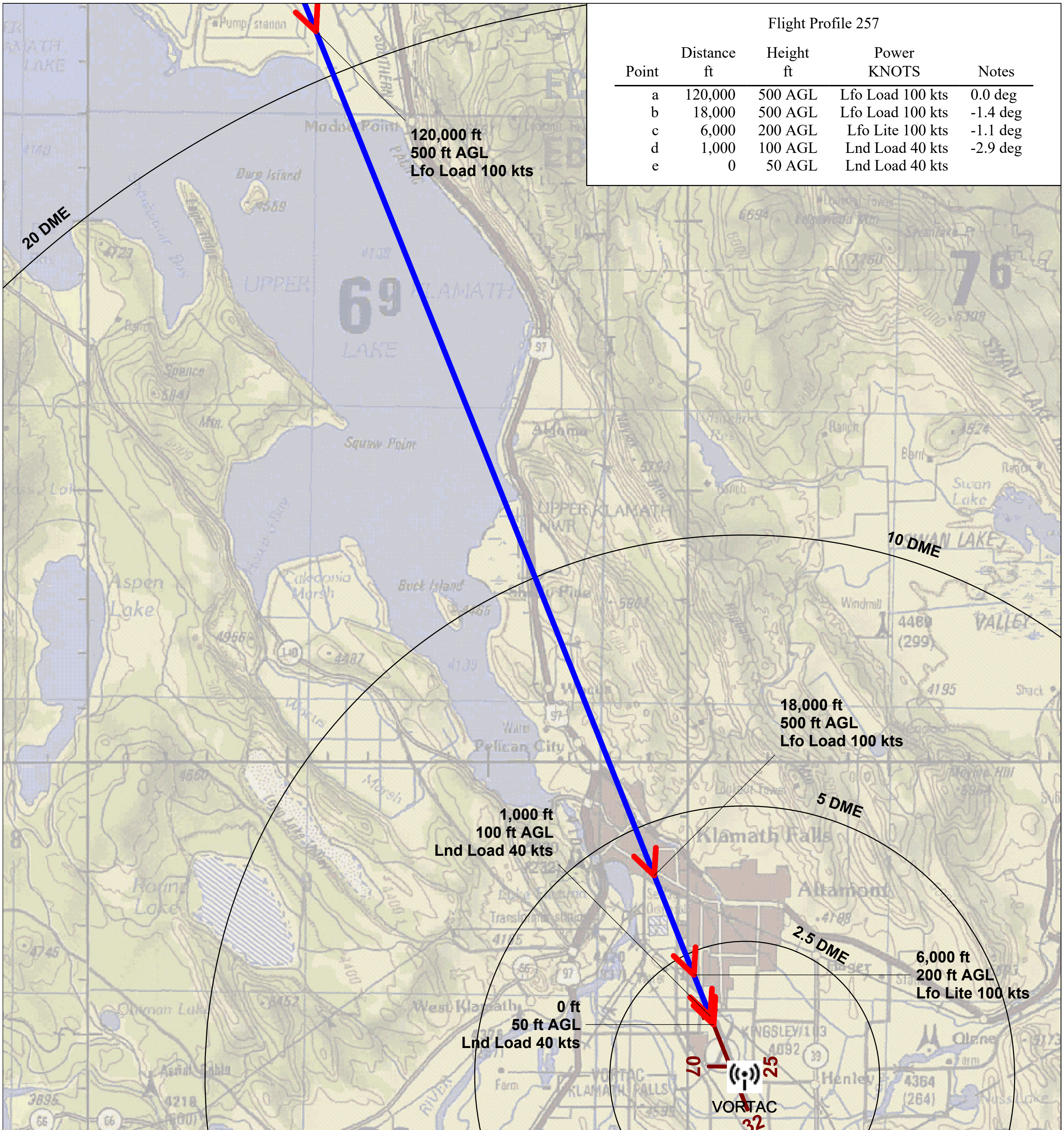
Point	Distance ft	Height ft	Power EPR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec
a	0	0 AGL	1.35 Variable	0	0.0	0	34
b	3,500	0 AGL	1.35 Variable	123	3.2	800	52
c	16,000	700 AGL	1.3 Variable	160	4.8	1700	35
d	28,000	1,700 AGL	1.3 Variable	250	4.1	1800	33
e	42,000	2,700 AGL	1.3 Variable	250	3.0	1300	137
f	100,000	5,700 AGL	1.3 Variable	250	2.5	1100	47
g	120,000	6,575 AGL	1.3 Variable	250			

Transient C-17 Flight Profile C17D1
DEPARTURE

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000

Scale in Feet 1:61,300 (1 inch = 5,110 feet)

N



Flight Profile 257

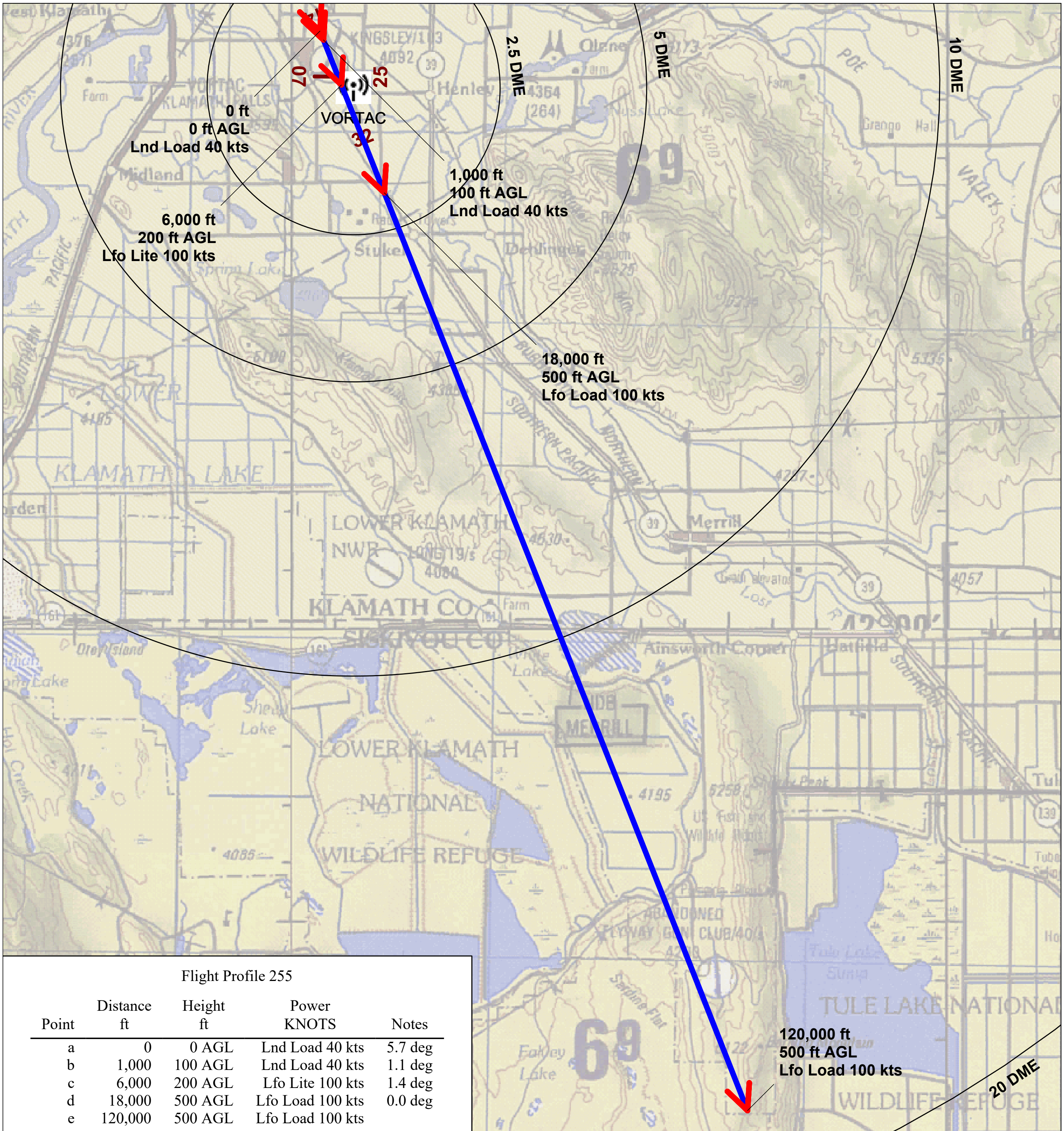
Point	Distance ft	Height ft	Power KNOTS	Notes
a	120,000	500 AGL	Lfo Load 100 kts	0.0 deg
b	18,000	500 AGL	Lfo Load 100 kts	-1.4 deg
c	6,000	200 AGL	Lfo Lite 100 kts	-1.1 deg
d	1,000	100 AGL	Lnd Load 40 kts	-2.9 deg
e	0	50 AGL	Lnd Load 40 kts	

Transient CH47B Flight Profile 257

Transient

0 10,000 20,000 30,000 40,000 50,000 60,000

Scale in Feet 1:190,000 (1 inch = 15,900 feet)



Flight Profile 255

Point	Distance ft	Height ft	Power KNOTS	Notes
a	0	0 AGL	Lnd Load 40 kts	5.7 deg
b	1,000	100 AGL	Lnd Load 40 kts	1.1 deg
c	6,000	200 AGL	Lfo Lite 100 kts	1.4 deg
d	18,000	500 AGL	Lfo Load 100 kts	0.0 deg
e	120,000	500 AGL	Lfo Load 100 kts	

Transient CH47B Flight Profile 255

Transient

0 10,000 20,000 30,000 40,000 50,000

Scale in Feet 1:175,000 (1 inch = 14,600 feet)

N

Flight Profile 207

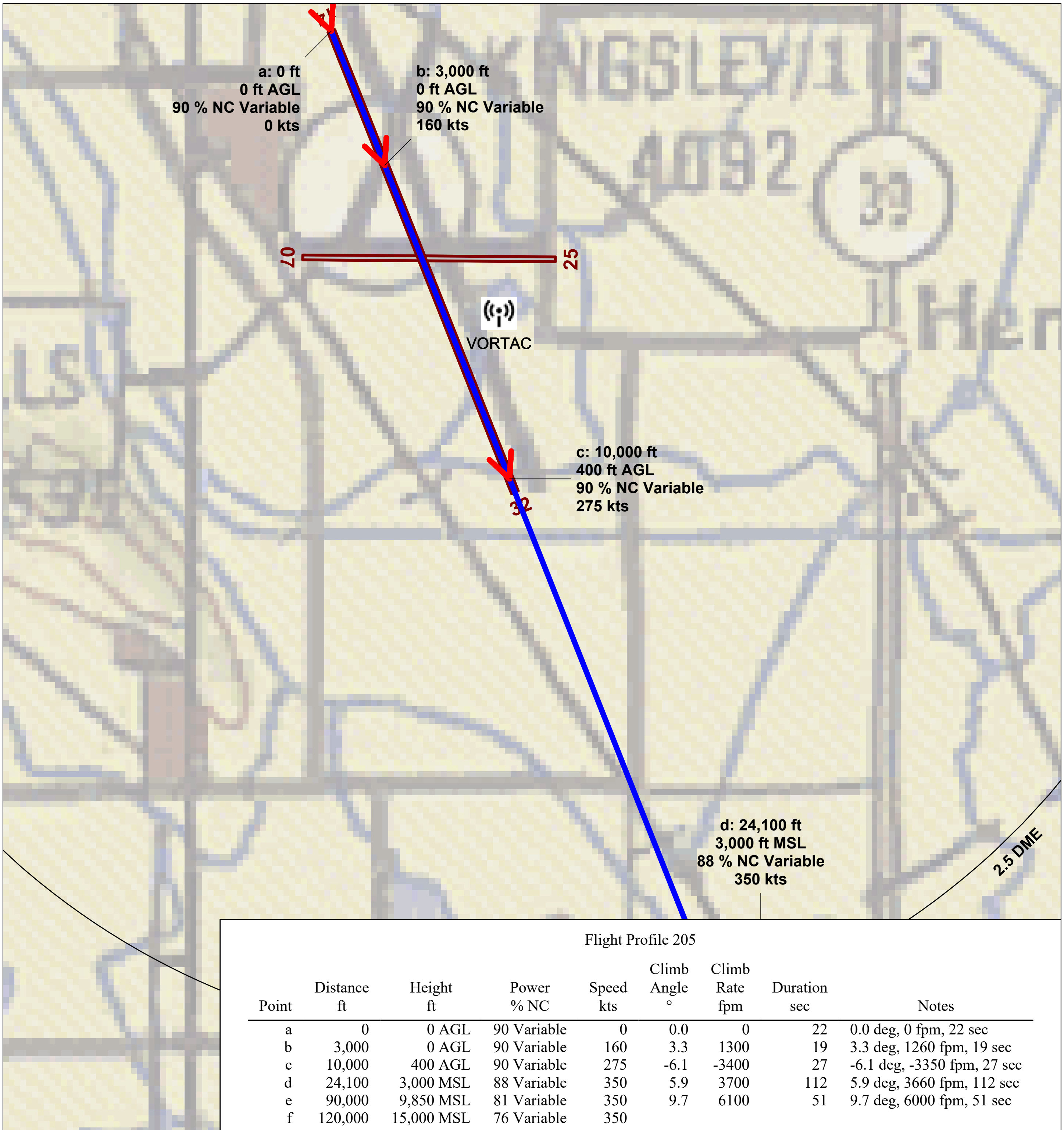
Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	15,000 MSL	78 Variable	300	-8.9	-4300	181	-8.9 deg, -4290 fpm, 181 sec
b	36,000	1,900 MSL	80 Approach	250	-2.9	-1000	53	-2.9 deg, -1010 fpm, 53 sec
c	18,000	1,000 MSL	78 Approach	150	9.9	2700	71	9.9 deg, 2620 fpm, 71 sec
d	0	50 AGL	73 Approach	150				

Transient F-15E Flight Profile 207

Transient

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:67,600 (1 inch = 5,640 feet)



Flight Profile 205

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	90 Variable	0	0.0	0	22	0.0 deg, 0 fpm, 22 sec
b	3,000	0 AGL	90 Variable	160	3.3	1300	19	3.3 deg, 1260 fpm, 19 sec
c	10,000	400 AGL	90 Variable	275	-6.1	-3400	27	-6.1 deg, -3350 fpm, 27 sec
d	24,100	3,000 MSL	88 Variable	350	5.9	3700	112	5.9 deg, 3660 fpm, 112 sec
e	90,000	9,850 MSL	81 Variable	350	9.7	6100	51	9.7 deg, 6000 fpm, 51 sec
f	120,000	15,000 MSL	76 Variable	350				

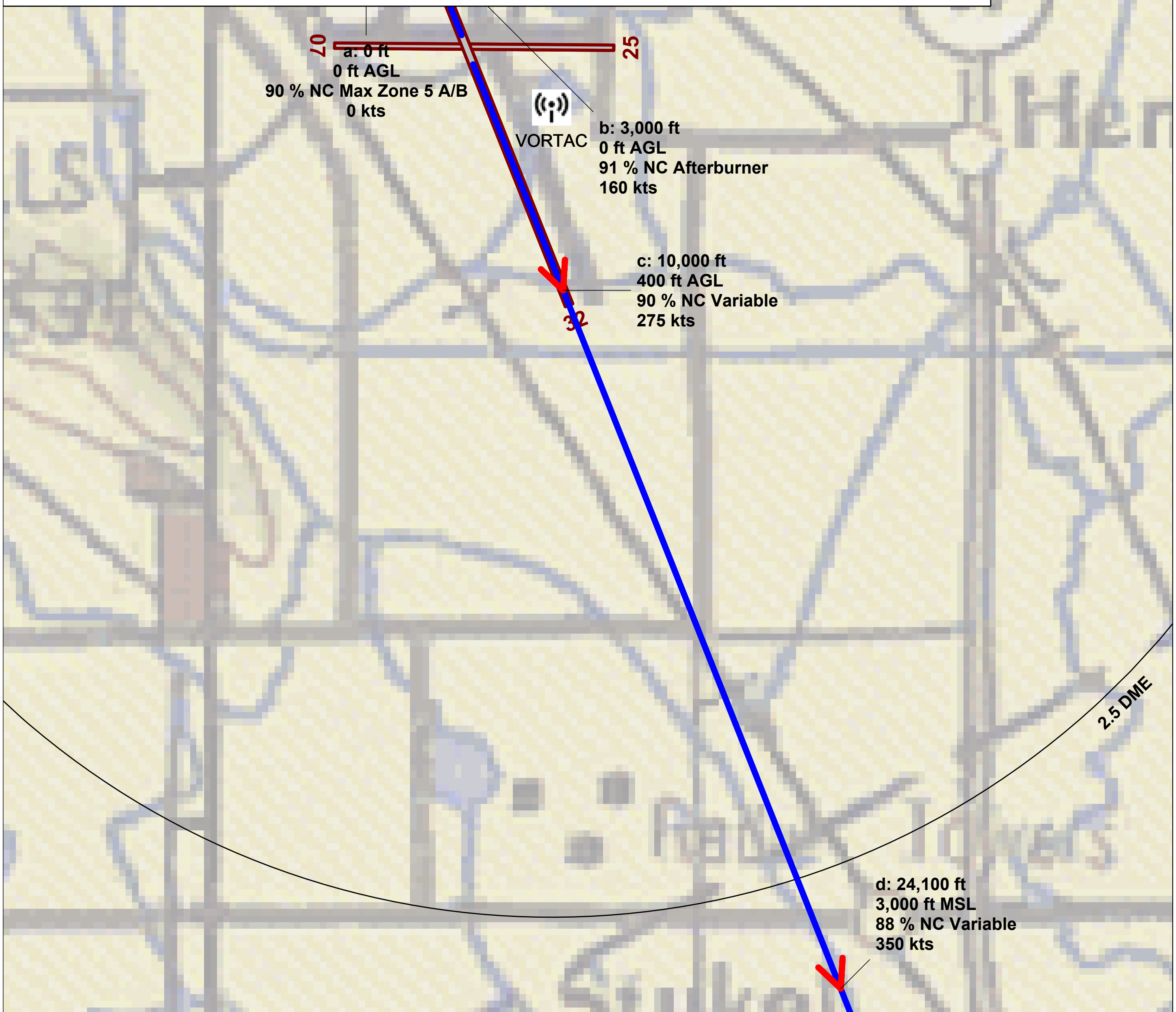
Transient F-15E Flight Profile 205

Transient

Scale in Feet 1:35,200 (1 inch = 2,930 feet)

Flight Profile 263

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	90 Max Zone 5 A/B	0	0.0	0	22	0.0 deg, 0 fpm, 22 sec
b	3,000	0 AGL	91 Afterburner	160	3.3	1300	19	3.3 deg, 1260 fpm, 19 sec
c	10,000	400 AGL	90 Variable	275	-6.1	-3400	27	-6.1 deg, -3350 fpm, 27 sec
d	24,100	3,000 MSL	88 Variable	350	5.9	3700	112	5.9 deg, 3660 fpm, 112 sec
e	90,000	9,850 MSL	81 Variable	350	9.7	6100	51	9.7 deg, 6000 fpm, 51 sec
f	120,000	15,000 MSL	76 Variable	350				

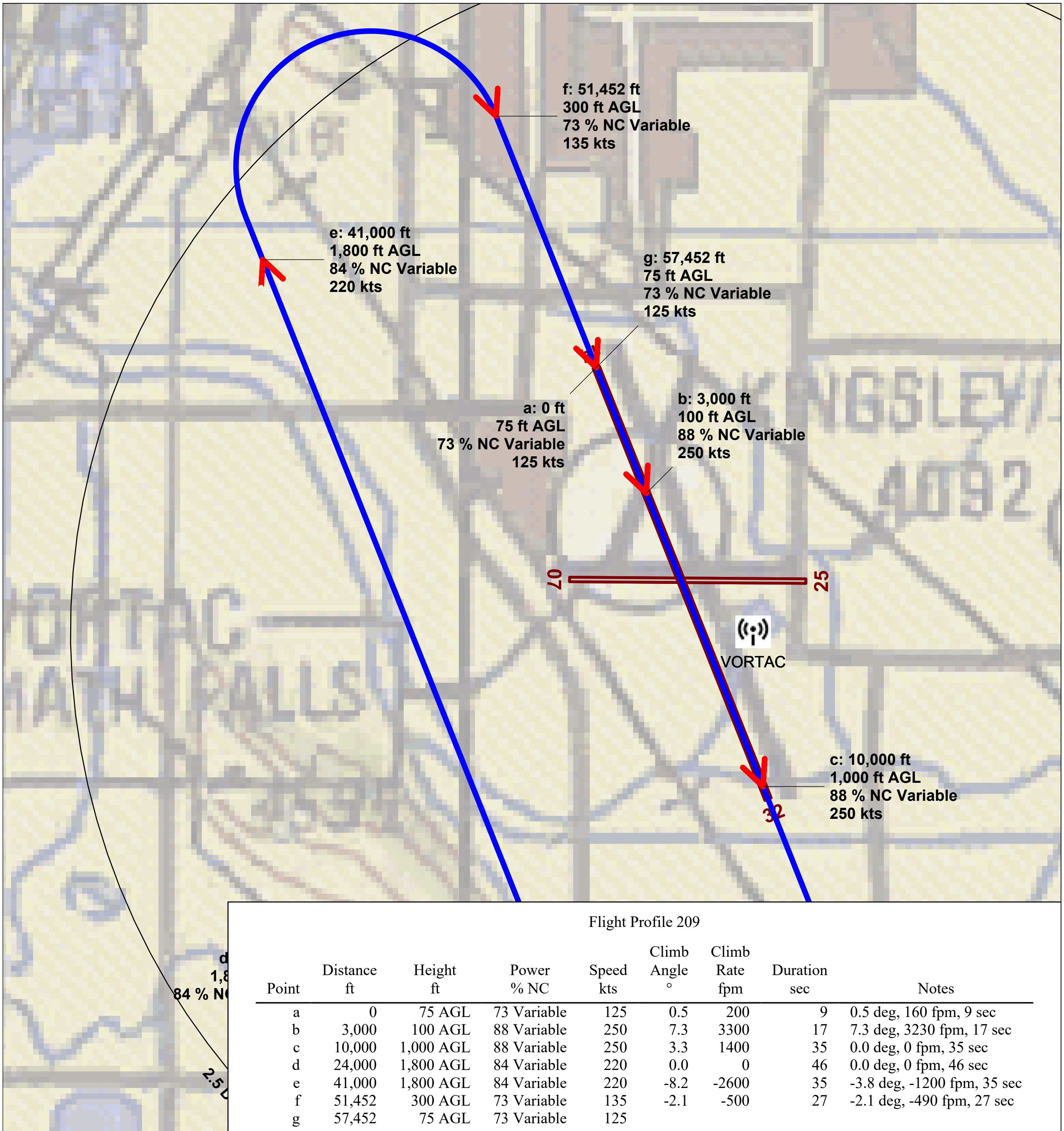


Transient F-15E Flight Profile 263

Transient

0 2,000 4,000 6,000 8,000 10,000

Scale in Feet 1:35,200 (1 inch = 2,930 feet)



Flight Profile 209

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	75 AGL	73 Variable	125	0.5	200	9	0.5 deg, 160 fpm, 9 sec
b	3,000	100 AGL	88 Variable	250	7.3	3300	17	7.3 deg, 3230 fpm, 17 sec
c	10,000	1,000 AGL	88 Variable	250	3.3	1400	35	0.0 deg, 0 fpm, 35 sec
d	24,000	1,800 AGL	84 Variable	220	0.0	0	46	0.0 deg, 0 fpm, 46 sec
e	41,000	1,800 AGL	84 Variable	220	-8.2	-2600	35	-3.8 deg, -1200 fpm, 35 sec
f	51,452	300 AGL	73 Variable	135	-2.1	-500	27	-2.1 deg, -490 fpm, 27 sec
g	57,452	75 AGL	73 Variable	125				

Transient F-15E Flight Profile 209
Transient

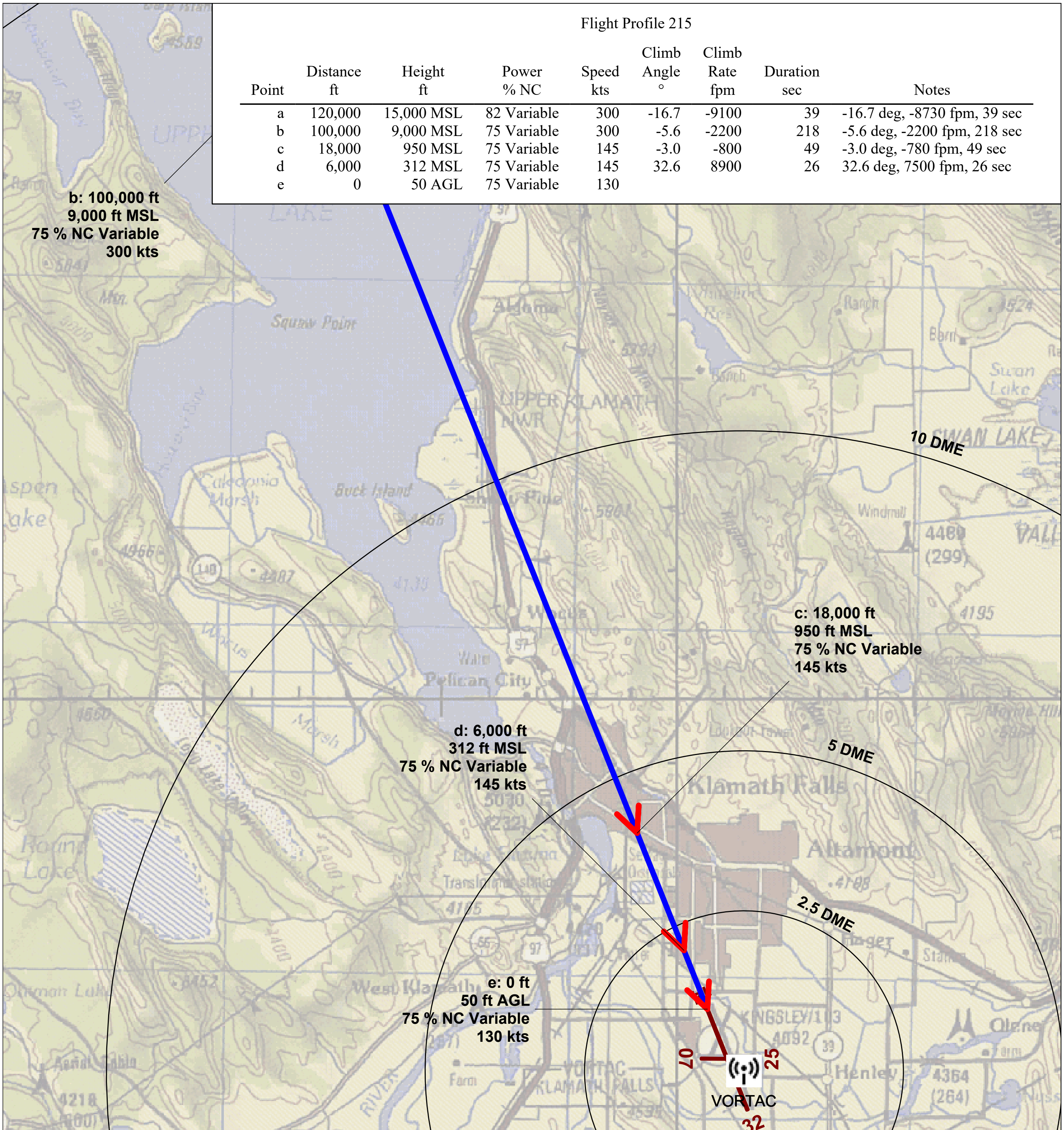
0 2,000 4,000 6,000 8,000 10,000 12,000

Scale in Feet 1:37,600 (1 inch = 3,140 feet)

N

Flight Profile 215

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	15,000 MSL	82 Variable	300	-16.7	-9100	39	-16.7 deg, -8730 fpm, 39 sec
b	100,000	9,000 MSL	75 Variable	300	-5.6	-2200	218	-5.6 deg, -2200 fpm, 218 sec
c	18,000	950 MSL	75 Variable	145	-3.0	-800	49	-3.0 deg, -780 fpm, 49 sec
d	6,000	312 MSL	75 Variable	145	32.6	8900	26	32.6 deg, 7500 fpm, 26 sec
e	0	50 AGL	75 Variable	130				



Transient F-16C Flight Profile 215

Transient

0 10,000 20,000 30,000 40,000 50,000

Scale in Feet 1:161,000 (1 inch = 13,400 feet)

Flight Profile 211

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	92 Max A/B	0	0.0	0	20	0.0 deg, 0 fpm, 20 sec
b	2,700	0 AGL	92 Afterburner	160	1.7	600	10	1.7 deg, 630 fpm, 10 sec
c	6,000	100 AGL	92 Afterburner	250	7.6	3400	7	7.6 deg, 3350 fpm, 7 sec
d	9,000	500 AGL	90 Variable	250	1.1	500	50	1.1 deg, 480 fpm, 50 sec
e	30,000	5,000 MSL	90 Variable	250	5.7	2800	65	5.7 deg, 2770 fpm, 65 sec
f	60,000	8,000 MSL	85 Variable	300	6.7	3800	109	6.7 deg, 3810 fpm, 109 sec
g	120,000	15,000 MSL	85 Variable	350				

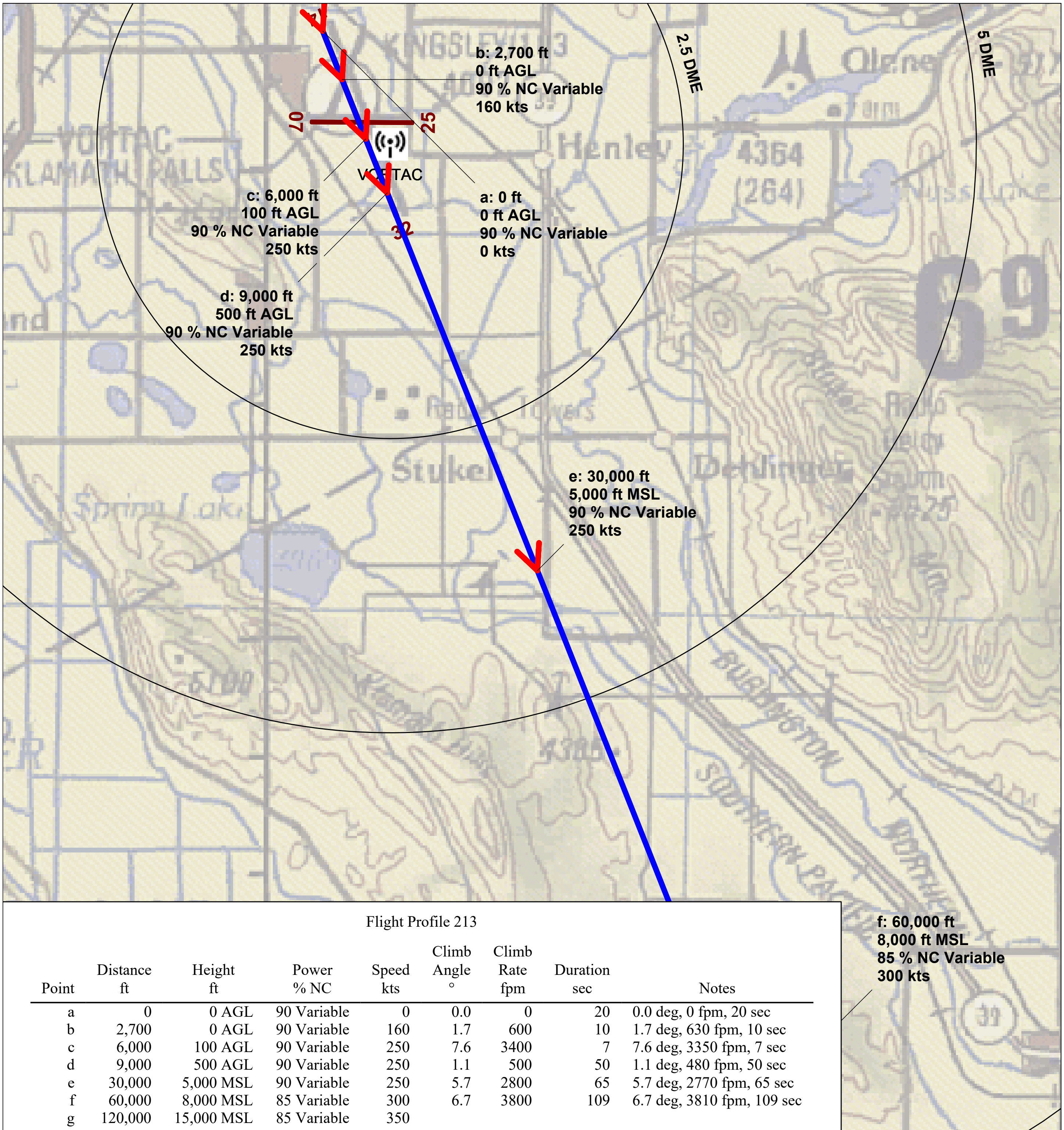
Transient F-16C Flight Profile 211

Transient

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000

Scale in Feet 1:87,600 (1 inch = 7,300 feet)

N



Flight Profile 213

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	90 Variable	0	0.0	0	20	0.0 deg, 0 fpm, 20 sec
b	2,700	0 AGL	90 Variable	160	1.7	600	10	1.7 deg, 630 fpm, 10 sec
c	6,000	100 AGL	90 Variable	250	7.6	3400	7	7.6 deg, 3350 fpm, 7 sec
d	9,000	500 AGL	90 Variable	250	1.1	500	50	1.1 deg, 480 fpm, 50 sec
e	30,000	5,000 MSL	90 Variable	250	5.7	2800	65	5.7 deg, 2770 fpm, 65 sec
f	60,000	8,000 MSL	85 Variable	300	6.7	3800	109	6.7 deg, 3810 fpm, 109 sec
g	120,000	15,000 MSL	85 Variable	350				

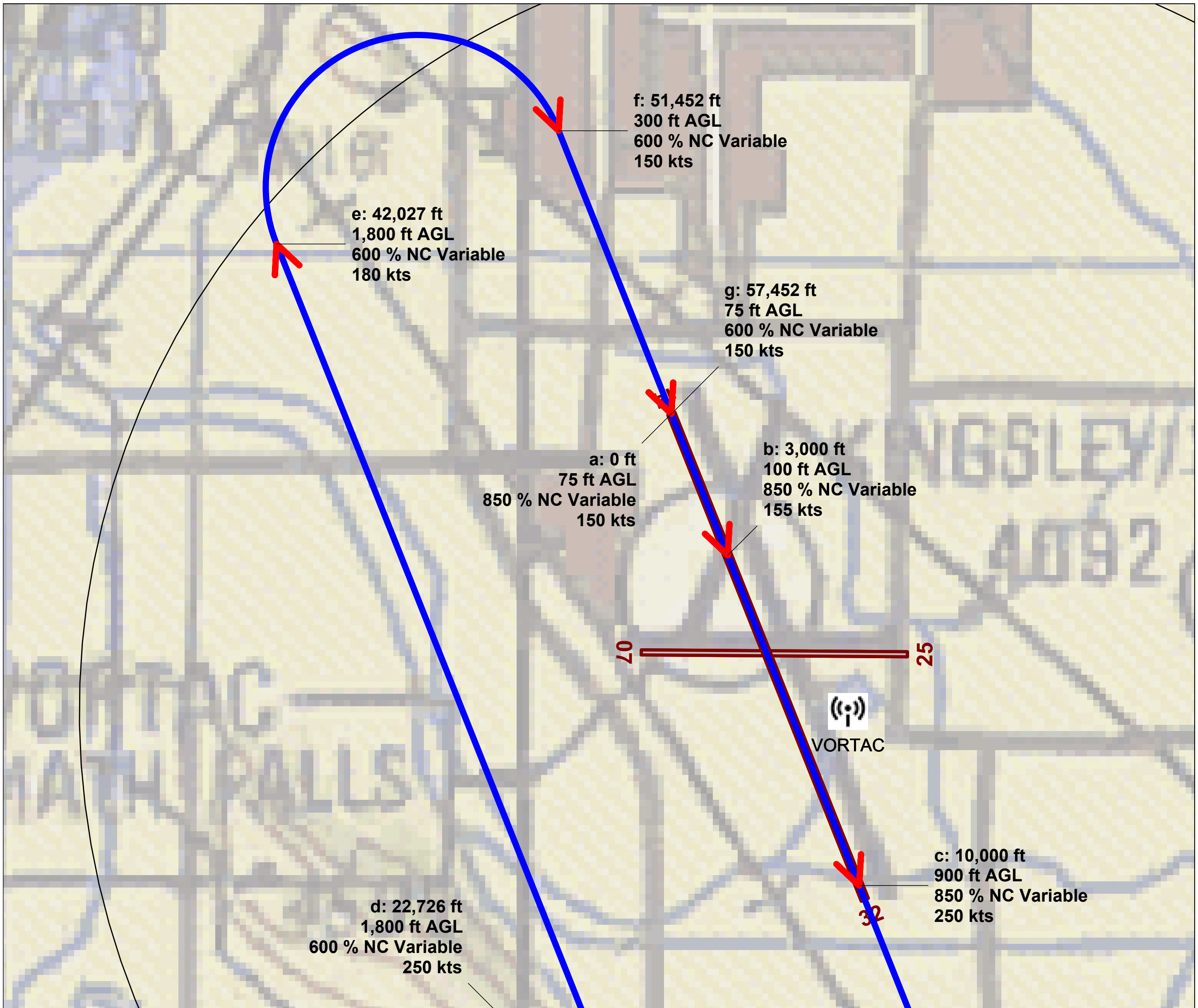
Transient F-16C Flight Profile 213

Transient

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000

Scale in Feet 1:87,600 (1 inch = 7,300 feet)

N



Flight Profile 217

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	75 AGL	850 Variable	150	0.5	100	12	0.5 deg, 130 fpm, 12 sec
b	3,000	100 AGL	850 Variable	155	6.5	2300	20	6.5 deg, 2330 fpm, 20 sec
c	10,000	900 AGL	850 Variable	250	4.0	1800	30	0.3 deg, 150 fpm, 40 sec
d	22,726	1,800 AGL	600 Variable	250	0.0	0	53	0.0 deg, 0 fpm, 39 sec
e	42,027	1,800 AGL	600 Variable	180	-9.0	-2700	34	-3.8 deg, -1120 fpm, 38 sec
f	51,452	300 AGL	600 Variable	150	-2.1	-600	24	-2.1 deg, -570 fpm, 24 sec
g	57,452	75 AGL	600 Variable	150				

Transient F-16C Flight Profile 217

Transient

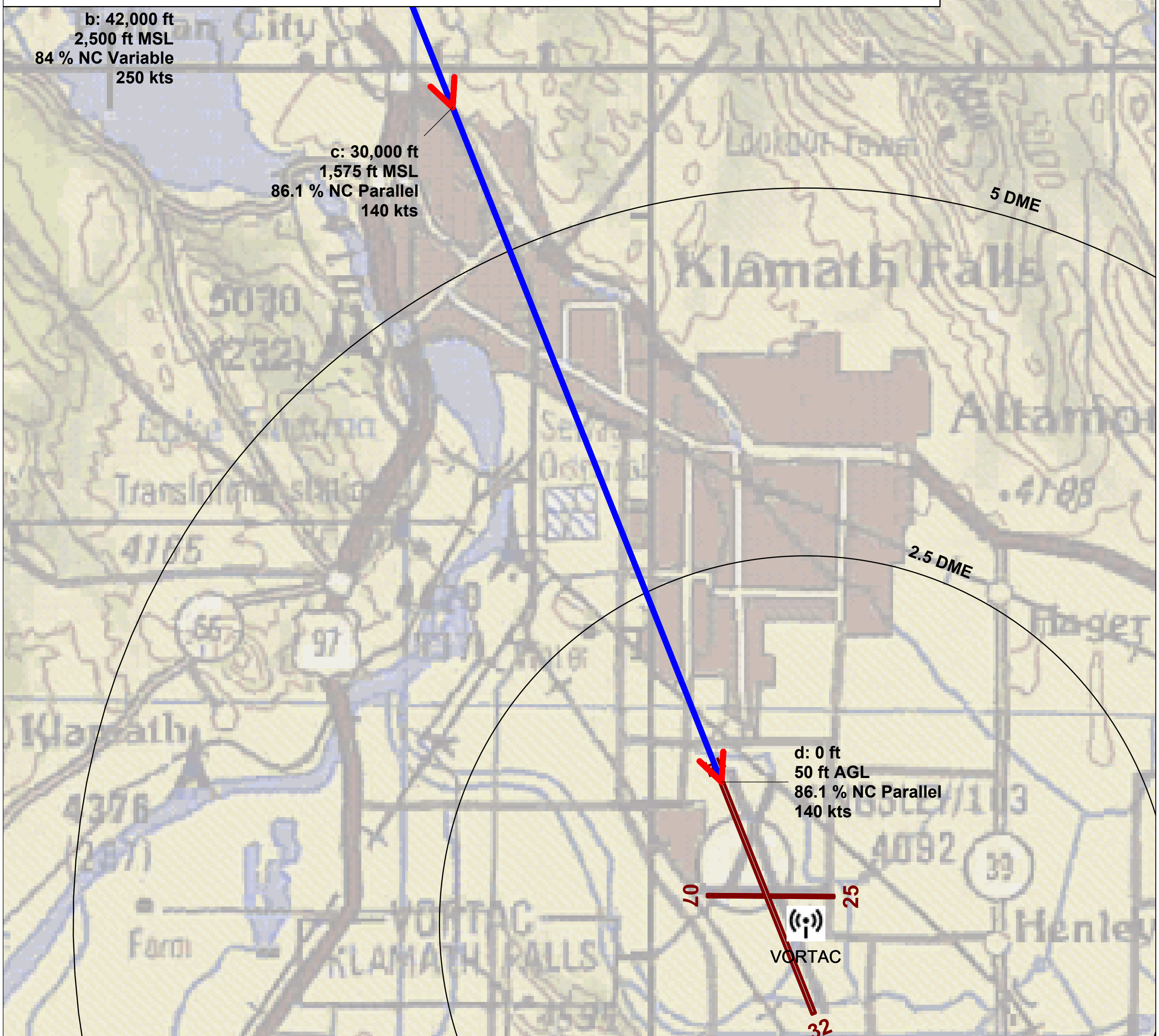
0 2,000 4,000 6,000 8,000 10,000 12,000

Scale in Feet 1:37,600 (1 inch = 3,140 feet)

N

Flight Profile 231

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	10,000 MSL	80 Variable	260	-5.5	-2500	181	-5.5 deg, -2470 fpm, 181 sec
b	42,000	2,500 MSL	84 Variable	250	-4.4	-1500	36	-4.4 deg, -1520 fpm, 36 sec
c	30,000	1,575 MSL	86.1 Parallel	140	4.9	1200	127	4.9 deg, 1210 fpm, 127 sec
d	0	50 AGL	86.1 Parallel	140				



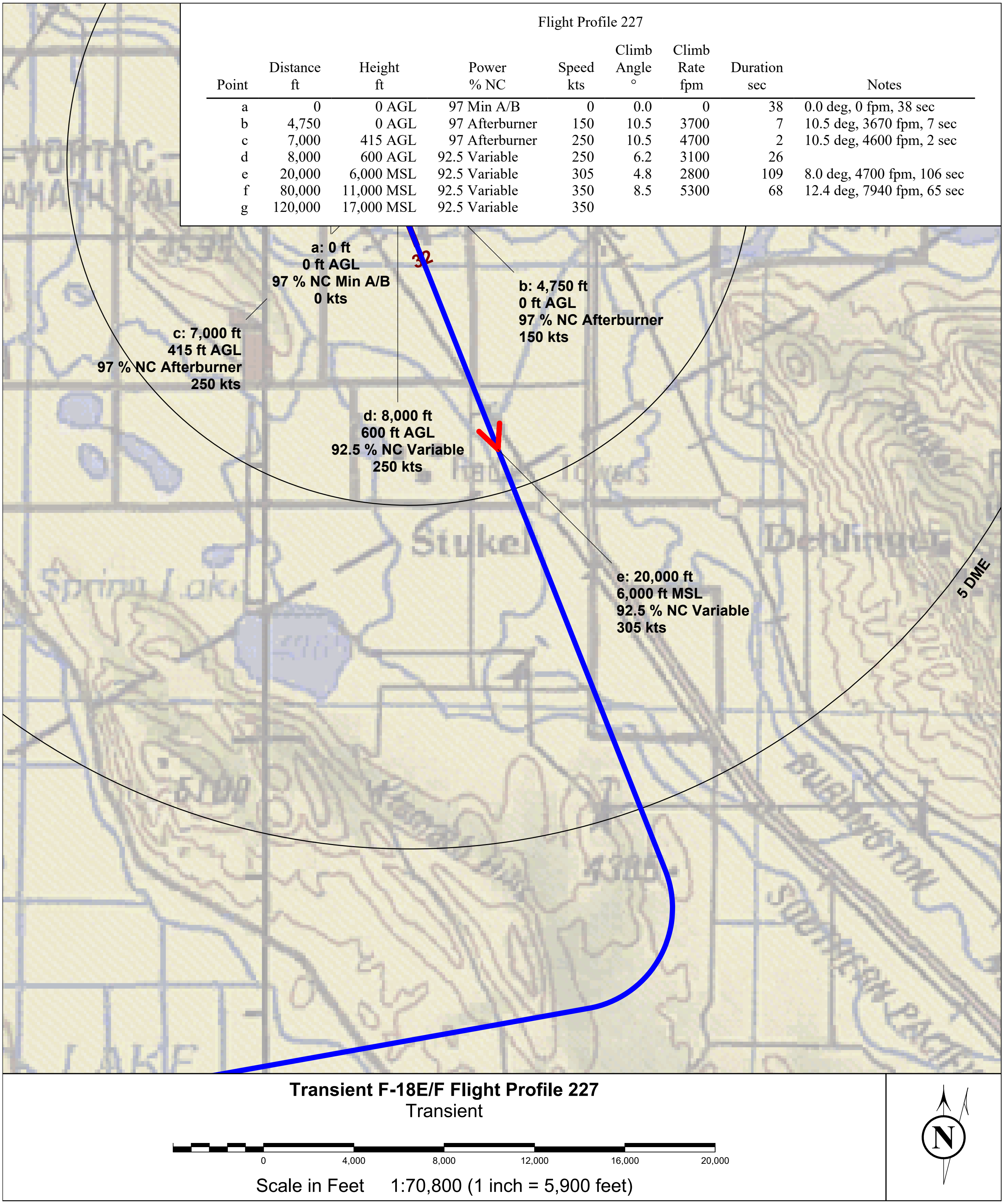
Transient F-18E/F Flight Profile 231
Transient

0 4,000 8,000 12,000 16,000 20,000 24,000

Scale in Feet 1:76,400 (1 inch = 6,370 feet)

Flight Profile 227

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	97 Min A/B	0	0.0	0	38	0.0 deg, 0 fpm, 38 sec
b	4,750	0 AGL	97 Afterburner	150	10.5	3700	7	10.5 deg, 3670 fpm, 7 sec
c	7,000	415 AGL	97 Afterburner	250	10.5	4700	2	10.5 deg, 4600 fpm, 2 sec
d	8,000	600 AGL	92.5 Variable	250	6.2	3100	26	
e	20,000	6,000 MSL	92.5 Variable	305	4.8	2800	109	8.0 deg, 4700 fpm, 106 sec
f	80,000	11,000 MSL	92.5 Variable	350	8.5	5300	68	12.4 deg, 7940 fpm, 65 sec
g	120,000	17,000 MSL	92.5 Variable	350				



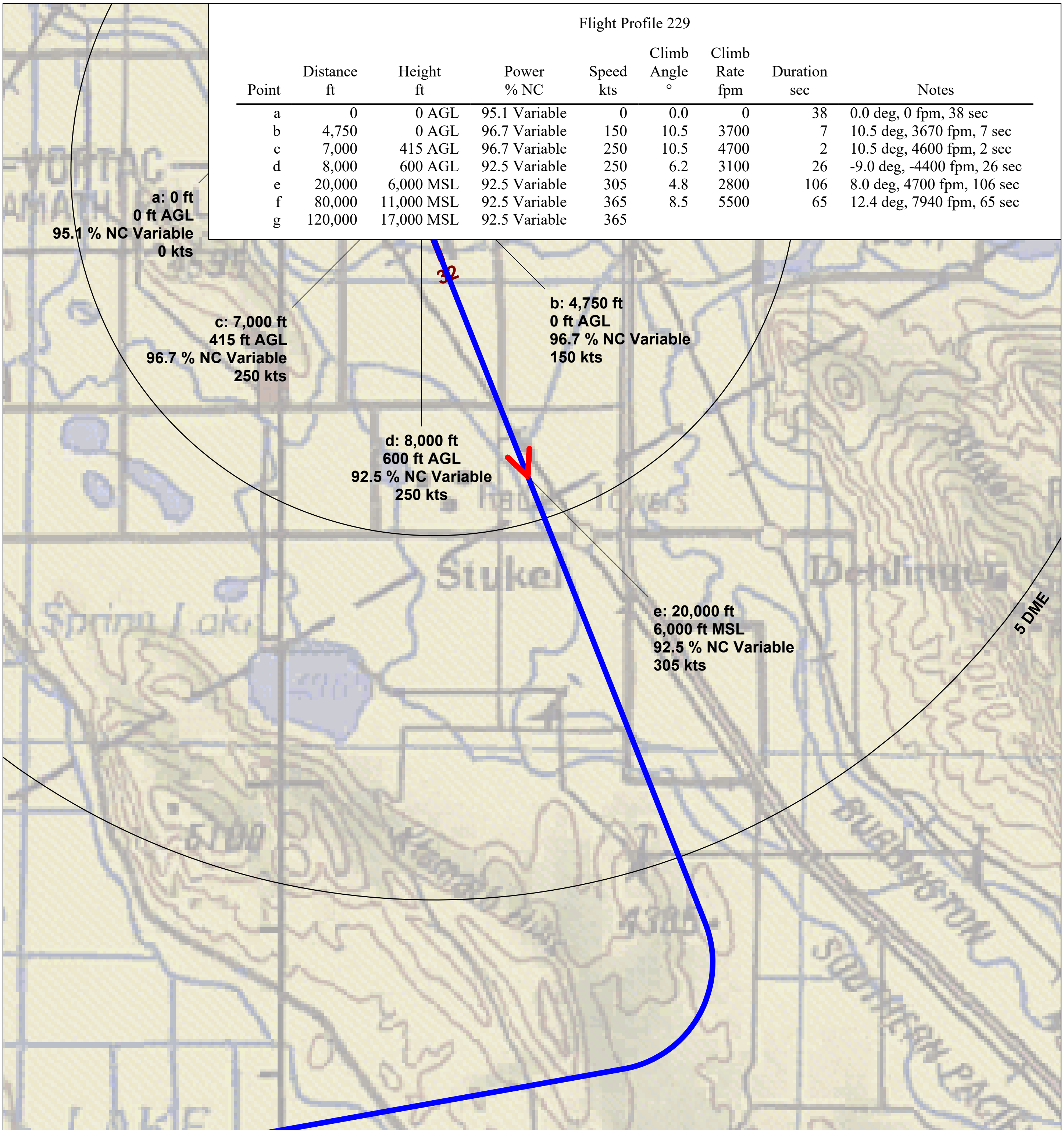
Transient F-18E/F Flight Profile 227

Transient

Scale in Feet 1:70,800 (1 inch = 5,900 feet)

Flight Profile 229

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	95.1 Variable	0	0.0	0	38	0.0 deg, 0 fpm, 38 sec
b	4,750	0 AGL	96.7 Variable	150	10.5	3700	7	10.5 deg, 3670 fpm, 7 sec
c	7,000	415 AGL	96.7 Variable	250	10.5	4700	2	10.5 deg, 4600 fpm, 2 sec
d	8,000	600 AGL	92.5 Variable	250	6.2	3100	26	-9.0 deg, -4400 fpm, 26 sec
e	20,000	6,000 MSL	92.5 Variable	305	4.8	2800	106	8.0 deg, 4700 fpm, 106 sec
f	80,000	11,000 MSL	92.5 Variable	365	8.5	5500	65	12.4 deg, 7940 fpm, 65 sec
g	120,000	17,000 MSL	92.5 Variable	365				

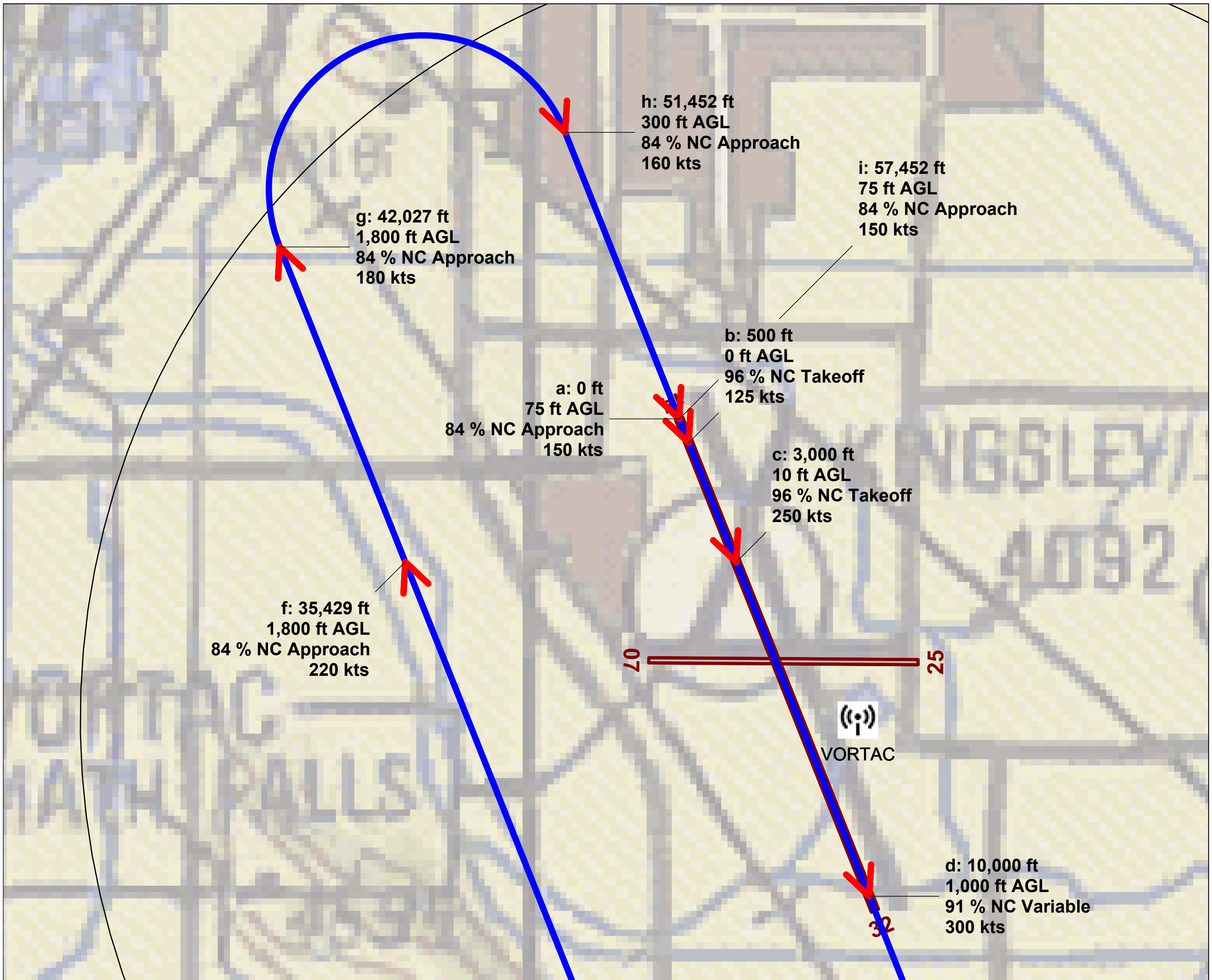


Transient F-18E/F Flight Profile 229

Transient

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:70,800 (1 inch = 5,900 feet)



Flight Profile 233

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	75 AGL	84 Approach	150	-8.5	-2100	2	-8.5 deg, -2070 fpm, 2 sec
b	500	0 AGL	96 Takeoff	125	0.2	100	8	0.2 deg, 80 fpm, 8 sec
c	3,000	10 AGL	96 Takeoff	250	8.0	3900	15	8.0 deg, 3900 fpm, 15 sec
d	10,000	1,000 AGL	91 Variable	300	3.6	1600	29	2.9 deg, 1320 fpm, 36 sec
e	22,795	1,800 AGL	83 Variable	220	0.0	0	34	0.0 deg, 0 fpm, 26 sec
f	35,429	1,800 AGL	84 Approach	220	0.0	0	20	0.0 deg, 0 fpm, 13 sec
g	42,027	1,800 AGL	84 Approach	180	-9.0	-2700	33	-7.5 deg, -2240 fpm, 40 sec
h	51,452	300 AGL	84 Approach	160	-2.1	-600	23	-2.1 deg, -590 fpm, 23 sec
i	57,452	75 AGL	84 Approach	150				Cross Threshold

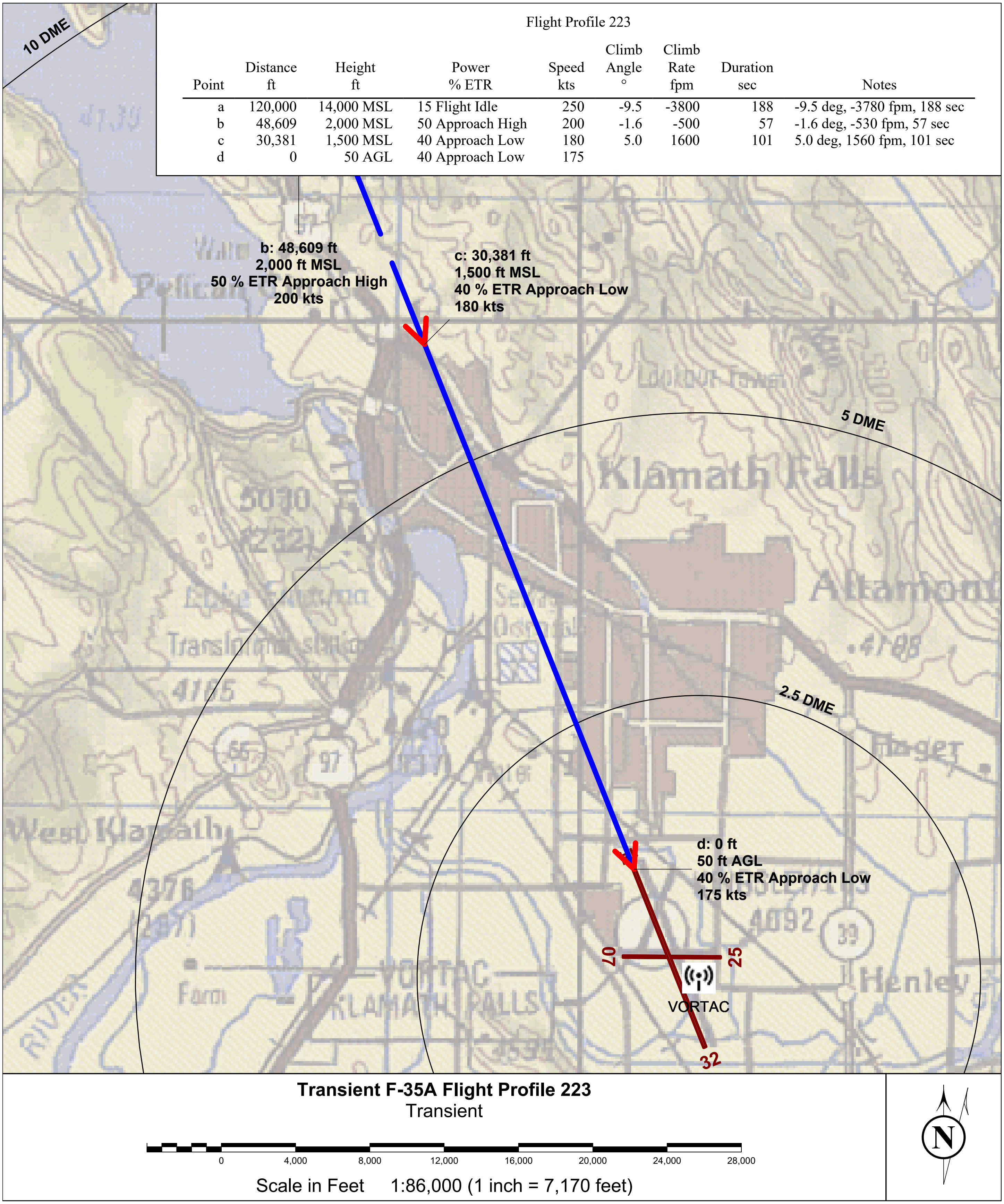
Transient F-18E/F Flight Profile 233

Transient

Scale in Feet 1:37,600 (1 inch = 3,140 feet)

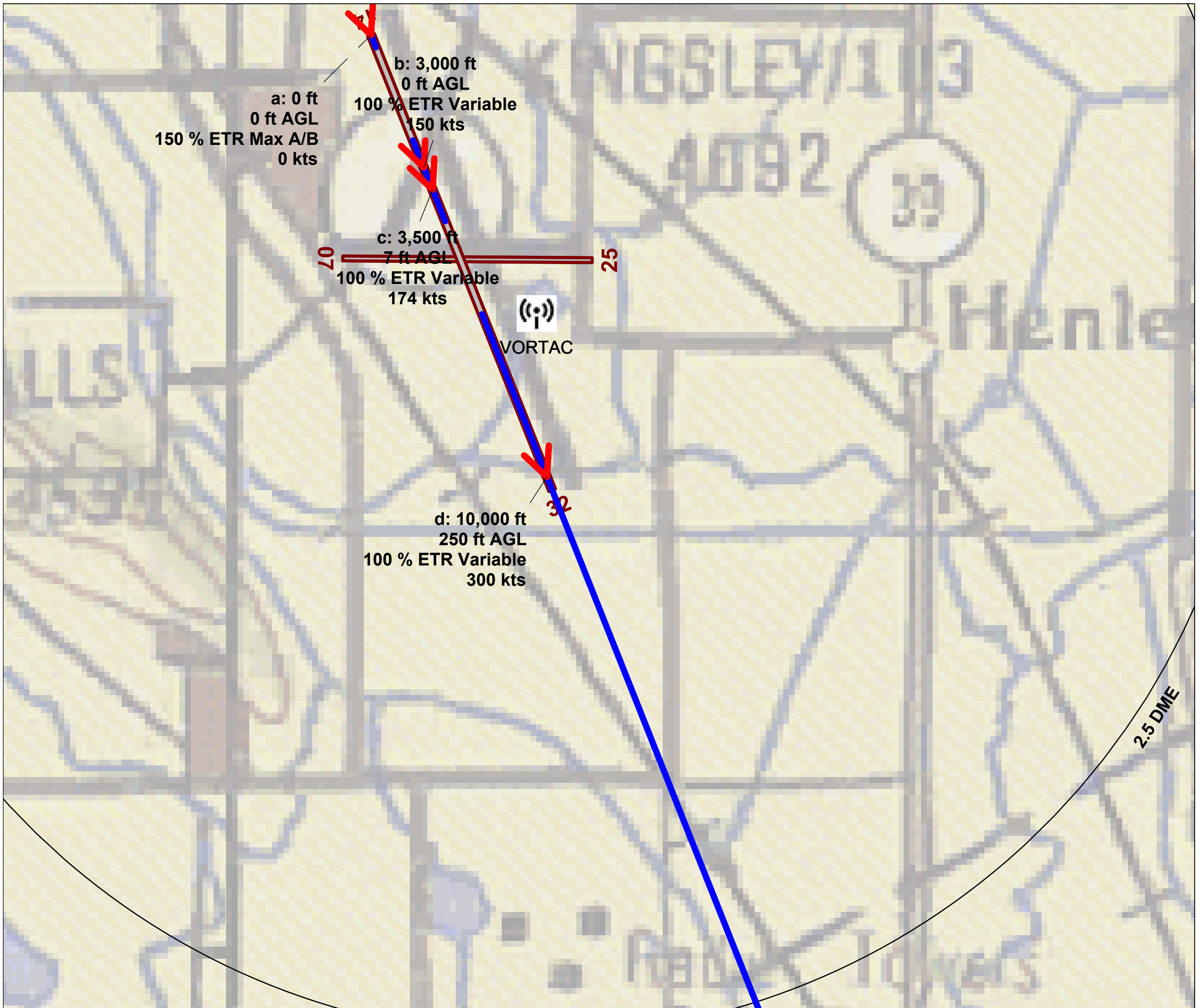
Flight Profile 223

Point	Distance ft	Height ft	Power % ETR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	14,000 MSL	15 Flight Idle	250	-9.5	-3800	188	-9.5 deg, -3780 fpm, 188 sec
b	48,609	2,000 MSL	50 Approach High	200	-1.6	-500	57	-1.6 deg, -530 fpm, 57 sec
c	30,381	1,500 MSL	40 Approach Low	180	5.0	1600	101	5.0 deg, 1560 fpm, 101 sec
d	0	50 AGL	40 Approach Low	175				



Transient F-35A Flight Profile 223
Transient

Scale in Feet 1:86,000 (1 inch = 7,170 feet)



Flight Profile 219

Point	Distance ft	Height ft	Power % ETR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	150 Max A/B	0	0.0	0	24	0.0 deg, 0 fpm, 24 sec
b	3,000	0 AGL	100 Variable	150	0.8	200	2	0.8 deg, 230 fpm, 2 sec
c	3,500	7 AGL	100 Variable	174	2.1	900	16	2.1 deg, 900 fpm, 16 sec
d	10,000	250 AGL	100 Variable	300	8.9	5200	32	8.9 deg, 5110 fpm, 32 sec
e	27,500	3,000 AGL	95 Variable	350	15.0	9500	44	15.0 deg, 9170 fpm, 44 sec
f	53,624	10,000 AGL	35 Variable	350	0.0	0	112	0.0 deg, 0 fpm, 112 sec
g	120,000	10,000 AGL	35 Variable	350				

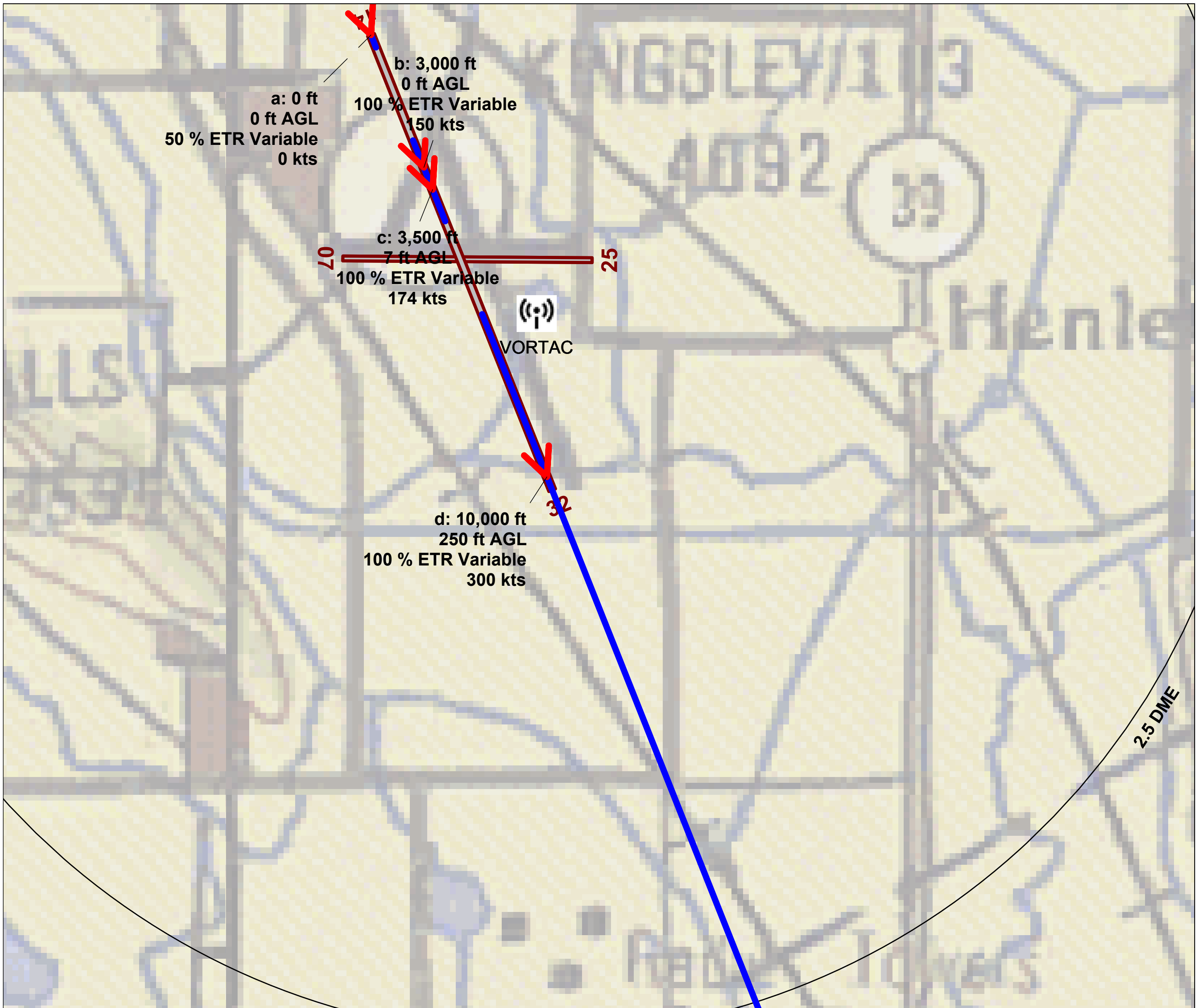
Transient F-35A Flight Profile 219

Transient

0 2,000 4,000 6,000 8,000 10,000 12,000

Scale in Feet 1:40,200 (1 inch = 3,350 feet)

N



Flight Profile 221

Point	Distance ft	Height ft	Power % ETR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	50 Variable	0	0.0	0	24	0.0 deg, 0 fpm, 24 sec
b	3,000	0 AGL	100 Variable	150	0.8	200	2	0.8 deg, 230 fpm, 2 sec
c	3,500	7 AGL	100 Variable	174	2.1	900	16	2.1 deg, 900 fpm, 16 sec
d	10,000	250 AGL	100 Variable	300	8.9	5200	32	8.9 deg, 5110 fpm, 32 sec
e	27,500	3,000 AGL	95 Variable	350	15.0	9500	44	15.0 deg, 9170 fpm, 44 sec
f	53,624	10,000 AGL	35 Variable	350	0.0	0	112	0.0 deg, 0 fpm, 112 sec
g	120,000	10,000 AGL	35 Variable	350				

Transient F-35A Flight Profile 221

Transient

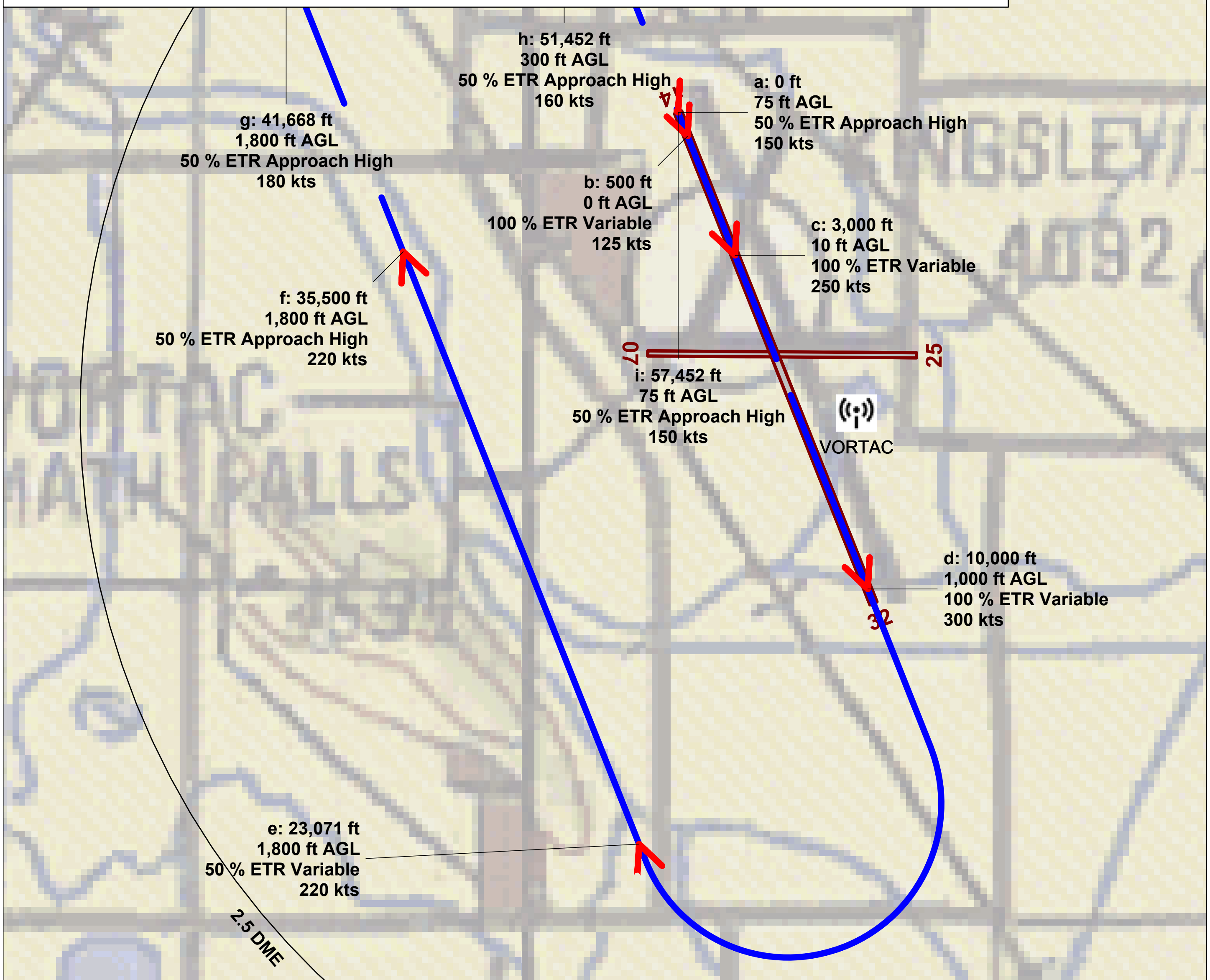
0 2,000 4,000 6,000 8,000 10,000 12,000

Scale in Feet 1:40,200 (1 inch = 3,350 feet)

N

Flight Profile 225

Point	Distance ft	Height ft	Power % ETR	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	75 AGL	50 Approach High	150	-8.5	-2100	2	-8.5 deg, -2070 fpm, 2 sec
b	500	0 AGL	100 Variable	125	0.2	100	8	0.2 deg, 80 fpm, 8 sec
c	3,000	10 AGL	100 Variable	250	8.0	3900	15	8.0 deg, 3900 fpm, 15 sec
d	10,000	1,000 AGL	100 Variable	300	3.5	1600	30	2.9 deg, 1320 fpm, 36 sec
e	23,071	1,800 AGL	50 Variable	220	0.0	0	33	0.0 deg, 0 fpm, 26 sec
f	35,500	1,800 AGL	50 Approach High	220	0.0	0	18	0.0 deg, 0 fpm, 13 sec
g	41,668	1,800 AGL	50 Approach High	180	-8.7	-2600	34	-7.5 deg, -2240 fpm, 40 sec
h	51,452	300 AGL	50 Approach High	160	-2.1	-600	23	-2.1 deg, -590 fpm, 23 sec
i	57,452	75 AGL	50 Approach High	150				Cross Threshold



Transient F-35A Flight Profile 225
Transient

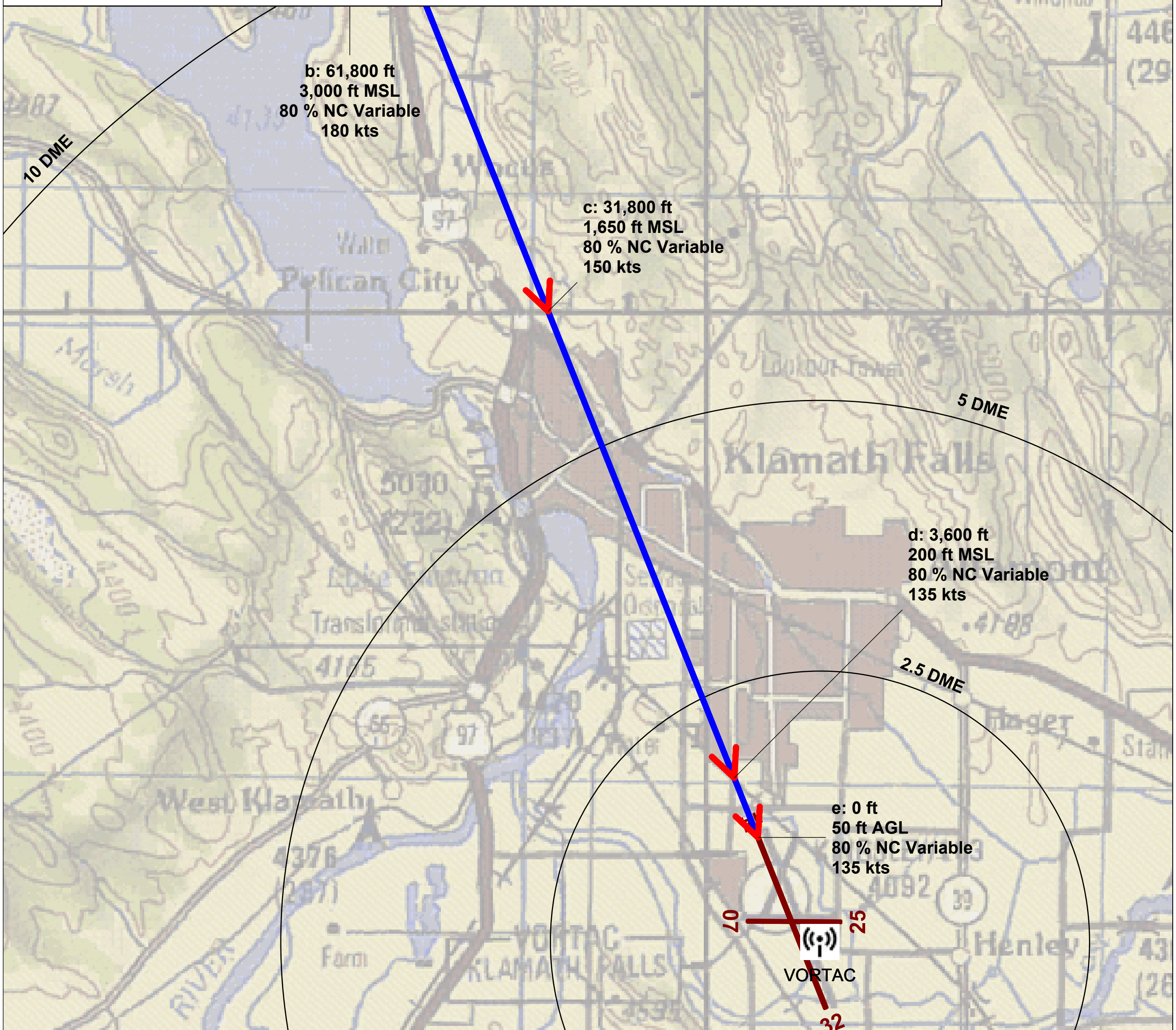
0 2,000 4,000 6,000 8,000 10,000 12,000

Scale in Feet 1:37,600 (1 inch = 3,140 feet)

N

Flight Profile 203

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	10,000 MSL	80 Variable	170	-6.9	-2100	197	-6.9 deg, -2120 fpm, 197 sec
b	61,800	3,000 MSL	80 Variable	180	-2.6	-800	108	-2.6 deg, -750 fpm, 108 sec
c	31,800	1,650 MSL	80 Variable	150	-2.9	-700	117	-2.9 deg, -740 fpm, 117 sec
d	3,600	200 MSL	80 Variable	135	47.6	15000	16	47.7 deg, 10100 fpm, 16 sec
e	0	50 AGL	80 Variable	135				



Transient KC-135R Flight Profile 203
Transient

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000

Scale in Feet 1:105,000 (1 inch = 8,780 feet)

Flight Profile 201

Point	Distance ft	Height ft	Power % NC	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	100 Variable	0	0.0	0	50	0.0 deg, 0 fpm, 50 sec
b	6,500	0 AGL	100 Variable	154	-30.0	-9800	21	-30.0 deg, -8460 fpm, 21 sec
c	12,300	750 MSL	100 Variable	180	3.5	1100	30	3.5 deg, 1100 fpm, 30 sec
d	21,400	1,300 MSL	100 Variable	180	4.7	2000	98	4.7 deg, 1940 fpm, 98 sec
e	60,000	4,500 MSL	100 Variable	285	7.1	3600	125	7.1 deg, 3580 fpm, 125 sec
f	120,000	12,000 MSL	100 Variable	285				

Transient KC-135R Flight Profile 201

Transient

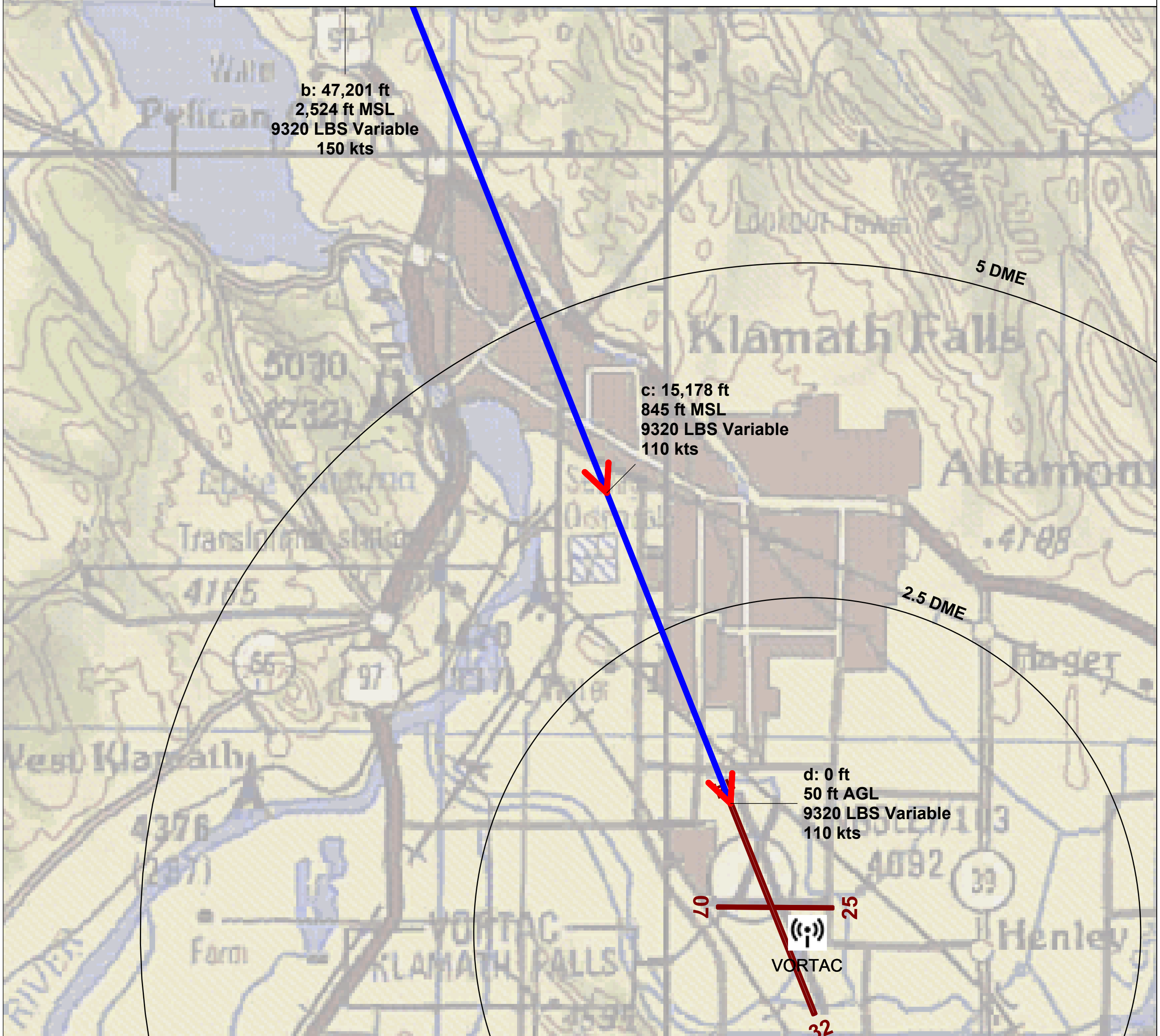
0 4,000 8,000 12,000 16,000 20,000 24,000 28,000

Scale in Feet 1:87,600 (1 inch = 7,300 feet)

N

Flight Profile 261

Point	Distance ft	Height ft	Power LBS	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	10,532 MSL	9320 Variable	170	-6.3	-1800	270	-6.3 deg, -1770 fpm, 270 sec
b	47,201	2,524 MSL	9320 Variable	150	-3.0	-700	146	-3.0 deg, -690 fpm, 146 sec
c	15,178	845 MSL	9320 Variable	110	12.3	2400	82	12.3 deg, 2370 fpm, 82 sec
d	0	50 AGL	9320 Variable	110				



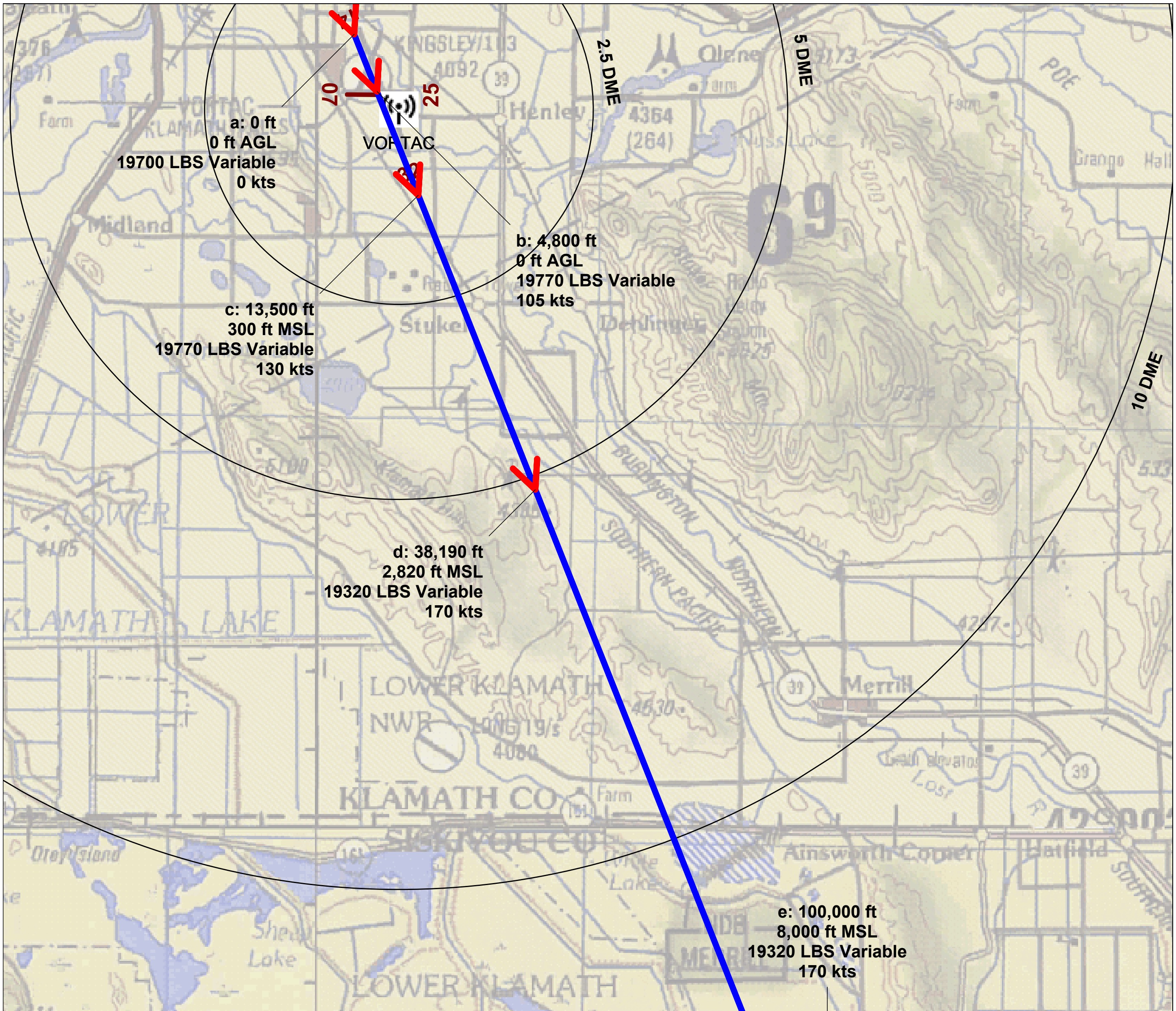
Transient MD-83 Flight Profile 261

Transient

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000

Scale in Feet 1:84,000 (1 inch = 7,000 feet)

N



Flight Profile 259

Point	Distance ft	Height ft	Power LBS	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	19700 Variable	0	0.0	0	54	0.0 deg, 0 fpm, 54 sec
b	4,800	0 AGL	19770 Variable	105	-23.6	-5200	44	-23.6 deg, -4760 fpm, 44 sec
c	13,500	300 MSL	19770 Variable	130	5.8	1600	98	5.8 deg, 1540 fpm, 98 sec
d	38,190	2,820 MSL	19320 Variable	170	4.8	1400	215	4.8 deg, 1440 fpm, 215 sec
e	100,000	8,000 MSL	19320 Variable	170	5.7	1700	70	5.7 deg, 1710 fpm, 70 sec
f	120,000	10,000 MSL	19320 Variable	170				

Transient MD-83 Flight Profile 259

Transient

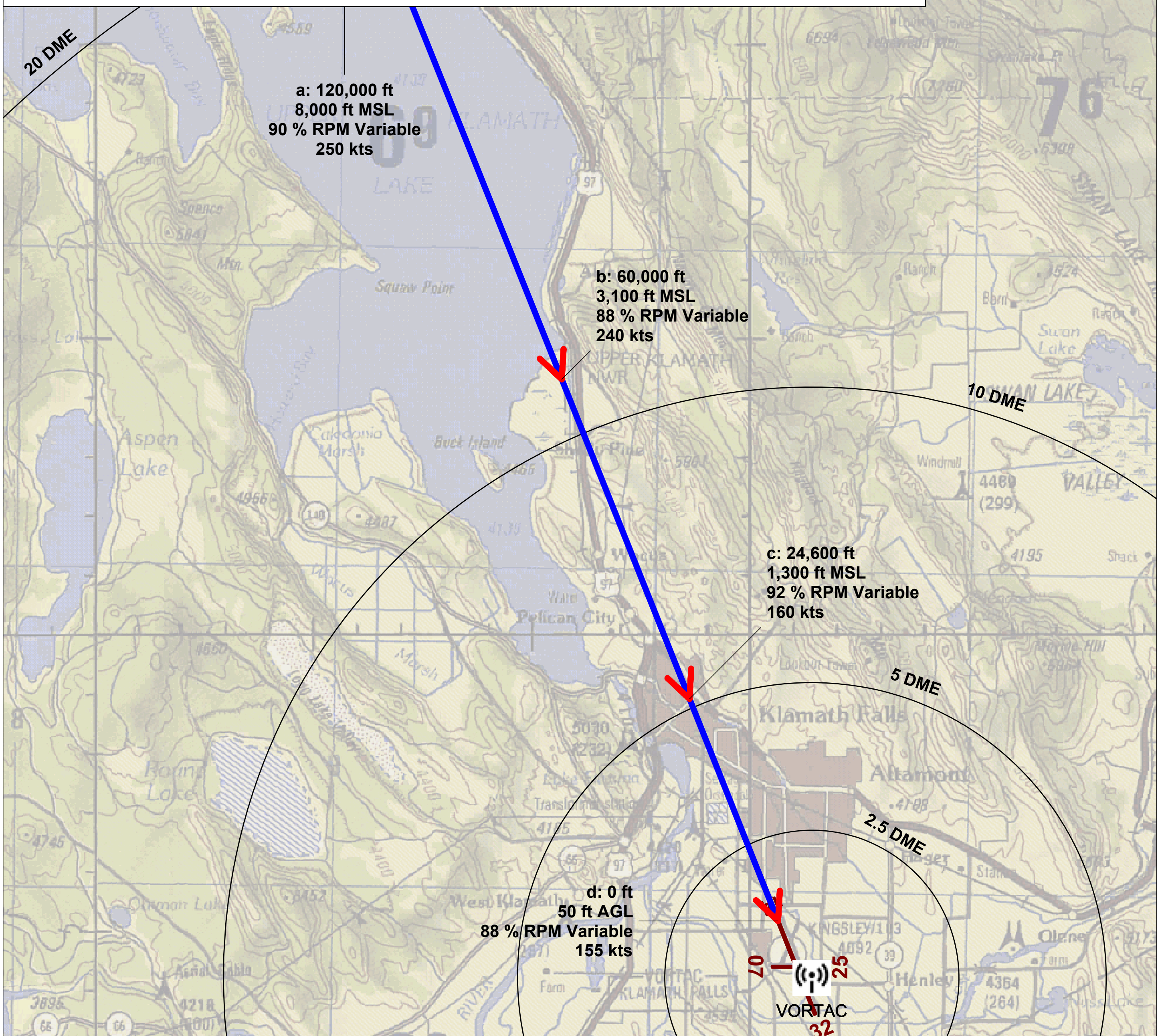
0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000 48,000 52,000

Scale in Feet 1:146,000 (1 inch = 12,200 feet)

N

Flight Profile 249

Point	Distance ft	Height ft	Power % RPM	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	8,000 MSL	90 Variable	250	-4.7	-2000	145	-4.7 deg, -2020 fpm, 145 sec
b	60,000	3,100 MSL	88 Variable	240	-2.9	-1000	105	-2.9 deg, -1030 fpm, 105 sec
c	24,600	1,300 MSL	92 Variable	160	6.6	1800	93	6.6 deg, 1840 fpm, 93 sec
d	0	50 AGL	88 Variable	155				



Transient T-38C Flight Profile 249
Transient

0 10,000 20,000 30,000 40,000 50,000 60,000

Scale in Feet 1:190,000 (1 inch = 15,900 feet)

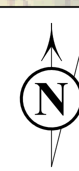
Flight Profile 247

Point	Distance ft	Height ft	Power % RPM	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	100 Max A/B	0	0.0	0	26	0.0 deg, 0 fpm, 26 sec
b	3,500	0 AGL	100 Afterburner	160	5.7	2100	19	5.7 deg, 2070 fpm, 19 sec
c	10,000	650 AGL	99 Variable	250	-28.4	-15100	13	-28.4 deg, -13260 fpm, 13 sec
d	16,000	1,500 MSL	99 Variable	300	7.1	3800	24	7.1 deg, 3770 fpm, 24 sec
e	28,000	3,000 MSL	99 Variable	300	7.8	4100	58	7.8 deg, 4110 fpm, 58 sec
f	57,300	7,000 MSL	99 Variable	300	7.6	4100	30	7.6 deg, 4020 fpm, 30 sec
g	72,300	9,000 MSL	99 Variable	300	8.2	4400	55	8.2 deg, 4340 fpm, 55 sec
h	100,000	13,000 MSL	99 Variable	300	19.3	10600	39	19.3 deg, 10040 fpm, 39 sec
i	120,000	20,000 MSL	96 Variable	300				

Transient T-38C Flight Profile 247

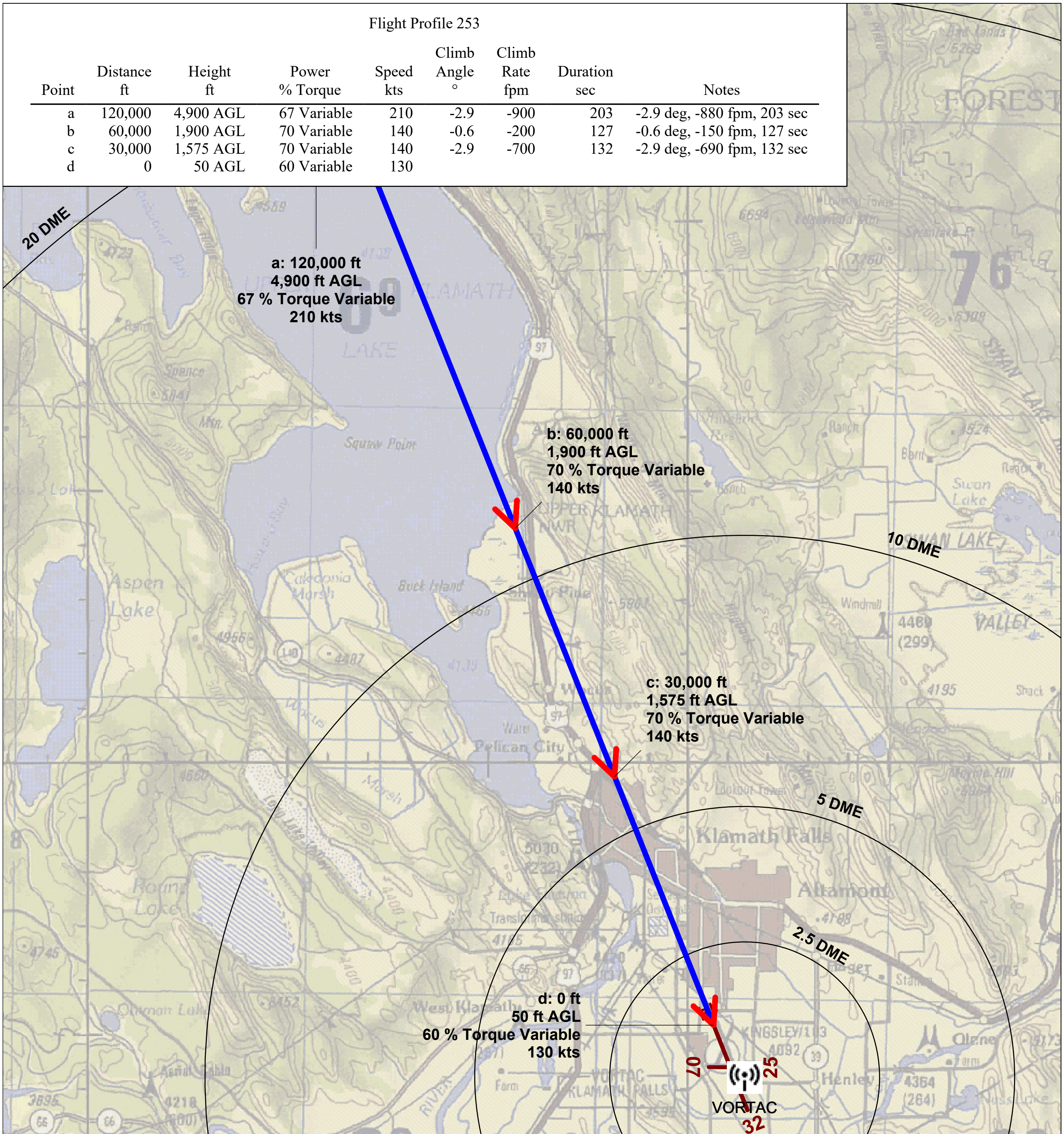
Transient

Scale in Feet 1:106,000 (1 inch = 8,800 feet)



Flight Profile 253

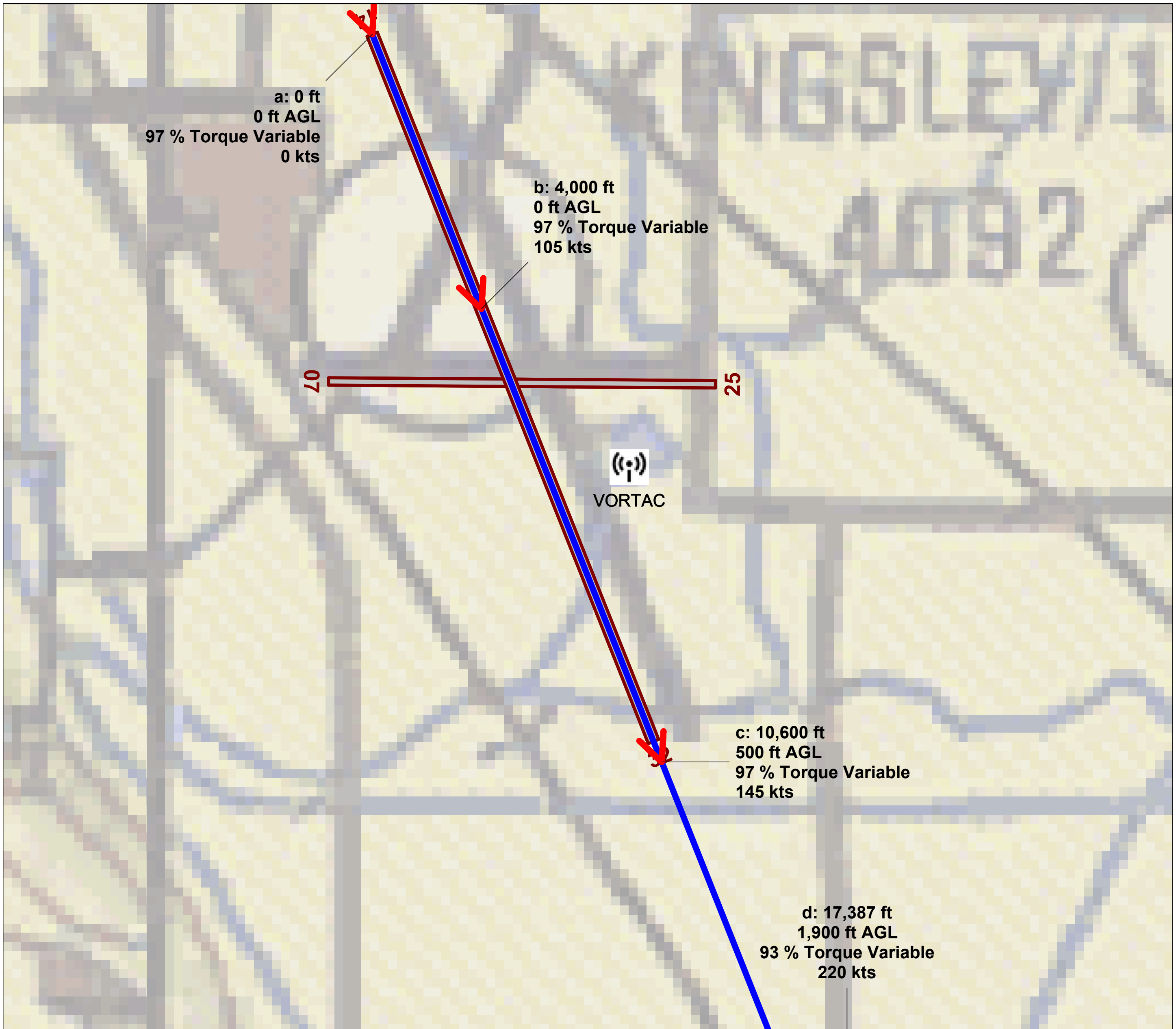
Point	Distance ft	Height ft	Power % Torque	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	120,000	4,900 AGL	67 Variable	210	-2.9	-900	203	-2.9 deg, -880 fpm, 203 sec
b	60,000	1,900 AGL	70 Variable	140	-0.6	-200	127	-0.6 deg, -150 fpm, 127 sec
c	30,000	1,575 AGL	70 Variable	140	-2.9	-700	132	-2.9 deg, -690 fpm, 132 sec
d	0	50 AGL	60 Variable	130				



Transient T-6 Flight Profile 253

Transient

Scale in Feet 1:190,000 (1 inch = 15,900 feet)



Flight Profile 251

Point	Distance ft	Height ft	Power % Torque	Speed kts	Climb Angle °	Climb Rate fpm	Duration sec	Notes
a	0	0 AGL	97 Variable	0	0.0	0	45	0.0 deg, 0 fpm, 45 sec
b	4,000	0 AGL	97 Variable	105	4.3	1000	31	4.3 deg, 960 fpm, 31 sec
c	10,600	500 AGL	97 Variable	145	11.7	3800	22	11.7 deg, 3730 fpm, 22 sec
d	17,387	1,900 AGL	93 Variable	220	4.0	1600	270	4.0 deg, 1570 fpm, 270 sec
e	120,000	9,000 AGL	90 Variable	230				

Transient T-6 Flight Profile 251

Transient

0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000

Scale in Feet 1:25,400 (1 inch = 2,120 feet)

N

Aircraft Operation, Runway, and Track Utilization

This page intentionally left blank.

Table A-1. Civilian Fleet Mix from FAA CY 2022 National Inventory by AEDT Equipment Type

AEDT Equipment ID	AEDT ANP Type	Representative Aircraft	Departures Day	Departures Night	Departures Total	Arrivals Day	Arrivals Night	Arrivals Total	Local Day	Local Night	Local Total
36	1900D	Raytheon Beech 1900-C, Raytheon Beech 1900-D, BAE Jetstream 1, BAE Jetstream 200 Series	10.8%	0.0%	10.8%	10.8%	0.0%	10.8%	12.8%	0.0%	12.8%
1193	BEC58P	Cessna 421 Piston, Britten-Norman BN-2 Islander, Britten-Norman BN-2A Series Mk III Trislander, Piper PA-31 Navajo, Rockwell Twin Commander 700, Cessna 337 Skymaster, Aerostar PA-60, Piper PA-23 Apache/Aztec, Piper PA-27 Aztec, Raytheon Beech Baron 58, Raytheon Beech 60 Duke, Cessna 310, Rockwell Twin Commander 500, Piper PA-34 Seneca, Rockwell Twin Commander 680, Cessna 340, Cessna 402, Cessna 404 Titan II, Cessna 414, Raytheon Beech 55 Baron, Beech 75 (FAS), Beech 95 (FAS), Beech E-55 (FAS), Beechcraft 56TC Baron (FAS), Beechcraft 76 Duchess, Beechcraft Queen Air 65/70/80 (FAS), Beechcraft Twin Bonanza (FAS), Cessna T303 Crusader (FAS), Cessna 320 (FAS), Cessna 335/340 (FAS), Tecnam P2012 Traveller, Cessna 401 (FAS), Cessna 401A (FAS), Cessna 401B (FAS), Cessna 411 (FAS), Cessna 411A (FAS), Beechcraft A56TC Baron (FAS), Rockwell Twin Commander 685, Rockwell Twin Commander 520, Rockwell Twin Commander 560	4.8%	0.1%	4.9%	4.8%	0.1%	4.9%	5.8%	0.0%	5.8%
1235	CIT3	Cessna 650 Citation III	0.3%	0.0%	0.3%	0.3%	0.0%	0.3%	0.0%	0.0%	0.0%
4284	CL600	Bombardier Challenger 600, Bombardier Challenger 300, Fokker (VFW) 614, Bombardier CRJ-100, Bombardier CRJ-200, Bombardier Challenger 604, Gulfstream G200, Bombardier CRJ-400, Bombardier CRJ-200-LR, Bombardier CRJ-200-ER, Bombardier CRJ-400-LR, Bombardier Challenger 605, Bombardier Challenger 850, Bombardier Challenger 601, Bombardier Challenger 350, Bombardier Challenger 650, Bombardier (Canadair) Challenger 800, Bombardier (Canadair) CRJ100PF Bulk Freighter, Bombardier (Canadair) CRJ200PF Bulk Freighter	0.3%	0.0%	0.3%	0.2%	0.0%	0.2%	0.0%	0.0%	0.0%
1242	CL601	Bombardier Challenger 601, Bombardier Challenger 602, Gulfstream G280, Bombardier Challenger 600, Bombardier (Canadair) CRJ200 ExecLiner, Bombardier (Canadair) CRJ200 328 Designs, Embraer Praetor 600	0.2%	0.0%	0.2%	0.2%	0.0%	0.2%	0.0%	0.0%	0.0%
1265	CNA172	Lancair 360, Aviat Husky A1B, Cessna 172 Skyhawk, Raytheon Beech D17S Staggerwing, Rans S7S, American Champion Cibrata (FAS), American Champion Scout (FAS), Cessna 170 (FAS), Cessna 175 (FAS), Cessna 177 (FAS), Piper PA-22-150 (FAS), Piper Pacer (FAS)	6.7%	0.4%	7.1%	6.9%	0.2%	7.1%	8.5%	0.0%	8.5%
1262	CNA182	Cessna 182, Cessna Aircraft Company 180F, Cessna 182 R (FAS), Cessna 185 Skywagon	2.9%	0.2%	3.0%	3.2%	0.0%	3.2%	3.6%	0.0%	3.6%
3172	CNA206	Cessna 206, Comp Air Aviation Comp Air 10, Comp Air Aviation Comp Air 10 XLT	0.5%	0.0%	0.5%	0.5%	0.0%	0.5%	0.6%	0.0%	0.6%
4677	CNA208	Pilatus PC-6 Porter, Piper PA46-TP Meridian, Pilatus PC-12, EADS Socata TBM-700, Cessna 208 Caravan, SOCATA TBM 850, DeHavilland DHC-3 Turbo Otter, EPIC LT/Dynasty, Extra EA-500, Quest Kodiak 100, Myasishchev M-101T, Pacific Aerospace P-750 XSTOL, DAHER TBM 900/930, DeHavilland DHC-2 Turbo Beaver, EMBRAER EMB-314 (FAS), Beechcraft T-6 Texan 2 (FAS), Socata TBM-9 (FAS), SCF Technoavia SM-92T	27.4%	4.6%	32.0%	26.9%	4.8%	31.7%	38.1%	0.0%	38.1%
1282	CNA441	Cessna 441 Conquest II, Piper PA-31T Cheyenne, Cessna 425 Conquest I, COMMANDER980/1000, Piaggio Aerospace P.180 Avanti, Cessna 421 Turboprop	0.1%	0.0%	0.1%	0.2%	0.0%	0.2%	0.1%	0.0%	0.1%
1289	CNA500	Cessna 500 Citation I, Cessna 501 Citation ISP	0.1%	0.0%	0.1%	0.2%	0.0%	0.2%	0.0%	0.0%	0.0%
6071	CNA510	Honda HA-420 Hondajet, CESSNA CITATION 510, Embraer Phenom 100 (EMB-500), EPIC Victory, Cirrus Vision SF50 (FAS), Embraer Legacy 450 (EMB-545)	1.5%	0.0%	1.5%	1.5%	0.0%	1.5%	0.0%	0.0%	0.0%
6061	CNA525C	Cessna CitationJet CJ3 (Cessna 525B), Cessna CitationJet CJ4 (Cessna 525C), Cessna CitationJet CJ2 (Cessna 525A), Cessna CitationJet CJ/CJ1 (Cessna 525)	2.6%	0.2%	2.8%	2.6%	0.2%	2.8%	0.0%	0.0%	0.0%
1294	CNA55B	Cessna 550 Citation II, Cessna S550 Citation S/II, Cessna 551 Citation IISP, Cessna 552 T-47A, Raytheon Premier I, Aerospatiale SN 601 Corvette, Cessna 550 Citation Bravo, Embraer Phenom 300 (EMB-505), Embraer Legacy 650, Pilatus PC-24, Embraer Legacy 500 (EMB-550)	1.2%	0.0%	1.2%	1.1%	0.0%	1.1%	0.0%	0.0%	0.0%
3045	CNA560E	Cessna 560 Citation Encore, Hawker Beechcraft Corp Beechjet 400A, Hawker Beechcraft Corp Beechjet 400T T-1A Jayhawk, Hawker Beechcraft Corp Nextant Aerospace 400NXT	0.2%	0.0%	0.2%	0.2%	0.0%	0.2%	0.0%	0.0%	0.0%
1298	CNA560U	Cessna 560 Citation V, Cessna 560 Citation Ultra	2.6%	0.2%	2.8%	2.4%	0.3%	2.7%	0.0%	0.0%	0.0%
6065	CNA560XL	Cessna 560 Citation Excel, Cessna 560 Citation XLS	0.8%	0.0%	0.8%	0.9%	0.0%	0.9%	0.0%	0.0%	0.0%
6386	CNA680	Cessna 680 Citation Sovereign, Cessna Citation Hemisphere, Cessna 680-A Citation Latitude, Cessna 700 Citation Longitude	0.4%	0.0%	0.4%	0.4%	0.0%	0.4%	0.0%	0.0%	0.0%
4766	CNA750	Cessna 750 Citation X, Dornier 328 Jet, Raytheon Hawker 4000 Horizon, Bombardier Learjet 60, CX 750 Citation X+, Dassault Falcon 2000-EX, Dassault Falcon 2000, Dassault Falcon 2000-LX, Embraer Praetor 500, Dassault Falcon 2000-DX	0.3%	0.0%	0.3%	0.2%	0.0%	0.2%	0.0%	0.0%	0.0%
1324	COMSEP	Cirrus SR20, 1985 1-ENG COMP, Cirrus SR22 Turbo (FAS), Cirrus SR22 (FAS)	2.5%	0.0%	2.6%	2.5%	0.0%	2.5%	3.0%	0.0%	3.0%
1349	DC1030	Boeing DC-10-30 Series, Boeing DC-10-30ER, Boeing MD-10-30	0.4%	0.0%	0.4%	0.4%	0.0%	0.4%	0.0%	0.0%	0.0%

AEDT Equipment ID	AEDT ANP Type	Representative Aircraft	Departures			Arrivals			Local		
			Day	Night	Total	Day	Night	Total	Day	Night	Total
1495	DHC6	BAE Jetstream 31, BAE Jetstream 32, BAE Jetstream 32-EP, Austrailia GAF N22/24 Nomad, SIAI-Marchetti SF-600 Canguro, CASA 212-200 Series, Raytheon Beech 18, Bombardier CL-415, Fairchild SA-227-AC Metro III, Xian Yunshuji Y-7, Embraer 312 Tucano, Grumman C-1 Trader, Fairchild Metro IVC, Embraer EMB110 Bandeirante, Israel IAI-201 Arava, Israel IAI-101 Arava, Neiva NE-821 Caraja, Harbin Y-12, Raytheon King Air 100, Raytheon King Air 90, Raytheon Beech 99, CASA 212-100 Series, Dornier 228-100 Series, Raytheon Super King Air 200, American Jet Hustler 400 A, DeHavilland DHC-6-300 Twin Otter, Reims-Cessna 406 Caravan II, DeHavilland DHC-6-100 Twin Otter, DeHavilland DHC-6-200 Twin Otter, Equator P-550 Turbo, Raytheon Super King Air 300, Ayres Turbo Thrush T-65, Dornier 128 Skyservant, Piaggio P-166, Raytheon Starship 2000, Rockwell Twin Commander 690, CASA 212-300 Series, Let 410, Let 410-UVP, Let 420 Tubolet, Mitsubishi MU-2, Fairchild SA-226-TC Metro II, Fairchild SA-227-AT Expeditor, Piaggio P.180 Avanti, Fairchild SA-26-T Merlin II, Grumman S-2E Tracker, Grumman G-21G Goose, C-26A, CASA 212-400 Series, Fairchild SA-226-T Merlin III, Shorts Skyvan SC7-3-1, Shorts Skyvan SC7-3-2, Shorts Skyvan SC7-3A-1, Antonov AN28 Cash, PZL M-28 Skytruck, Embraer EMB-121 Xingu, Evektor EV-55, Dornier Seastar CD-1/CD-2, Antonov An-2 MS, Antonov An-2 MS Freighter, Viking Air DHC-6-400 Guardian, CAIC China Aviation Industry Corp MA-60, CAIC China Aviation Industry Corp MA-600, SHERPA Sherpa K-650T, Grumman G-73 Mallard, Aero Commander 680 Turbo Commander, Gulfstream Gulfstream S-2T Marsh Airtanker	12.3%	1.3%	13.7%	12.4%	1.1%	13.5%	16.3%	0.0%	16.3%
6082	DHC8	ATR 42-400, ATR 42-500, Antonov 32 Cline, ATR 42-200, ATR 42-300, DeHavilland DHC-8-100, Bombardier de Havilland Dash 8 Q100, ATR 42-320, CASA 295, Antonov 24 Coke, Antonov 26 Curl, Antonov 30 Clank, Convair CV-440, Antonov 38-100, Antonov 38-110, Antonov 38-120, Beriev Be-12/Be-14, Alenia C-27J, Curtiss-Wright C-46, Convair CV-240/T-29, ATR 42-600	0.2%	0.0%	0.2%	0.2%	0.0%	0.2%	0.2%	0.0%	0.2%
3802	ECLIPSE500	Eclipse 500 / PW610F, Hawker Beechcraft Corp Beechjet 400A, SJ-30-1/-2/-2+, CIRRUS SF-50 Vision	0.6%	0.0%	0.6%	0.6%	0.0%	0.6%	0.0%	0.0%	0.0%
1708	EMB120	Embraer EMB120 Brasilia	0.2%	0.0%	0.2%	0.1%	0.1%	0.2%	0.2%	0.0%	0.2%
1320	FAL900EX	Dassault Falcon 50, Dassault Falcon 50-EX, Dassault Falcon 900, Dassault Falcon 900-B, Dassault Falcon 900-C, Dassault Falcon 900-EX, Falcon 900DX, Dassault Falcon 900-LX, Yakovlev 40 Codling	2.4%	0.3%	2.7%	2.2%	0.5%	2.7%	0.0%	0.0%	0.0%
6246	GASEPF	Robin DR 400, Robin R 2160 Alpha Sport, Robin R 3000, EADS Socata TB-9 Tampico, Cessna 150 Series, Piper PA-28 Cherokee Series, Aero Commander (Single engine) (FAS), Aeronca 15 Sedan (FAS), Beech 23 Musketeer Sundowner (FAS), Beech 24 Musketeer Super Sierra (FAS), Beech 77 Skipper (FAS), Beechcraft Musketeer Model 19 (FAS), Cessna 140 (FAS), Cessna 152 (FAS), Cessna 162 (FAS), Cozy (FAS), Diamond DV-20 Katana (FAS), Diamond HK36 Super Dimona (FAS), GC1 Globe Swift (FAS), Grob G115A/B/C/D/E Bavarian (FAS), Grumman AA-5A/B (FAS), Gulfstream American GA-7 Cougar (FAS), Lancair 320 (FAS), Piper J-3 Cub (FAS), Piper PA-18-150 (FAS), Piper PA-38 Tomahawk (FAS), Sequoia Falco (FAS), Stinson (FAS), Vans RV12 (FAS), Vans RV3 (FAS), Vans RV4 (FAS), Velocity (FAS), Zenair CH-100/150/250 (FAS)	3.1%	0.2%	3.3%	3.4%	0.0%	3.4%	3.9%	0.0%	3.9%
1276	GASEPV	Maule MT-7-235, Ryan Navion B, Ryan Navion F, Piper PA-32 Cherokee Six, Boeing Stearman PT-17 / A75N1, Ryan ST3KR, Raytheon Beech Bonanza 36, Cessna 210 Centurion, ATI AT-802, ATI AT-502, ATI AT-502A, ATI AT-602, Helio U-10 Super Courier, Ayres S2R-T34 Turbo-Thrush, ATI AT-502B, Mooney M20-K, EADS Socata TB-10 Tobago, Spencer S-12 Air Car, Piper PA-24 Comanche, EADS Socata TB-20 Trinidad, DeHavilland DHC-2 Beaver, DeHavilland DHC-3 Otter, Piper PA46 (Piston), Beechcraft Bonanza 33 (FAS), Beechcraft Bonanza 35 (FAS), Beechcraft T-34 Mentor (FAS), Bellanca 8 Scout Super Decathlon (FAS), Bellanca Viking (FAS), Cessna 177 Cardinal RG (FAS), Cessna 180 (FAS), Cessna 190 (FAS), Cessna 195 (FAS), Cessna 205 (FAS), Cessna 207 (Turbo) Stationair (FAS), Cessna 210 Turbo (FAS), Cessna 400 (FAS), Columbia Aircraft Lancair (COL3/4 All Types) (FAS), Commander 114/115 (FAS), Diamond DA40, EAGLE DW-1 Eagle (FAS), Express 2000 (FAS), EXTRA EA-300 (FAS), GippsAero GA8 Airvan (FAS), Glasair (FAS), Lancair ES (FAS), Lancair Evolution (FAS), Lancair Legacy 2000 (FAS), Meyers Aero Commander 200 (FAS), Model 35 Bonanza (FAS), North American T-6 Texan (FAS), Piper PA-36 Pawnee Brave (FAS), Piper PA46 Malibu (FAS), Pitts Special S-1 (FAS), Vans RV10 (FAS), Vans RV6 (FAS), Vans RV-7, Vans RV8 (FAS), Vans RV9 (FAS), Zlin Aircraft Z 143 L	5.4%	0.1%	5.6%	5.7%	0.0%	5.7%	6.6%	0.0%	6.6%
5273	GIV	Gulfstream G300, Gulfstream G350, Gulfstream G400, Gulfstream G450, Gulfstream IV-SP, Falcon 7X, Dassault Falcon 8X	0.2%	0.0%	0.2%	0.2%	0.0%	0.2%	0.0%	0.0%	0.0%
1925	GV	Gulfstream G-5 Gulfstream 5 / G-5SP Gulfstream G500, Gulfstream G550, Gulfstream V-SP, Gulfstream Aerospace Gulfstream G500 (G-7), Gulfstream G600	0.1%	0.0%	0.1%	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%
2014	LEAR35	Rockwell Sabreliner 65, Lockheed L-1329 Jetstar I, Lockheed L-1329 Jetstar II, Hawker HS-125 Series 1, Raytheon Hawker 1000, Hawker HS-125 Series 3, Hawker HS-125 Series 400, Hawker HS-125 Series 700, Raytheon Hawker 800, Dassault Falcon 100, Dassault Falcon 10, Hawker HS-125 Series 600, Bombardier Learjet 55, Bombardier Learjet 60, Bombardier Learjet 31, Bombardier Learjet 35, Bombardier Learjet 36, Bombardier Learjet 40, Bombardier Learjet 45, Bombardier Learjet 45-XR, Raytheon Hawker 900, Raytheon Hawker C-29A, Bombardier Learjet 35A/36A (C-21A), Hawker 900XP, Bombardier Learjet 70, Bombardier Learjet 75	1.0%	0.0%	1.0%	1.0%	0.0%	1.0%	0.0%	0.0%	0.0%
2104	PA30	Vulcanair P.68, Piper PA-30 Twin Comanche, Diamond DA42 Twin Star, Diamond DA62, Piper PA44 (FAS), Piper PA-44-180 (FAS), Tecnam P2006T (FAS), Piper PA-44-180T (FAS)	0.2%	0.0%	0.2%	0.2%	0.0%	0.3%	0.2%	0.0%	0.2%
20	S70	Sikorsky SH-60 Sea Hawk, Sikorsky UH-60 Black Hawk, Sikorsky S-92	0.2%	0.0%	0.2%	0.2%	0.0%	0.2%	0.0%	0.0%	0.0%
		Total	92.3%	7.7%	100.0%	92.4%	7.6%	100.0%	100.0%	0.0%	100.0%

Table A-2. Departure Stagelength Distribution from FAA CY 2022 National Inventory by AEDT Equipment Type

AEDT Equipment ID	AEDT ANP Type	Stagelength Distribution														
		1		2		3		4		5		6		7		
		Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Total
36	1900D	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
1193	BEC58P	98.3%	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
1235	CIT3	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
4284	CL600	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
1242	CL601	80.0%	20.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
1265	CNA172	94.0%	6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
1262	CNA182	94.9%	5.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
3172	CNA206	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
4677	CNA208	85.6%	14.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
1282	CNA441	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
1289	CNA500	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
6071	CNA510	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
6061	CNA525C	92.5%	7.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
1294	CNA55B	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
3045	CNA560E	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
1298	CNA560U	94.0%	6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
6065	CNA560XL	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
6386	CNA680	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
4766	CNA750	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
1324	COMSEP	98.1%	1.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
1349	DC1030	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
1495	DHC6	90.3%	9.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
6082	DHC8	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
3802	ECLIPSE50	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
1708	EMB120	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
1320	FAL900EX	46.8%	1.5%	7.8%	0.0%	3.2%	1.5%	29.7%	9.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
6246	GASEPF	94.1%	5.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
1276	GASEPV	97.8%	2.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
5273	GIV	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
1925	GV	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2014	LEAR35	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
2104	PA30	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
20	S70	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%

Table A-3. Civilian and Military Runway Utilization (All Scenarios)

Op Type	*Runway[1]*	*Utilization*				
		Based F-15C/D, F-35A	*ADAIR F-5*	*Transient Mil*	*Civilian (Small Propeller GA)*	*Civilian (AC, AT, and all other GA)*
Departures	14	50%	50%	50%	40%	50%
	32	50%	50%	50%	40%	50%
	7	0%	0%	0%	10%	0%
	25	0%	0%	0%	10%	0%
SI Arrival	14	50%	35%	50%	40%	50%
	32	50%	65%	50%	40%	50%
	7	0%	0%	0%	10%	0%
	25	0%	0%	0%	10%	0%
Break Arrival	14	50%	50%	50%	N/A	N/A
	32	50%	50%	50%	N/A	N/A
	7	0%	0%	0%	N/A	N/A
	25	0%	0%	0%	N/A	N/A
T&G	14	50%	50%	50%	40%	N/A
	32	50%	50%	50%	40%	N/A
	7	0%	0%	0%	10%	N/A
	25	0%	0%	0%	10%	N/A
GCA Box	14	N/A	N/A	N/A	N/A	N/A
	32	N/A	N/A	N/A	N/A	N/A
	7	N/A	N/A	N/A	N/A	N/A
	25	N/A	N/A	N/A	N/A	N/A

Note: [1]Runway 07 and 25 are planned to be renamed to 08 and 26 when the surfaces are repaved.
[2]Small Propeller GA includes ANP Modeled Types: CNA172, COMSEP, PA30, BEC58P, CNA182, CNA206, GASEPF, GASEPV.

Legend: ADAIR = Adversary Air; ANGB = Air National Guard Base; GASEPF/V = general aviation single-engine fixed pitch propeller, general aviation single-engine variable pitch propeller; GCA = ground-controlled approach; Mil = military; Op = operations; SI = Straight-In; T&G = Touch and Go.

Table A-4. Modeled Military Flight Track Utilization

Rwy	*Track IDs*	*Descriptions*	*F-15C/D*	*F-5E/F*	*F-35A*
Departures					
14	14D1A	First turn	38%	38%	38%
	14D1B	Second turn	38%	38%	38%
	14D2	LATER TURN TO 090 DEG HEAD	19%	19%	19%
	14D3	TURN TO 260 DEG TO OCEAN RANGES	5%	5%	5%
32	32D1A	First turn	38%	38%	38%
	32D1B	Second turn	38%	38%	38%
	32D2	LATER TURN TO 090 DEG HEAD	19%	19%	19%
	32D3	TURN TO 260 DEG TO OCEAN RANGES	5%	5%	5%
Arrivals					
14	14A1OHE	RWY 14_1 OVERHEAD WEST	5%	5%	4%
	14A1OHW	RWY 14-1 OVERHEAD EAST	21%	21%	17%
	14A4TC90EL	TAC 90 EAST LEAD	7%	7%	6%
	14A4TC90EW	TAC 90 EAST WING	3%	3%	2%
	14A4TC90WL	TAC 90 WEST LEAD	29%	29%	24%
	14A4TC90WW	TAC 90 WEST WING	10%	10%	8%
	14A2	ILS (includes PFO for F-35)	20%	20%	26%
	14A3	TACAN or VOR	5%	5%	4%
	14AWPFO	PFO overhead break track	0%	0%	9%
32	32A1OHE	RWY 32_1 OVERHEAD EAST	5%	5%	4%
	32A1OHW	RWY 32_1 OVERHEAD WEST	21%	21%	17%
	32A4TC90EL	TAC 90 EAST LEAD	7%	7%	6%
	32A4TC90EW	TAC 90 EAST WING	3%	3%	2%
	32A4TC90WL	TAC 90 WEST LEAD	29%	29%	24%
	32A4TC90WW	TAC 90 WEST WING	10%	10%	8%
	32A2	ILS (includes PFO for F-35)	13%	13%	19%
	32A3	TACAN or VOR	12%	12%	10%
	32AWPFO	PFO overhead break track	0%	0%	9%
Closed Patterns					
14	14C1E	RWY 14 EAST	20%	20%	20%
	14C1W	RWY 14 WEST	80%	80%	78%
	14PFO	PFO closed pattern	0%	0%	2%
32	32C1E	RWY 32 EAST	20%	20%	20%
	32C1W	RWY 32 WEST	80%	80%	78%
	32PFO	PFO closed pattern	0%	0%	2%

Legend: DEG = degrees; ILS = Instrument Landing System; PFO = Precautionary Flameout; RWY = Runway; TACAN = Tactical Air Navigation System; VOR = Very High Frequency Omnidirectional Range.

Table A-5. Modeled Civil Flight Track Utilization

Rwy	*Track IDs*	*Descriptions*	*Small Prop GA[1]*	*AC, AT, and other GA*
Departures				
14	14D4	Straight Departure	56%	100%
	14D11	Dep to Practice Area	44%	0%
32	32D4	Straight Departure	56%	100%
	32D11	Dep to Practice Area	44%	0%
7	07D1	Straight Departure	100%	100%
25	25D1	Straight Departure	100%	100%
Arrivals				
14	14A2	Straight Arrival	56%	100%
	14A11	Arrive from Practice Area	44%	0%
32	32A2	Straight Arrival	56%	100%
	32A11	Arrive from Practice Area	44%	0%
7	07A1	Straight Arrival	100%	100%
25	25A1	Straight Arrival	100%	100%
Closed Patterns				
14	14C1	Touch and Go	100%	100%
32	32C1	Touch and Go	100%	100%
7	07C1	Touch and Go	100%	100%
25	25C1	Touch and Go	100%	100%

Note: [1]Small Propeller GA includes ANP Modeled Types: CNA172, COMSEP, PA30, BEC58P, CNA182, CNA206, GASEPF, GASEPV.
Legend: AC = Air Carrier; AT = Air Taxi; GA = General Aviation; ID = Identification; Rwy = Runway.