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# CHAPTER 7: AIRPORT LAYOUT PLAN

## Background and Purpose

This Chapter presents the Airport Layout Plan (ALP) and associated drawings for the Warren Municipal Airport (D37). The ALP drawing set graphically depicts the development of the airport proposed over the 20-year planning period and beyond. The ALP drawings reflect the culmination of the master planning process evaluating aviation demand, airside and landside facility needs, and options for development of airside and landside facilities. The preferred development plan is shown on the ALP drawings located at the end of this chapter. The rationale for preferred development and the public involvement process is documented in **Chapter 5: Alternatives Analysis**.

The ALP is intended to serve as the framework for future development and growth. All airport development must be done in accordance with FAA standards to reflect on the ALP. Proposed development must be shown on an approved ALP to be eligible for state funding. Projects must be justified based on safety, security, capacity, planning, environmental and infrastructure needs meeting FAA standards.

The ALP drawing set reflects airport design standards in accordance with the following documents:

- [FAA AC 150/5070-6B, Airport Master Plans \(Change 2\)](#)
- [FAA AC 150/5300-13B, Airport Design \(2022\)](#)
- [FAA ARP SOP No. 2.00, Airport Layout Plan Review Checklist \(October 2013\)](#)
- [MnDOT Sate Aviation System Plan \(2012 & 2022\)](#)

These drawings will be submitted to the MnDOT Office of Aeronautics (MnDOT Aeronautics) for their review and comment. State approval of the ALP indicates that the existing facilities and proposed development depicted on the ALP conforms to the FAA airport design standards in effect at the time of the approval. Approval indicates the MnDOT Office of Aeronautics finds the proposed development to be safe and efficient.

The airport has state grant and loan obligation to keep the ALP document current. Periodic “as-built” updates should be completed during the closeout of projects to update existing conditions. The Master Plan and accompanying ALP drawing set should be updated every 10 years at a general aviation airport to evaluate aviation needs and the development plans.

## ALP Drawing Set

The ALP drawing set contains several sheets depicting the existing facilities, planned development, and other pertinent information concerning the airport. The following sections describe the specific elements found on each sheet with the ALP drawing set, along with significant changes from the previously approved D37 ALP (2013) with an update approved in 2022. D37 ALP drawings in this planning study include:

- Sheet 1: Title Sheet
- Sheet 2: Airport Data Sheet
- Sheet 3: Airport Layout Plan

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- Sheet 4: Terminal Area Drawing
  - Sheet 5: Inner Portion of the Approach Surface – Runway 12 End
  - Sheet 6: Inner Portion of the Approach Surface – Runway 30 End
  - Sheet 7: Inner Portion of the Approach Surface – Runway 4-22
  - Sheet 8: Part 77 Airspace Plan – (Ultimate)
  - Sheet 9: Runway Departure Surface
  - Sheet 10: MnDOT Zoning Sheet
  - Sheet 11: Land Use Drawing
  - Sheet 12: Property Map

### ***Sheet 1: Title Sheet***

The title sheet is an index to the ALP drawing set. It also provides pertinent information such as the airport sponsor, airport name, location and vicinity maps, revision numbers and the date the plan was completed.

The title sheet also includes the airport wind coverage tables and wind roses for space purposes. The title sheet has completely changed from the 2013 D37 ALP.

### ***Sheet 2: Airport Data Sheet***

The data sheet provides technical information on airport facilities and design standards for the existing and future airport configurations. Elements include an airport data table, runway data table, and taxiway data table.

The data tables for this ALP depict the existing (E) and ultimate (U). These have been identified to better match with the development sequence identified in the Master Plan.

### ***Sheet 3: Airport Layout Plan***

The Airport Layout drawing is a graphical depiction of the airport facilities and design standards. Existing conditions and future development phases are distinguished.

The ALP sheet depicts the Runway Protection Zones (RPZs); land use protection areas on the ground near each runway end. The existing and future Runway 12 RPZ dimensions are 500 feet (inner width) by 1,000 feet (length) by 700 feet (outer width). The existing and future Runway 30 RPZ dimensions mirror the Runway 12 dimensions.

Currently, Runway 30 End includes 1-mile visibility approach minimums while the Runway 12 End and Runway 4-22 have visual approach minimums. These approach minimums will continue the same through the planning period.

MnDOT also requires the depiction of the Clear Zone. Like the FAA RPZ, the Clear Zone encompasses land which should be owned by the airport owner. The Clear Zone is typically larger than the FAA RPZ to encompass the FAR Part 77 approach surface. The existing and ultimate Runway 30 Clear Zone is longer than the existing FAA RPZ at 500 feet (inner width) by 1,700 feet (length) by 1,010 (outer width). The current and future Runway 4-22 Clear Zones inner width starts at the runway threshold 250 wide (same as the RPZ) by 1,200 feet (length) and 490 feet (outer width). The Runway 12 Clear Zone encompasses the FAA RPZ.

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### ***Sheet 4: Terminal Area Plan***

The Terminal Area Plan Drawing provides a large-scale view of areas with significant terminal facility development, so that features such as aprons, buildings, hangars, and parking lots are easily discernable. Dimensions are included to clearly depict clearance from objects.

The terminal area plan was updated in 2022 as a separate sheet from the 2013 approved D37 ALP. Although similar, the new configuration has been modified to meet TDG 1B standards for ADG-I aircraft and TDG-2A standards for larger aircraft. This provides sufficient space for landside development, and an expandable ultimate development plan.

### ***Sheets 5 through 7: Inner Portion of the Approach Surface Drawings***

This drawing provides plan and profile views of the portions of approach surfaces that are typically to a point on the approach slope 100 feet above the runway threshold elevation. Several approach surfaces are shown including FAR Part 77, FAA threshold siting, and glidepath qualification surface approach surfaces.

Roadways and railroads assume a standard mobile vehicle per Part 77 criteria. Standards include 10 feet for private roads, 15 feet for public roads, 17 feet for interstate highways and 25 feet for railroads. These heights are added to the ground elevation.

The obstacle data is based on a drone LiDAR survey performed in October 2022 as part of this study. Configurations evaluated in this ALP include the 1-mile approach for the Runway 30 End and the visual approach minimums for all other runway ends.

Any obstructions that were examined include an action recommended (remain, remove, grade, or trim).

### ***Sheet 8: Part 77 Airport Airspace Plan***

This drawing shows the FAR Part 77 Imaginary Surfaces for the ultimate layout of the Airport. The Part 77 surfaces are the basis for identifying obstructions to the airspace around an airport. The FAA determines if any of the obstructions to Part 77 surfaces are hazards to air navigation.

Part 77 defines five distinct surfaces, each with a different size and shape. The dimensions of these surfaces are based on the type of runway and the type of approach ultimately planned for the Airport. The imaginary surfaces are defined below.

**Primary Surface** - The primary surface is rectangular, is centered on the runway, extends 200 feet beyond a paved runway, and has a width that varies based on airport-specific criteria. The elevation of the primary surface corresponds to the elevation of the nearest point of the runway centerline.

The width of the existing primary surface of Runway 12-30 is 500 feet, which will remain in the future. The width of the Runway 4-22 primary surface remains at 250 feet for a visual utility runway.

**Approach Surface** - Each runway end has an approach surface. The approach surface is centered on the extended runway centerline, starts at the end of the primary surface, and has a width equal to that of the primary surface. Approach surfaces slope upward and outward from the runway ends.

Runway 30 End approach surface will remain at the inner width of 500 feet by 10,000 feet wide by 3,500 feet of inner width and raises at a slope of 20:1. The approach surface to Runway 12 End and Runway 4-

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22 will remain visual, with an inner approach surface width of 500 feet, extending outward 5,000 feet to an outer width of 1,500 feet, and rises at a slope of 20:1.

**Transitional Surface** - The transitional surface is a sloping 7:1 surface that extends outward and upward at right angles to the runway centerline from the sides of the primary surface and from the sides of the approach surfaces.

**Horizontal Surface** - The horizontal surface is a flat, elliptical surface at an elevation 150 feet above the established airport elevation (1,038.5' MSL). The extent of the horizontal surface is determined by swinging arcs of a 10,000-foot radius from the center of each end of the primary surface for other-than-utility runways.

**Conical Surface** - The conical surface extends outward and upward from the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet. The conical surface rises to a maximum elevation of 1238.5' MSL.

The obstacle data is based on a drone LiDAR survey performed in October 2022 as part of this study. There are Part 77 obstruction which an FAA Aeronautical Study is recommended to determine if the obstacle is a hazard to air navigation, or if obstruction lighting is required. The FAA determination will be used to formulate future actions.

The Part 77 airspace surfaces have changed from the approved 2013 D37 ALP and have been updated.

### ***Sheet 9: Runway Departure Surface***

The Runway Departure Surface Drawing depicts the plan and profile views of runways with instrument departure procedures. Each departure surface at the Airport begins at the departure end of the runway at a width of 1,000 feet, extends outward 12,152 feet to an outer width of 7,512 feet, and slopes up at 40:1.

The departure surface applies to all existing, future, and ultimate runway end locations for Runway 12-30. Runway 4-22 does not have a departure surface since it is not designated for instrument departures.

In general, no new vertical development penetrating the FAA departure surface is allowed. There are distinct FAA Departure Surface obstruction points with action recommended (remain, remove or trim).

This is a new sheet from the approved 2013 D37 ALP.

### ***Sheet 10: MnDOT Zoning Sheet***

The MnDOT Zoning Drawing depicts the required safety zones set by the MnDOT Office of Aeronautics. There are three zones depicted; Zone A, Zone B, and Zone C, and each zone encompasses certain restrictions which the state requires the airport sponsor to enforce and maintain. Safety Zone definitions can be found in the **Chapter 2: Airport Inventory**.

Currently, for D37, all zones are approximately twice the size of the minimum standards set by the state. The City of Warren adopted these zoning ordinances in March 1975 and the ordinance has not been changed since. This sheet shows the current and ultimate safety zoning plans. The city wishes to maintain the current zoning with no changes.

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## ***Sheet 11: Airport Land Use***

The Airport Land Use Drawing depicts both on- and off-airport land uses and zoning in the area around the airport. Land uses around airports should be compatible with airport operations. The airport should enact zoning to control land uses from incompatibility activities. Examples of land use compatibility issues at airports include:

- Aircraft Noise
- Nearby Lighting
- Glare, Smoke, and Dust Emissions
- Wildlife Attractions and Landfills
- Airspace Obstructions
- Electromagnetic Interference
- Concentrations of People
- Structures Near Runway Ends

Airport land use compatibility is a significant consideration in the airport development plan. The land use sheet depicts the on- and off-airport land uses as well as the existing, future, and ultimate FAA Runway Protection Zones and MnDOT Clear Zones.

This sheet has been separated from the Land Use and Zoning Drawing sheet from the approved 2013 D37 ALP.

## ***Sheet 12: Airport Property Map***

This sheet serves as an Airport Property Map and is a snapshot of the inventory of parcels that make up dedicated airport property and provides boundary information on airport property interests and encumbrances upon airport property. Detailed information is provided on airport property interests, released, or sold property, recorded or unrecorded encumbrances. All land shown on an Exhibit 'A' constitutes the airport property federally obligated for compliance. The airport property map builds upon the information by depicting property to be acquired to support the future and ultimate development of the airport.

The existing Airport encompasses 167 acres owned in fee and 31 acres of property controlled through easements. It is currently proposed that an additional 37.42 acres are needed to accommodate the ultimate build-out of the Airport. Ultimate property acquisition is shown to cover aeronautical expansion, FAA Runway Protection Zone, MnDOT Runway Clear Zone, and navigational aid protection areas.

Much of the property information is the same from the approved 2013 D37 ALP. Property acquisition limits have also changed in this ALP to meet current standards.