



Paine Field Master Plan 2040

Chapter 7 | Airport Plans

7

May 2024

PREPARED FOR
Snohomish County

PREPARED BY
Landrum & Brown, Incorporated



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7 Airport Plans

7.1 Introduction

The Paine Field (PAE) Master Plan 2040 has evolved through the analytical efforts described in previous chapters. The information in Chapter 6, *Development Plan*, presents the recommended Master Plan projects grouped into three phases that correspond to the Planning Activity Levels (PALs) presented in Chapter 4, *Facility Requirements*.

This chapter presents the preferred PAE development plan in a set of detailed drawings, referred to as the Airport Layout Plan (ALP) set. These drawings depict the recommendations for the airfield layout, disposition of obstructions, and future use of land at PAE. This set of plans includes the following drawings that are presented in reduced format at the end of this chapter:

- Sheet 01: Cover Sheet
- Sheet 02: Data Sheet
- Sheet 03: Existing Airport Layout Plan (ALP)
- Sheet 04: Future Airport Layout Plan (ALP) Overall
- Sheet 05: Airspace Overall (Part 77)
- Sheet 06: Airspace Horizontal (Part 77)
- Sheet 07: Airspace Horizontal Surface Obstacles (Part 77)
- Sheet 08: Runway and Approach Profiles
- Sheet 09: Inner Portion of the Approach Surface – Runway 16R
- Sheet 10: Inner Portion of the Approach Surface – Runway 34L
- Sheet 11: Inner Portion of the Approach Surface - Runway 16L-34R
- Sheet 12: Runway Departure Surface - Runway 16R-34L
- Sheet 13: Runway Departure Surface - Runway 16L-34R
- Sheet 14: On Airport Land Use
- Sheet 15: Off Airport Land Use
- Sheet 16: Exhibit 'A' Airport Property Map and Data Tables

The ALP set has been prepared in accordance with Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5300-13B, *Airport Design*, the FAA Standard Operating Procedure (SOP) 2.00, *Standard Procedure for FAA Review and Approval of Airport Layout Plans (ALPs)* and the FAA Standard Operating Procedure 3.00 for FAA Review of Exhibit 'A' Airport Property Inventory Maps.

7.2 Airport Layout Plan Drawings Set

The following subsections describe the major components of the ALP drawings set. The ALP set is a sponsor-obligating document used in the FAA's review of airport development grant applications under the Airport Improvement Program (AIP). The FAA refers to the ALP set in its review of proposed construction projects that may affect navigable airspace. The ALP set also serves as a planning tool for use by surrounding jurisdictions to address land use, zoning, and resource planning issues.

7.2.1 Sheet 1: Cover Sheet

The Cover Sheet (**Exhibit 7-1**) serves as an introduction to the PAE plans set. It includes the following:

- Name of the Airport
- Name of the Study
- Period of the Study
- Index of the Included Drawings
- Approval Blocks

7.2.2 Sheet 2: Airport Data Sheet

This sheet as shown in **Exhibit 7-2** provides basic airport and runway data tables associated with the existing and future airport layout. The Airport Data Sheet includes the following information:

- Existing Taxiway Data
- Proposed Taxiway Data
- Airport Data
- Runway Data
- Declared Distance Data
- Acronym Table
- Wind Coverage Table

7.2.3 Sheets 3 and 4: Airport Layout Plans

The ALP drawings graphically present the existing and future airport facility layout. These sheets depict the recommended improvements that will enable PAE to meet the forecast demand through the 20-year planning period.

The Existing ALP (Sheet 3), as graphically depicted in **Exhibit 7-3**, is a base drawing that depicts the existing airport facilities operational as of the end of 2022. As shown in **Exhibit 7-4**, the Future ALP (Sheet 4) provides the proposed airport improvements for both the airside and landside areas “on top of” the existing airport facilities.

The Future ALP shows the proposed phasing for the future projects. These phases are described as Planning Activity Levels (PALs):

- PAL 1 = 1.0 Million Annual Passengers
- PAL 2 = 1.5 Million Annual Passengers
- PAL 3 = 4.3 Million Annual Passengers

7.2.4 Sheets 5 through 7: Federal Aviation Regulation (FAR) Part 77 Airspace Plan and Obstruction Data Tables

Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace*, prescribes airspace standards that establish criteria for evaluating navigable airspace around airports. As shown in **Exhibit 7-5** through **Exhibit 7-7**, these sheets present FAR Part 77 standards and their relationship to the

physical features and terrain on and around PAE. The FAR Part 77 surfaces and limiting heights and evaluations for future development adjacent to PAE are shown on this sheet.

The intent of FAR Part 77 is to protect the airspace and approaches to each runway from hazards that could affect the safe and efficient operation of aircraft. These federal criteria have also been established for use by local jurisdictions to control the height of objects in an airport vicinity. For example, FAR Part 77 can be utilized in zoning ordinances to enhance area land use compatibility.

These drawings are also used to identify potential obstructions that are located within the imaginary surfaces of an airport. Ideally, an obstruction should be removed or lowered beneath the imaginary Part 77 surfaces. In some cases, it is appropriate to mark and light the obstruction in accordance with FAA AC 70/7460-1M, *Obstruction Marking and Lighting*. All obstructions must be reviewed by the FAA to determine if they are a hazard to air navigation and to determine which course of action is appropriate. Sheet 5 shows the entire Part 77 surfaces, while Sheet 6 zooms in to show more detail.

The FAR Part 77 imaginary surfaces are established relative to an airport and its runway system. The size of each imaginary surface is based on the runway approach category (visual, non-precision, or precision). Each of the Part 77 surfaces is described as follows:

Primary Surface: The primary surface is located closest to the runway environment. It is a rectangular area symmetrically located above each runway centerline and extends a distance of 200 feet beyond each runway threshold. Its elevation is the same as the runway centerline at a point perpendicular to the runway centerline. The width of the primary surface depends on the type of runway approach capability (visual, non-precision, or precision). All existing PAE runways have precision approach capability.

The primary surface must remain clear of most objects to allow unobstructed passage of aircraft. Objects are only permitted if they are no taller than two feet above the ground, and if they are constructed on frangible (breakaway) mounts. The only exception to this rule is for objects for which location is “fixed by function,” such as navigational and visual aid facilities (glide slope, precision approach path indicator, windsock, etc.).

Approach Surface: An approach surface is also established for each runway end. The approach surface has the same inner width as the primary surface, and then flares (widens) as it rises upward and outward along the extended runway centerline. The approach surface begins 200 feet beyond the runway end. The slope of the rise and the length of the approach surface is dictated by the type of approach available to the runway (visual, non-precision or precision), and by the approach category of the aircraft for which the runway is designed. Runway 16R at PAE has the only precision approach capability while Runway 34L has non-precision approach capabilities. Runway 16L–34R has visual approaches only at both ends.

Transitional Surface: Each runway has a transitional surface that begins at the outside edge of the primary surface, and at the same elevation as the runway centerline. There are three transitional surfaces: the first is off the sides of the primary surface, the second is off the sides of the approach surface, and the third is outside of the conical surface and pertains to precision

runways only. The transitional surface rises at a slope of one foot vertically for each seven feet of horizontal distance (7:1) up to a height that is 150 feet above the highest runway elevation.

Horizontal Surface: The horizontal surface is established at 150 feet above the published airport elevation. This is an oval-shaped flat surface that connects the transitional and approach surfaces to the conical surface at a distance of 10,000 feet from the primary surface.

Conical Surface: The conical surface begins at the outer edge of the horizontal surface. The conical surface continues for a distance of 4,000 feet horizontally at a slope of a one foot rise for each 20 feet of horizontal distance (20:1).

7.2.5 Sheet 8: Runway Centerline and Approach Profiles

This sheet (**Exhibit 7-8**) shows the centerline profiles for the two existing runways at PAE. This drawing also includes the composite profile out to the limits of the Part 77 approach surfaces.

7.2.6 Sheets 9 through 11: Inner Portion of the Approach Surface

As depicted on **Exhibits 7-9** through **7-11**, these sheets show the inner portion of the approach surface plan and profile views of the approaches to each of the existing runways. The plan and profile views facilitate identification of obstructions located within the areas that should be void of objects that may endanger safe aircraft flight during takeoff and landing. A database of obstructions both manmade and naturally occurring are included on each sheet.

7.2.7 Sheets 12 and 13: 40:1 Departure Surface Drawings

Shown in **Exhibits 7-12** and **7-13**, the 40:1 Runway Departure Surface drawings show both the plan and profile views for each of the departure surfaces as shown on the ALP. Departure surfaces, when clear, allow pilots to follow standard departure procedures. It is important for airports to identify and remove these obstacles whenever possible to enhance takeoff procedures. It is also important to control the departure surface to prevent new obstacles. A database of obstructions both manmade and naturally occurring are included on each sheet.

7.2.8 Sheets 14 and 15: On and Off-Airport Land Use Plans - Existing & Future

The purpose of developing the on-airport land use plan shown on Sheet 14 is to achieve an arrangement of land uses within an airport's boundary best utilizing available property for existing and future airport needs (see **Exhibit 7-14**). An airport's land uses should be compatible with the surrounding environment. The Future Airport Land Use Plan for PAE provides adequate growth for all airport functions and provides for the potential to develop non-aviation related development that could generate additional revenue for PAE.

Sheet 15 of this plan set presents the off-airport land use plan overlaid by aircraft noise contours (see **Exhibit 7-15**). The purpose of the off-airport land use plan is to guide the future development of the property in the vicinity of PAE to ensure that incompatible uses are not developed in areas that are potentially affected by airport operations. This plan should be used by municipal planners to develop the appropriate zoning regulations and for the approval of future off-airport development proposals.

7.2.9 Sheet 16: Exhibit 'A' Airport Property Map

The purpose of an Exhibit 'A' Airport Property Map is to represent all real property currently owned and previously owned by an airport. Specific data is maintained for each numbered parcel presented in the Exhibit 'A'. The data includes physical description of parcel, grantee information, type of interest acquired, and public land record references. The Exhibit 'A' also includes information such as project number, specific to FAA funded projects. The Exhibit 'A' is maintained by PAE and must be provided to the FAA to receive funding for airport projects. A database of the Exhibit 'A' Property Map information is shown in tables on Sheet 16 (see **Exhibit 7-16**).

Exhibit 7-1 Cover Sheet

LOCATION MAP
NTS

AIRPORT LAYOUT PLAN FOR PAINE FIELD

Snohomish County, Washington
May 2024

INDEX OF SHEETS	
Sheet Number	Sheet Title
01	COVER SHEET
02	AIRPORT DATA
03	EXISTING AIRPORT LAYOUT PLAN
04	FUTURE AIRPORT LAYOUT PLAN
05	FAR PART 77 AIRSPACE PLAN
06	FAR PART 77 AIRSPACE PLAN - HORIZONTAL SURFACE
07	FAR PART 77 OBSTACLE TABLES
08	FAR PART 77 - RUNWAY AND APPROACH PROFILES
09	INNER PORTION OF THE APPROACH SURFACE - 16R
10	INNER PORTION OF THE APPROACH SURFACE - 34L
11	INNER PORTION OF THE APPROACH SURFACE - 16L-34R
12	DEPARTURE SURFACE - 16R-34L
13	DEPARTURE SURFACE - 16L-34R
14	FUTURE ON-AIRPORT LAND USE
15	FUTURE OFF-AIRPORT LAND USE
16	EXHIBIT A - AIRPORT PROPERTY MAP

VICINITY MAP
NTS

FAA LETTER OF APPROVAL
1 OF 2

FAA LETTER OF APPROVAL
2 OF 2

FAA, Tim House	Date:
Airport Sponsor:	Date:
Consultant: Michael Tubridy, Vice President	Date:

Revision Description	Date	By

COVER SHEET

AIRPORT LAYOUT PLANS PACKAGE

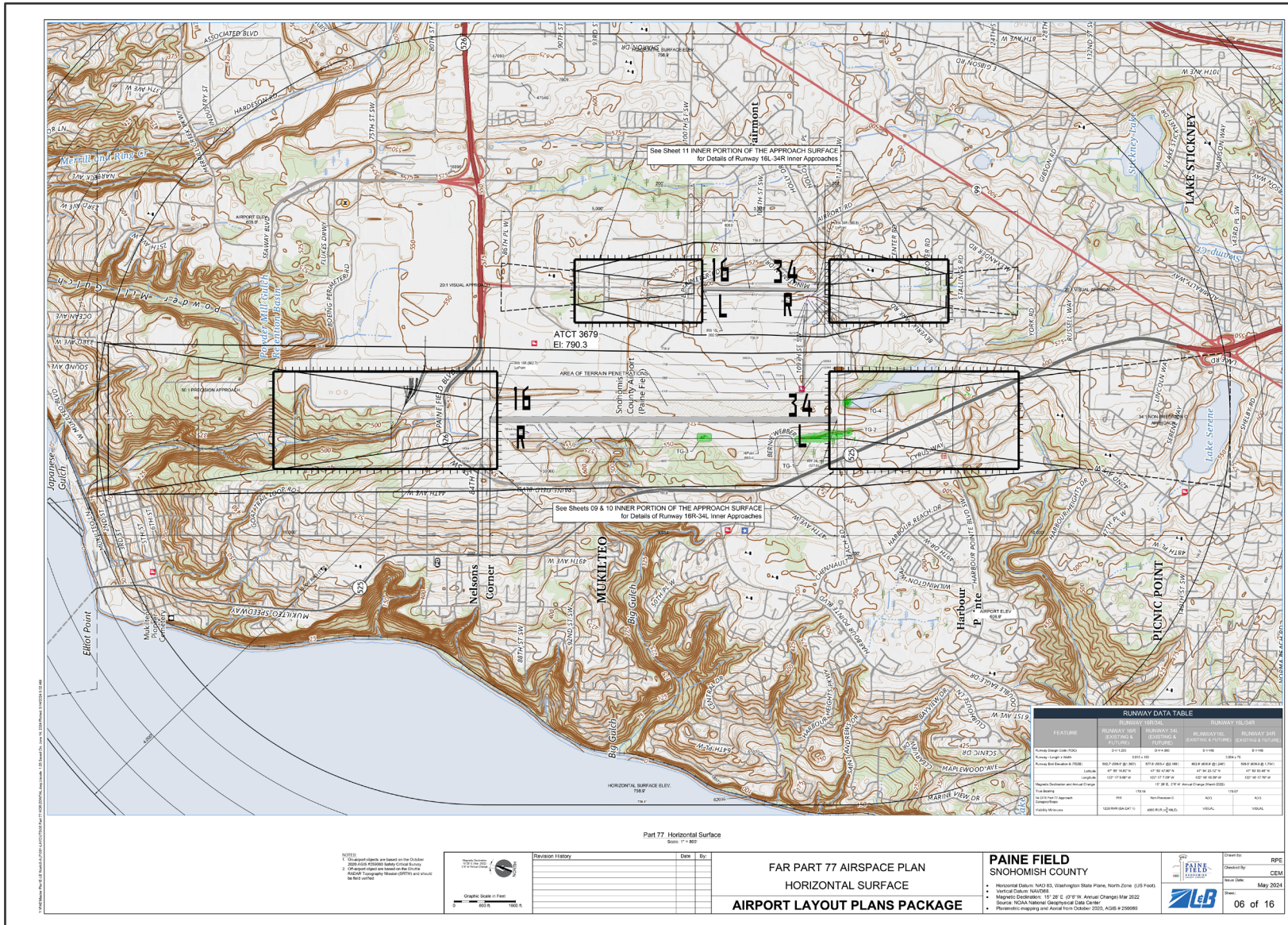
PAINE FIELD
SNOHOMISH COUNTY

- Horizontal Datum: NAD 83, Washington State Plane, North Zone (US Feet)
- Vertical Datum: NAVD83
- Magnetic Declination: 1° 28' E, 07/01/2024 Annual Change/May 2022
- Source: NOAA National Geophysical Data Center
- Photometric Imaging and Aerial from October 2020, AGES # 200085

	Drawn by: RPE Checked by: CEM Issue Date: May 2024 Sheet: 01 of 16
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Source: Landrum & Brown

Exhibit 7-6 Part 77 Airspace Plan – Horizontal Surface



Source: Landrum & Brown

Exhibit 7-8 Runway Centerline and Approach Profiles

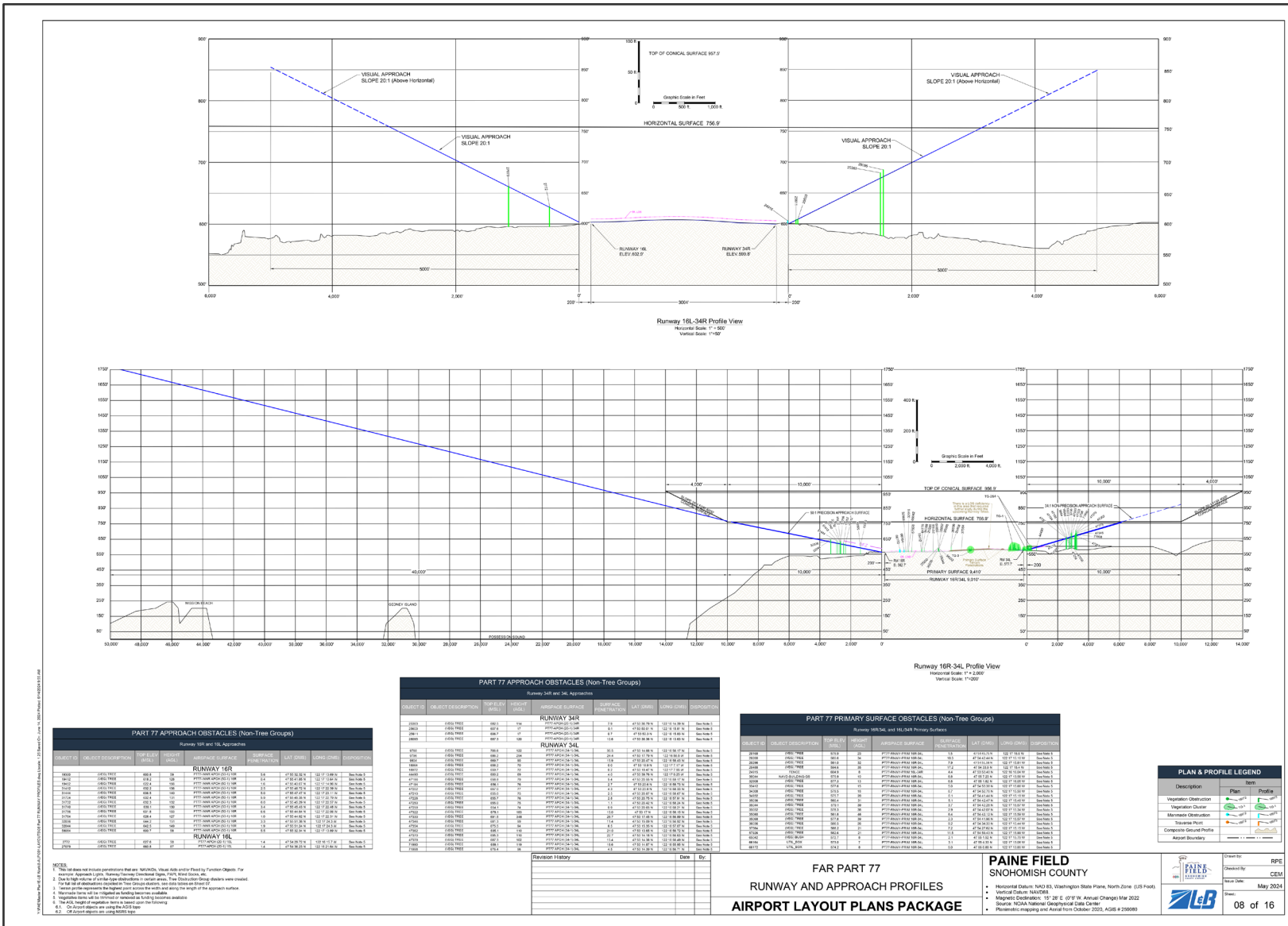
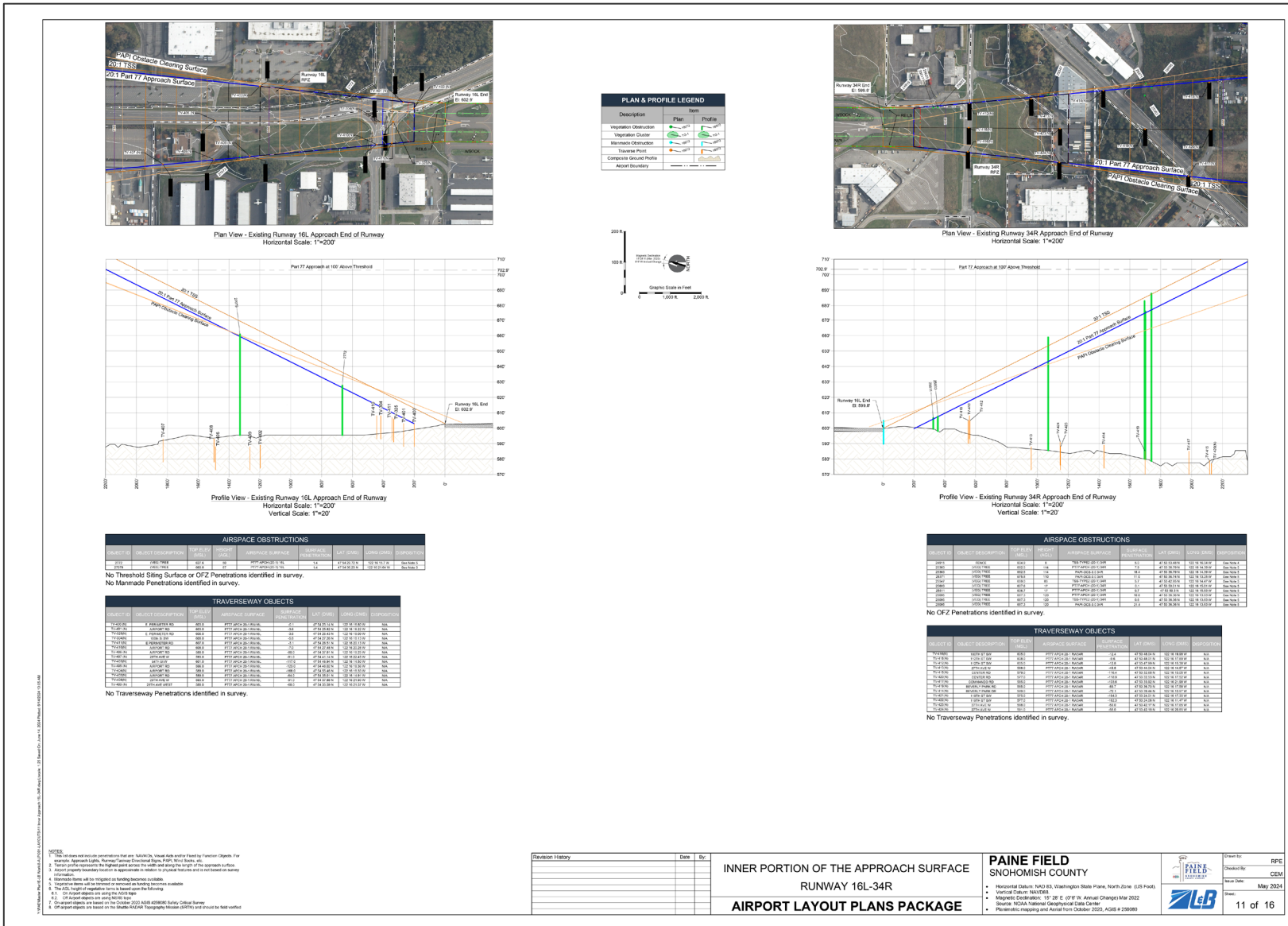
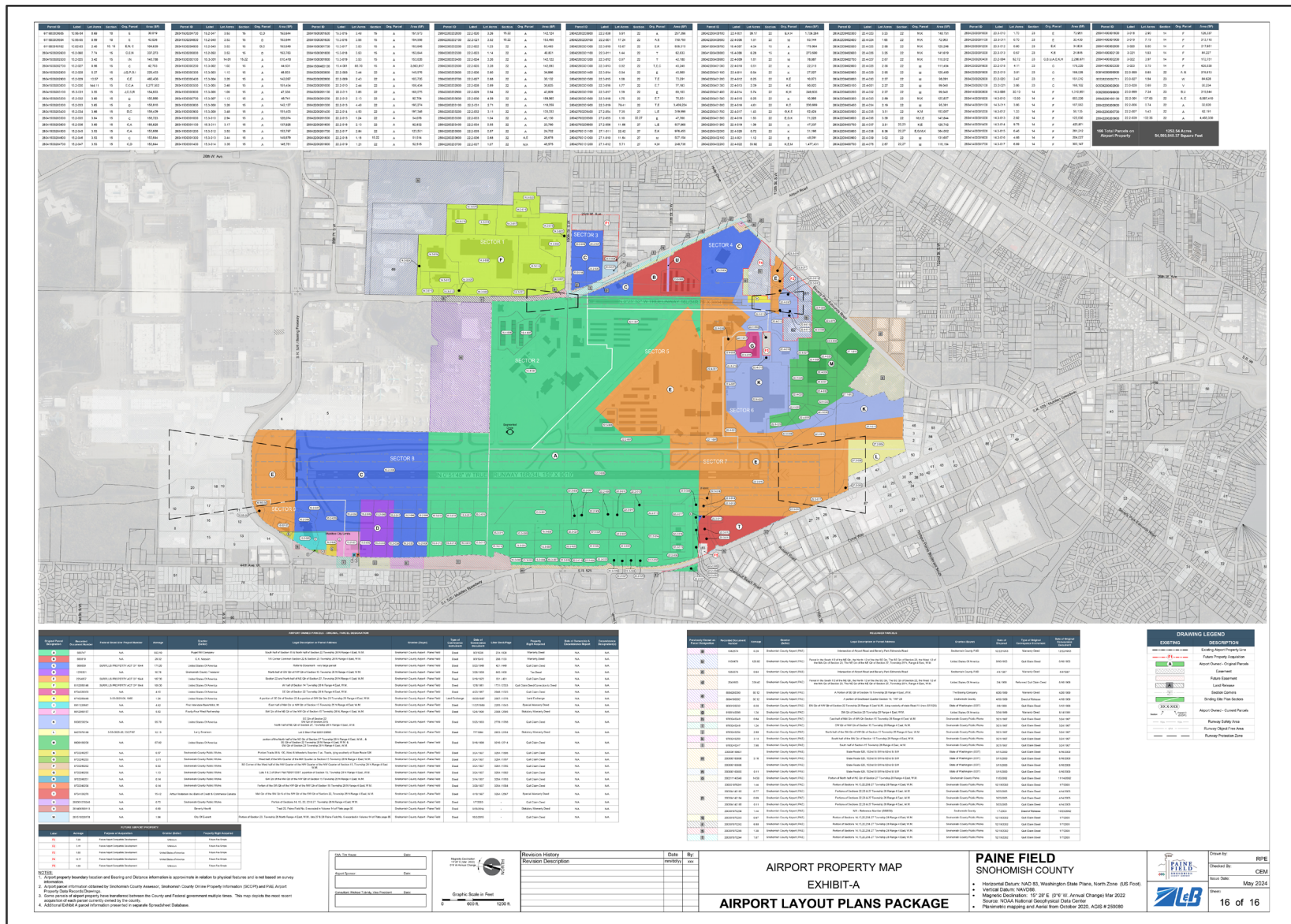


Exhibit 7-11 Inner Portion of the Approach Surface - Runway 16L-34R



Source: Landrum & Brown

Exhibit 7-16 Exhibit 'A' Airport Property Map



Source: Landrum & Brown