William R. Fairchild International Airport

Master Plan Update

September 2019

Prepared for

PORT OF PORT ANGELES WASHINGTON

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Executive Summary

INTRODUCTION

Port Angeles, Washington, is the largest city on the Olympic Peninsula. William R. Fairchild International Airport (CLM) serves the aviation needs of Port Angeles and the northern tier of the Olympic Peninsula, including the counties of Clallam, Jefferson, and portions of Mason. In 2015 CLM accommodated an estimated 27,058 aircraft takeoffs and landings and had 70 based aircraft. The airport is owned and operated by the Port of Port Angeles and is classified as a regional commercial service airport by the Federal Aviation Administration (FAA) and a commercial service airport by the Washington State Department of Transportation (WSDOT), Aviation Division.

With its many aviation-related businesses and facilities, CLM represents a vital and significant regional economic asset. In addition to the many aviation-related assets, CLM also provides benefits to local business and industries, promotes tourism, provides emergency medical transport services, and encourages additional business development and expansion throughout the community and region. CLM has been designated as a Tier Two response facility by the Washington State Department of Military Emergency Management Division (EMD). In the event of a Cascadia Subduction fault earthquake and tsunami, CLM will provide vital infrastructure to the Olympic Peninsula for sustained disaster response tempo in support of emergency supplies, personnel, and medical evacuation.

In keeping with FAA guidelines and grant assurances, this report explains and documents the reasons and goals for updating the Airport Master Plan. It illustrates the comprehensive, long-term, physical airport development that addresses community needs, and meets FAA standards, guidelines, and policies. This chapter provides a summary of the findings and recommendations of the William R. Fairchild International Airport Master Plan Update.

AVIATION FORECASTS

The last Master Plan and Airport Layout Plan (ALP) update for CLM was completed in 2011, using 2007 as the base year for forecasts. During the intervening years, changes have transpired within the aviation industry on a local, regional, and national level that impact the aviation facilities and services provided at CLM. Most notably is the loss of scheduled commercial service in November 2014 when Kenmore Air withdrew service.

Forecasts provide the basis for effective decisions in planning airports. They are used to determine the need for new or expanded facilities and should be realistic, be based upon the latest aviation data, and provide adequate justification for the proposed airport development. **Table 1-1** on the following page provides a summary of the existing and projected aviation activity at CLM as prepared in Chapter 3, Aviation Demand Forecasts.

The aircraft types projected to use CLM during the next 20 years are, for the most part, the same types that presently use the airport, including all sizes of general aviation (GA) and business-use aircraft (including very large business jets such as the Gulfstream IV and V). However, only operations conducted by smaller business jets and multi-engine turboprops have enough numbers to be selected as the Design Aircraft (represented by the Beech Super King Air 200). These aircraft types have a Runway Design Code (RDC) of B-II. The total number of annual aircraft operations (takeoffs and landings) is expected to increase from approximately 27,000 in 2015 to over 36,000 in 2035. A trend in increasing percentage of turbine-powered aircraft (turboprops and business jets) is expected, with a slight decreasing usage by smaller piston-powered aircraft. At the time the forecasts were prepared and approved by FAA, it was anticipated that commercial passenger service would be reinstated in early 2016 by nine-passenger seat Cessna Caravan aircraft. However, that service has not yet materialized.

Table 1-1. Summary of Aviation Activity, 2015-2035

AIRCRAFT OPERATIONS	2015[1]	2020	2025	2030	2035
Commercial Service	**---**	**3,224**	**3,224**	**3,952**	**4,992**
Single Engine	---	3,224	3,224	3,952	4,992
Air Taxi	**3,800**	**3,875**	**3,955**	**4,050**	**4,150**
Single Engine	3,500	3,550	3,600	3,650	3,700
Multi-Engine Piston	50	40	10	0	0
Multi-Engine Turboprop	75	75	90	100	115
Business Jet	125	150	175	200	225
Helicopter	50	60	80	100	110
Air Cargo	**1,158**	**1,160**	**1,160**	**1,160**	**1,160**
Single Engine	1,083	1,085	1,085	1,085	1,085
Multi-Engine Piston	50	50	50	50	50
Turboprop	25	25	25	25	25
General Aviation	**20,000**	**20,969**	**21,967**	**22,993**	**24,049**
Single Engine	17,500	18,180	18,803	19,406	20,081
Multi-Engine Piston	400	398	395	368	385
Multi-Engine Turboprop	600	692	769	920	1,034
Business Jet	500	629	791	966	1,106
Helicopter	1,000	1,069	1,208	1,334	1,443
Military	**2,100**	**2,100**	**2,100**	**2,100**	**2,100**
Fixed Wing	100	100	100	100	100
Helicopter	2,000	2,000	2,000	2,000	2,000
Itinerant Operations	**15,939**	**19,688**	**20,287**	**21,643**	**23332**
Local Operations	**11,120**	**11,640**	**12,119**	**12,6142**	**13,119**
Design Aircraft (Beech Super King Air 200)	252	300	355	440	515
Total Operations	**27,058**	**31,328**	**32,406**	**34,255**	**36,451**
Passenger Enplanements	**---**	**9,411**	**11,131**	**13,884**	**18,167**
Air Cargo Freight (In Tons)	**392.7**	**400.6**	**408.7**	**416.9**	**425.3**
Based Aircraft	**70**	**74**	**78**	**82**	**86**
Single Engine	63	65	67	68	69
Multi-Engine Piston	1	1	0	0	0
Multi-Engine Turboprop	0	0	1	2	2
Business Jet	1	1	2	2	3
Other[2]	5	6	7	8	9
Helicopter	0	1	1	2	3

Source: Reid Middleton, Inc. and Mead & Hunt.

1 Actual, as estimated by FBO personnel, November 2015.

2 Includes light sport aircraft and ultralights.

REQUIRED FACILITIES

To quantify CLM's future required facility needs, it is necessary to translate the expected long-term aviation demand into specific physical requirements. An airport's geometric design standards are based on the appropriate RDC for each runway. An RDC is based on aircraft approach speed, wingspan, and the lowest visibility minimums expressed as runway visual range values in feet. For Runway 8/26, the appropriate RDC is B-II-2400; for Runway 13/31, the appropriate RDC is A-I-VIS.

AIRSIDE FACILITIES

Airport facilities determined to be deficient based on the designated RDC within the Master Plan Update include:

Runway 8/26 Runway Safety Area (RSA) and Runway Object Free Area (ROFA): An RSA is defined as a surface centered on a runway centerline, prepared and suitable for reducing the risk of damage to aircraft in the event of an excursion from the runway. An ROFA is an area on the ground centered on a runway provided to enhance the safety of aircraft operations by clearing of above-ground objects protruding above the nearest point of the RSA, except for those objects that need to be located there for air navigation or aircraft ground maneuvering purposes.

The existing localizer antenna located east of the Runway 26 pavement end limits the RSA and ROFA length distances to 291 feet, which is 309 feet deficient of the 600-foot standard lengths. The localizer antenna equipment building limits the ROFA width from the runway centerline to 251 feet, which is 149 feet deficient of the 400-foot standard width.

Runway 8/26 Width: The existing Runway 8/26 width of 150 feet exceeds the standard width of 100 feet by 50 feet.

Taxiway A Centerline Distance from Runway 8/26 Centerline: The centerline separation distance of Taxiway A is 275 feet from the Runway 8/26 centerline, a deficiency of 25 feet from the standard 300 feet.

Aircraft Parking Distance from Runway 8/26 Centerline: The terminal apron aircraft parking area is located a minimum distance of 345 feet from the Runway 8/26 centerline, a deficiency of 55 feet from the standard 400 feet.

Runway 13/31 RSA: The Runway 13/31 RSA length is limited to 218 feet from the Runway 13 end by the airport fence, a deficiency of 22 feet from the standard 240 feet. Additionally, the maximum standards gradient of 3.0 percent beyond runway ends is exceeded by approximately 2.0 percent beyond the Runway 13 end.

Runway 13/31 Width: The existing Runway 13/31 width of 50 feet is 10 feet deficient of the standard 60 feet.

Runway 13/31 ROFA: The Runway 13/31 ROFA length is also limited to 198 feet by the airport fence located beyond the Runway 13 end, a deficiency of 42 feet from the standard 240 feet.

Taxiways D, E, and J: Taxiways D, E, and J intersect Runway 8/26 at non-perpendicular angles and are high energy crossings within the middle third of the runway.

Taxiway C: Taxiways should not lead directly from an apron to a runway without requiring a turn. Taxiway C leads directly from the terminal aircraft parking apron to the Runway 26 displaced threshold.

Runway Length: The appropriate runway length determination is a complex consideration. The required runway length for the Design Aircraft (i.e., Beech Super King Air 200) is 3,850 feet. However, the Port of Port Angeles desires to accommodate emergency medical flights conducted by business jet aircraft (i.e., Lear 31s) and other business jets exceeding maximum takeoff weights of 12,500 pounds that frequent CLM. Therefore, the maintenance of a minimum runway length of 5,000 feet is recommended and maintaining the existing runway length of 6,347 feet is desired.

Runway Protection Zones (RPZs): RPZs enhance the protection of people and property on the ground beyond the runway ends. This is achieved through airport control of the RPZ areas, and control is preferably exercised through fee simple ownership by the airport within the RPZs. RPZ compatible land uses are generally limited to non-public roads contained within airport property; most other land uses are considered incompatible. The Runway 8 Departure RPZ extends beyond airport-controlled property into the incompatible land uses of Lincoln Park and South L Street. The Runway 13 PRZ extends beyond airport-controlled property into the incompatible land use of West 18th Street.

Obstructions: Obstructions are a significant issue facing CLM because of the many trees located in Lincoln Park that penetrate or come close to penetrating the Runway 26 displaced Threshold Siting Surface. The Port of Port Angeles has an existing interlocal agreement with the City of Port Angeles for the purpose of coordination on the elimination and prevention of encroachments into the Runway 26 approach path. The Port has and will continue to remove or top trees in the RPZ under the interlocal agreement.

LANDSIDE FACILITIES

Landside facilities determined to be deficient and in need of relocation were identified in the previous 2011 Master Plan. These facilities included the existing terminal building, terminal apron, air cargo building, parking facilities, and aircraft storage hangars adjacent the terminal building and in the east general aviation hangar area. This Master Plan Update incorporated the terminal area development proposal from the 2011 Master Plan with minor adjustments to meet current FAA design criteria. No new analysis or alternatives evaluation was conducted for landside facilities.

DEVELOPMENT CONSIDERATIONS

Using the identified facility deficiencies and improvements, development alternatives were prepared that focused on long-term solutions and remedies. The preparation of the development alternatives began with establishing several basic assumptions to guide and direct the evaluation process.

Assumption One: CLM will continue to be developed and operated in a manner that is consistent with local ordinances and codes, federal and state statutes, federal grant assurances, and FAA regulations.

Assumption Two: Runway 8/26 will be maintained to FAA defined RDC B-II-2400 design standards.

Assumption Three: Based on recent FAA Reauthorization legislation, when evaluating airport master plans, the FAA shall take into account the role the airport plays with respect to medical emergencies and evacuation, and the role the airport plays in emergency or disaster preparedness in the community served by the airport. Therefore, the Port desires to maintain Runway 8/26 to a minimum length of 5,000 feet, as well as retain, to the extent financially practical, the entire length of 6,347 feet.

Assumption Four: Retain, but do not evaluate improvements to, the existing Runway 26 Instrument Approach Procedure providing visibility minimums not less than ¾-statute mile.

Assumption Five: The Port of Port Angeles will eventually elect to close Runway 13/31 but is committed to keeping the runway functional as long as financially feasible. Any work performed on the runway will be completed to FAA standards, but no FAA funds are anticipated to be used on the runway during the time period of this Master Plan Update.

Assumption Six: To the maximum extent possible, CLM will be designed to enhance the compatibility of the operation of the airport with the surrounding environs.

Assumption Seven: The terminal area and east GA redevelopment plan from the 2011 Master Plan will be incorporated as is and alternatives will not be evaluated.

Accompanying the assumptions are the following goals that have been established to direct the plan and establish continuity for the future development plan.

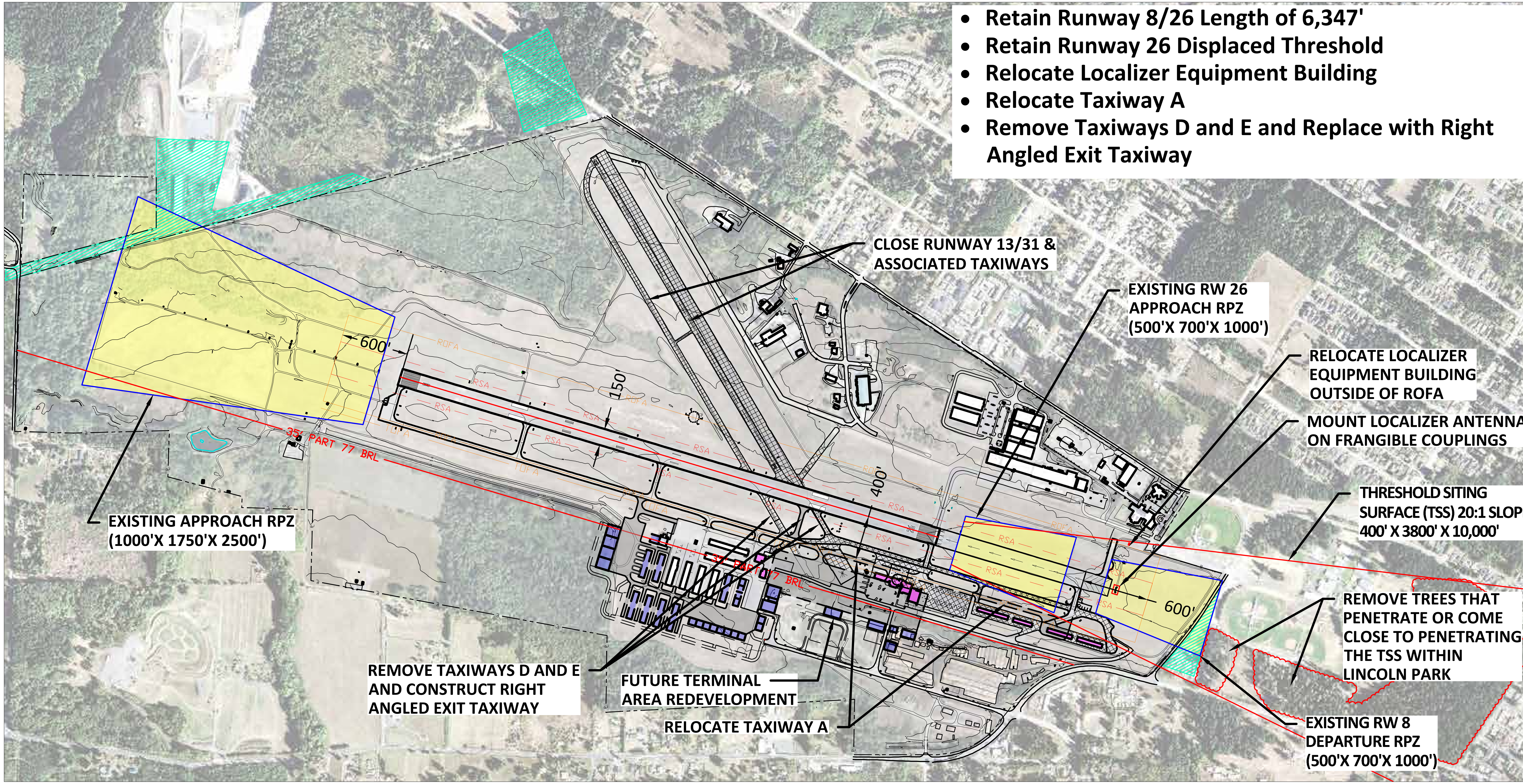
- *Plan the airport to accommodate the forecast aircraft fleet safely and efficiently.*
- *Program facilities to be constructed when actual demand is realized, not based on forecast demand.*
- *Enhance the self-sustaining capability of CLM and ensure the financial feasibility of all future development.*
- *Encourage the protection of existing public and private investment in land and facilities and advocate the resolution of any potential land use conflicts, both on and off airport property.*
- *Plan and prepare airport facilities that meet the State of Washington Military Department EMD Tier Two response facility criteria as well as other local, regional, and national emergency response agencies, to the extent practical and feasible.*
- *Plan and develop airport facilities to be environmentally compatible with the community and minimize or mitigate environmental impacts to the extent practical and feasible.*
- *Maintain compatibility with existing surrounding land uses and zoning ordinances and work with land use jurisdictions to ensure reasonable land use and zoning changes.*
- *Provide effective direction for future airport development through the preparation of a rational plan and adherence to the adopted development program.*

DEVELOPMENT RECOMMENDATIONS

Following a careful examination of several alternatives, a recommended development plan was determined and is presented below. **Exhibit 1-1** presents CLM's recommended conceptual development plan.

- *Runway 8/26 will be maintained at a length of 6,347 feet and a width of 150 feet. The Port of Port Angeles understands that it might be required to use Port or other funds exclusively to maintain a runway length and width exceeding FAA Airport Improvement Program (AIP) funding eligibility requirements in place at the time the project is implemented.*
- *The 1,354-foot Runway 26 displaced threshold will be maintained.*
- *The localizer antenna will be mounted on frangible couplings and the localizer equipment building will be relocated outside the ROFA.*
- *Taxiway A will be realigned to 400 feet from the Runway 8/26 centerline between Taxiways B and E. The Port of Port Angeles understands that to implement the relocation by 100 feet more than the 300-foot B-II-2400 design standard, it might be required to do so with Port or other funds exclusively.*
- *Construct a right-angled exit taxiway to replace Taxiways D and E.*
- *Remove all trees within Lincoln Park that penetrate or come close to penetrating the Runway 26 displaced Threshold Siting Surface.*
- *Continue to keep Runway 13/31 functional as long as feasible but anticipate closing the runway sometime after the Runway 8/26 pavement rehabilitation project is complete. The Port of Port Angeles has an agreement with the Federal Emergency Management Agency (FEMA) to use Runway 13/31 for staging in emergency events. Therefore, limited access to the pavement will need to be maintained.*
- *Relocate all existing terminal area buildings, hangars, automobile parking, and access to an area south of the existing structures providing ample room for the Taxiway A realignment.*
- *Relocate existing T-hangars in the east GA area to the west GA area.*
- *Provide an Aircraft Rescue and Fire Fighting (ARFF) facility and airport maintenance facility in the future terminal area.*
- *Provide additional T-hangars, corporate hangars, fuel storage facility, and fixed-base operator facilities as demand dictates.*

There are no significant environmental impacts anticipated with the implementation of the proposed long-term development plan. It is anticipated that an Environmental Assessment will be required for the tree removal in Lincoln Park.



LEGEND
- EXISTING BUILDINGS
- EXISTING BUILDINGS TO BE REMOVED
- FUTURE BUILDINGS
- EXISTING AIRFIELD PAVEMENT
- EXISTING AIRFIELD PAVEMENT TO BE REMOVED OR ABANDONED
- FUTURE AIRFIELD PAVEMENT
- EXISTING RUNWAY PROTECTION ZONE (RPZ)
- EXISTING AVIGATION EASEMENTS

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GRAPHIC SCALE IN FEET

Conceptual Development Plan

Exhibit 1-1. Conceptual Development Plan

FINANCIAL IMPLEMENTATION

The long-term financial implementation program for CLM is intended to establish a strategy to fund airport improvement and maximize the potential to receive federal grant funds, while also establishing a financially prudent plan for improvement funding at the local level. Potential improvements necessary to accommodate CLM's future needs have been placed into three phases: Phase I (1-5 years), Phase II (6-10 years), and Phase III (11-20 years). The planning level costs estimates for the three development phases are provided in **Table 1-2**.

Table 1-2. Funding Plan

PHASE	TOTAL COST[1]	FEDERAL[2]	STATE	LOCAL/ PRIVATE[3]
Total Phase I (2020-2024)	$11,834,000	$7,731,100	$419,450	$3,684,450
Total Phase II (2025-2029)	$9,380,000	$4,273,200	$237,400	$4,869,400
Total Phase III (2030-2039)	$40,030,000	$24,525,000	$---	$15,505,000
GRAND TOTAL (2020-2039)	**$61,244,000**	**$36,528,300**	**$656,850**	**$24,058,850**

Notes: *1 Cost estimates based on 2019 data, are intended for planning purposes only, and do not reflect a detailed engineering evaluation.*

2 Eligible for FAA AIP, Non-Primary Entitlement (NPE) and Discretionary grants.

3 Local match requirements from current revenues, cash reserves, bonds, and other sources. Can include private monies, funding from revenue bond, or special tax assessments.

SUMMARY

The development plan for CLM calls for the retention of the basic runway layout as it presently exists, with programmed improvements to maximize the efficient and safe aircraft operational activity and to provide adequate area for future landside facilities. The projects represented as potentially needed are based on forecast demand. Only those projects that are required by actual demand will be proposed for construction. If actual demand does not materialize as anticipated, some of the projects will need to be revised, delayed, or potentially eliminated. Providing a flexible and realistic development plan and program for future airport growth is the overall objective of this Master Plan Update.

Chapter 2
Existing Conditions & Inventory

INTRODUCTION

William R. Fairchild International Airport (CLM) is located approximately three miles west of Port Angeles, Washington, the largest city on the Olympic Peninsula (see **Exhibit 2-1**). The airport, owned and operated by the Port of Port Angeles, is classified as a regional commercial service airport by the Federal Aviation Administration (FAA) and a commercial service airport by the Washington State Department of Transportation (WSDOT), Aviation Division. The airport serves the commercial service needs of the Olympic Peninsula, including Clallam, Jefferson, and portions of Mason Counties.

Exhibit 2-1. Olympic Peninsula Regional Map

This chapter documents the existing conditions within CLM and the airport's environs, providing current information about airport facilities, airspace, airport support services, land use, and the relationship between the airport and the community. This chapter also reviews the applicable environmental conditions on the airport.

Information in this chapter was obtained from multiple sources, including the William R. Fairchild International Airport Layout Plan (ALP), dated May 2011; the William R. Fairchild International Airport Master Plan, dated September 2011; the WSDOT Long-Term Air Transportation Study (LATS); the current airport 5010 report; and the FAA's National Plan of Integrated Airport Systems (NPIAS). This information has been supplemented and updated through site visits to the airport. Additional input was received from city and county personnel, WSDOT Aeronautics Division, the FAA, Rite Bros. Aviation, Inc. (the Fixed Base Operator (FBO)), members of the Study Advisory Committee (SAC), and others involved in the airport's use and operation. The base year for which existing conditions have been documented is 2015. All information was collected during the summer of 2015 and is current as of December 2015.

AIRPORT DEVELOPMENT HISTORY

CLM is owned and operated by the Port of Port Angeles as a public transportation asset. The airport was built at the current site in the early 1930s by Clallam County, with assistance from the City of Port Angeles, the state of Washington, and the U.S. government, after the original landing strip near downtown Port Angeles was closed. By 1937, regular passenger service was operating between Port Angeles and Seattle. Development of the airport continued through the 1930s and early 1940s as part of a Works Progress Administration (WPA) project, and the runway system was developed to accommodate large bombers.

Airport expansion continued during World War II, with major runway and taxiway construction completed by the U.S. Army. During this time, the airport was operated as a satellite to McChord Field and was home to a squadron of P 38 Lightning fighter aircraft. In 1948, the airport was declared surplus and returned to civilian use under the control of Clallam County. In 1951, ownership of the airport was transferred to the Port of Port Angeles.

In 1953, William R. Fairchild became an active user and promoter of the airport. He was instrumental in airport development through 1968, at which time the Port of Port Angeles hired him as the first full-time airport supervisor. In 1969, Fairchild was killed in an aircraft accident at the airport that claimed the lives of ten people. Later that year, the airport was officially renamed the William R. Fairchild International Airport in honor of his many years of service to the community.

Table 2-1, Historical Airport Development Projects, shows a timeline of major projects completed at the airport.

Table 2-1. Historical Airport Development Projects

YEAR	PROJECT	COST
1952	Runway lighting, segmented circle, fencing	$11,400
1977	Land acquisition, obstruction removal	$412,900
1978	Aircraft parking apron, tie-downs, fencing, beacon and tower, apron lighting	$295,600
1979	Obstruction removal, extend runway 1,420 feet, install MIRL, parking apron	$1,309,200
1980	Strengthen runway, construct terminal aircraft parking apron	$911,100
1983	Land acquisition	$563,800
1984	Land acquisition	$99,800
1985	Noise Compatibility Study	$28,000
1988	Acquire land, ARFF vehicle, design runway overlay, taxiway hold signs, terminal building improvements, security gates	$292,000
1989	Runway overlay (west)	$664,000
1991	Taxiway lighting, distance to go, safety area design	$434,800
1992	Safety area Runway 8, install signs, mark runway, update ALP	$662,400
1993	Customs facility	$92,900
1995	Security fencing	$117,600
1995	New ARFF truck	$174,000
1996	Runway overlay (East)	$829,000
1997	Snow blower, sweeper	$105,400

YEAR	PROJECT	COST
1998	Snow plow truck, slurry seal pavements, terminal roadway overlay, security fencing, decellerometer, pilot control lighting, beacon relocation	$741,700
2000	General Aviation (GA) site development, taxiway safety area grading, ultralight operating area, passenger lift	$1,100,000
2002	Storm water system expansion	$640,000
2003	New terminal entrance roadway	$624,400
2004	Safety area grading, taxilane development	$632,000
2005	Runway lighting replacement, ramp reconstruction	$957,000
2006	Phase III GA site development, obstruction identification	$920,000
2007	Apron and ramp reconstruction	$1,825,000
2008	Taxiway Redevelopment Phase I	$350,000
2008	Rehabilitate Taxiway A (partial), connectors B-H, hangar taxilane, and general aviation apron, including subdrains (Phase 2) (AIP 26)	$360,000
2009	Rehabilitate Taxiway A (partial), connectors B-H, and subdrains (partial) (Phase 2), improve airfield lighting (Phase 1), install runway and taxiway markings (AIP 27)	$1,503,000
2011	Airport Master Plan Project (AIP 25)	$331,000
2011	Construction of two buildings and a third building pad for the Composite Manufacturing Center (CMC)	$4,398,800
2012	Install airfield guidance signs (Phase 1 – design), acquire sweeper equipment/truck (Phase 1 – design), rehabilitate Taxiway A medium intensity taxiway lighting (MITL) (LED lights) (Phase 1 – including design and construction) (AIP 30)	$434,700
2013	Planning for construction of apron and taxiway, relocation of access road, fencing and building demolition (FBO Building) (AIP 28)	$415,600
2013	Lincoln Park Master Plan (AIP 29)	$145,500
2013	Install airfield guidance signs (Phase 2), acquire sweeper equipment/truck (Snow Removal Equipment), rehabilitate Taxiway A MITL and signs (Phase 2) (AIP 31)	$832,200
2014	Construct apron, airport access road, fencing, lighting, and gates (Phase 2 – construction) (AIP 32)	$1,193,500
2015	Install perimeter fence, including automatic (electric vehicle) gates (8), install Runway 26 PAPI, remove Runway 26 VASI (AIP 33)	$910,600

EXISTING AIRPORT PLANS & DOCUMENTS

The last Airport Master Plan prepared for CLM was published in September 2011, following the Airport Layout Plan Update approved by the FAA in May 2011. Key recommendations of the master plan called for facility expansion and renewal to bring airport facilities into compliance with the FAA's Airport Design Standards for Category B-II aircraft. The forecast projections predicted continued growth in commercial, corporate, and general aviation traffic, and recommendations included Runway Safety Area (RSA) improvements, relocation of the passenger terminal facilities, relocation of portions of Taxiway A, and expansion of general aviation storage facilities. Some of these recommendations have been implemented, but others have been delayed or changed due to recent changes in the airport operational levels, such as the loss of commercial services when Horizon and Kenmore Air withdrew service to Port Angeles. This master plan will identify changes in current and projected aircraft fleet mix operations and critical aircraft category. Further, the facilities requirements, subsequent alternatives analysis and the preferred alternatives recommendations will then be revised for runway, taxiway, apron, runway protection zones, and airspace to improve safety while maintaining airport utility and compatibility with surrounding land uses.

DISASTER RESPONSE ROLE

In the event of a Cascadia Subduction fault earthquake and subsequent tsunami, the Washington State Department of the Military Emergency Management Division (EMD) has designated CLM as a Tier Two response facility. The Analytical Baseline Study for the Cascadia Earthquake and Tsunami, a 2011 study commissioned by FEMA Region 10 and conducted by the National Infrastructure Simulation and Analysis Center Homeland Infrastructure Threat and Risk analysis Center (HITRAC) within the Department of Homeland Security Office of Infrastructure Protection, provides a primary foundation for estimating the impacts of this event.

The HITRAC study is based upon a 9.0 magnitude earthquake along the length of the Cascadia Subduction Zone fault which is approximately 700 miles long stretching from Northern California to the top of Vancouver Island, in British Columbia. The duration of an earthquake of this size, commonly called a "great quake" will be from four to seven minutes and will cause catastrophic damage to all infrastructures. The Olympic Peninsula will sustain heavier damage in all respects than the Interstate 5 corridor and we will be totally dependent on air support for at least a year. After 30 days, some support will begin to arrive by sea, but the bulk of transportation needs will be met by air service. Approximately 80 percent of roads will have ground displacement from 3 inches to over 12 inches and will require total replacement. Over 73 percent of bridges will require major repair with 50 percent having to be completely replaced. Extensive damage to all utilities will take several months to a year to restore (source FEMA CSZ Response Plan, 2013).

The Washington National Guard and the Military Department of Defense in concert with EMD will respond initially with loads dropped by parachute and follow with landing supplies, personnel, and medical evacuation as soon as an inspection team can certify that the airfield is safe to land on. Port employees responsible to reopen the airport will be assisted by a four person RSOI (reception, staging, onward movement and integration) military team that will be air dropped to CLM in the first 24 to 72 hours after the earthquake.

The Port of Port Angeles recognizes the potential operational impacts a sustained disaster response tempo will have on the airport and the supporting infrastructures. Pavement strengths and the airport's ability to handle C-130 operations are discussed further in pavement conditions.

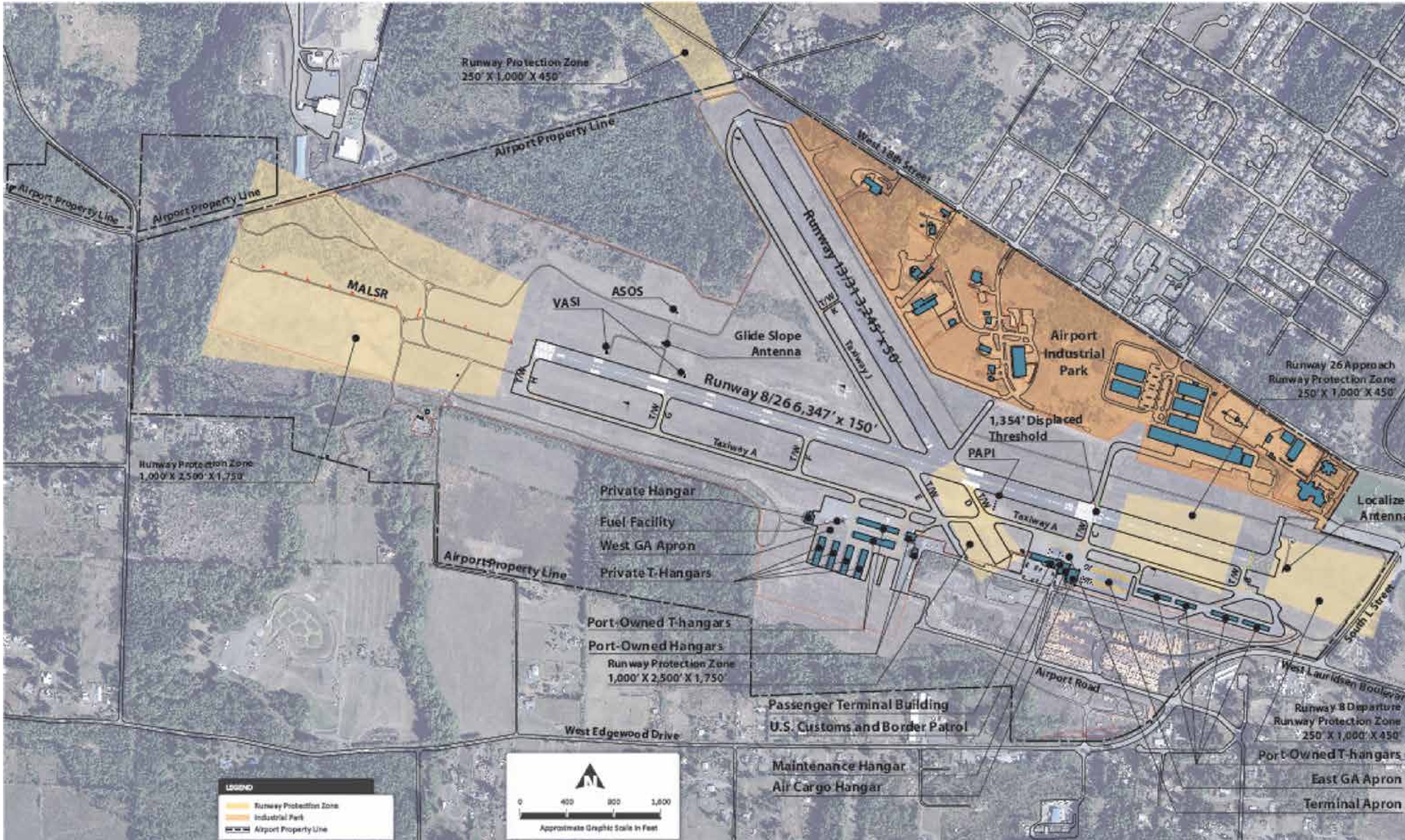


Exhibit 2-2. Exisiting Airport Facilities

AIRSIDE FACILITIES

Airside facilities at CLM are illustrated in **Exhibit 2-2**. CLM has two runways: primary Runway 8/26 and auxiliary Runway 13/31. Runway 8/26 is 6,347 feet long and 150 feet wide, with a displaced threshold of 1,354 feet on the approach end to Runway 26 to provide for an unobstructed visual approach slope of 20:1. Runway 13/31, designated as the auxiliary runway, is 3,245 feet long by 50 feet wide. (See **Table 2-2**).

In the 1997 ALP Update, the FAA determined that Runway 13/31 was not required for adequate wind coverage and improvements would not be eligible for FAA funding. The Port of Port Angeles has committed to keeping this runway functional without FAA support for as long as feasible. The revised wind analysis for this Master Plan (See **Table's 4-2** and **4-3** in the Facilities Requirements chapter) reaffirms that Runway 8/26 has greater than 95 percent crosswind coverages. Combined, Runway 8/26 provides a wind coverage of 99.75 percent for all weather conditions at 10.5 knots crosswind; 99.95 percent for all weather conditions at 13 knot crosswind; 99.96 percent IFR weather wind coverage at 10.5 knot cross wind, and; 99.99 percent coverage for IFR weather at 13 knots crosswind component.

Both runways are supported by parallel taxiway systems, with Taxiway A serving as the full parallel taxiway to Runway 8/26 and Taxiway J serving Runway 13/31. Taxiway A is 40 feet wide and Taxiway J is 50 feet wide.

AIRFIELD PAVEMENTS

Runway 8/26

Runway 8 is 6,347 feet long by 150 feet wide. Full distance from end to end is available for landing and takeoff operations. Runway 26 is also 6,347 feet long by 150 feet wide with full length available for takeoff to the west. Runway 26 landing threshold is displaced by 1,354 feet due to obstructions to the east. The Runway 26 Landing Distance Available (LDA) is 4,993 feet. In 2012, a pavement conditions report was completed for the WSDOT Aviation Division and the FAA. Runway 8/26 is composed of asphalt, with pavement strengths of 115,000 pounds for dual-tandem gear; 66,000 pounds for dual-wheel gear; and 55,000 pounds for single-wheel gear. The pavement is in good condition with a Pavement Condition Index (PCI) of 71/100 to 85/100.

Runway 8/26 is supported by a parallel taxiway system on the south side (Taxiway A) that extends the length of the runway and provides aircraft movement within the airside area. There are seven taxiway connectors that link Taxiway A to Runway 8/26. See **Table 2-3** for dimensions and descriptions.

Runway 13/31

Runway 13/31 is 3,245 feet long by 50 feet wide. The runway is composed of asphalt, with a pavement strength of 30,000 pounds for single-wheel gear. The pavement is in moderate condition with PCI rating 65/100 for the runway surfaces. Runway 13/31 is not eligible for FAA funds because it is not required for wind coverage.

The auxiliary runway is supported by the parallel Taxiway J.

Taxiway A

Taxiway A is constructed of asphalt that extends the full length to Runway 8/26 and is 40 feet wide. Between Taxiways B and D, the distance between the runway centerline and Taxiway A centerline is 276 feet. West of Taxiway D, Taxiway A transitions away from the runway to 400 feet from the runway centerline to taxiway centerline. A pavement strength survey conducted in August 2012 indicates Taxiway A has a 6-inch base course, with a 2-inch surface course and a 2-inch overlay. Pavement strength is listed at a maximum gross weight of 55,000 pounds for aircraft with single-wheel main gear, 66,000 pounds for dual-wheel main gear, and 115,000 pounds for dual-tandem gear. The Taxiway A pavement is in good condition, with the section between Taxiways B and E having a PCI rating of 100. Between Taxiways E and H, Taxiway A has a PCI rating of 88.

Taxiway J

Taxiway J is constructed of asphalt, runs parallel to Runway 13/31, and is 46 feet wide. Centerline to centerline distance is 230 feet. At the north end of the taxiway, approaching the Runway 13 threshold, it curves into the Runway 13 approach end and has a hold line position approximately 45 degrees relative to the runway centerline. The southern end of taxiway J does not connect directly with Runway 31, but rather Taxiway J intersects with runway 8/26 at an angle of 50 degrees and serves as a crossing connector to Taxiway E and the commercial and GA ramp areas. Taxiway J is no longer receiving maintenance funding as Runway 13/31 is not required as a crosswind runway. Taxiway J has an 8-inch base course and a 2 ½-inch surface course. Pavement strength is listed at a maximum gross weight of 44,000 pounds for aircraft with single-wheel mains, 64,000 pounds for dual-wheel mains, and 111,000 pounds for dual tandem-wheel mains. Taxiway J pavement is in poor condition with a PCI rating of 34 due to raveling, rutting, and cracking.

Pavement Capacity to Support C-130 Operations

As part of the operational analysis to support potential C-130 aircraft operations as planned to meet a Cascadia Subduction Zone Event response, Runway 13/31 was found to not be rated for a C-130 but may support some limited C-130 taxi/parking operations. Findings indicate that Runway 13/31 could handle an isolated operation at max weight (155,000 pounds) and could possibly support more operations with an aircraft gross weight limitation at 100,000 pounds. Runway 13/31 may support some C-130 activity; however, it is more susceptible to damage than Runway 8/26. The calculated Pavement Classification Number (PCN) is less than the Aircraft Classification Number (ACN) of the C-130. Despite this the C-130 cumulative damage factor is still less than 1, indicating the pavement should be capable to support an isolated aircraft operation. The California Bearing Ratio (CBR) value utilized for analysis was assumed from recent CBR test data for a nearby apron development. Runway specific CBR test was not performed.

Runway 8/26 does appear to be adequate to support limited C-130 operations without adversely affecting the pavement. Actual pavement conditions may vary, and some areas may be susceptible to damage, but there appears to be excess pavement thickness beyond the required thickness to provide some additional protection. The calculated PCN also indicates the pavement is capable to support the C-130 ACN. The C-130 cumulative damage factor is less than 1 indicating the pavement should be capable to support the aircraft. The CBR value utilized for analysis was assumed from recent CBR test data for a nearby apron development. Runway specific CBR test was not performed.

Taxiway A is not rated specifically for a C-130 but may support some limited C-130 taxi operations. Findings indicate that Taxiway A can handle an isolated operation at max weight (155,000 pounds) and could possibly support more operations with an aircraft gross weight limitation at 100,000 pounds. The Taxiway may sustain some C-130 activity however it is more susceptible to damage than RW 8/26. The Calculated PCN is less than the ACN of the C-130, and the cumulative damage factor is equal to 1 indicating the pavement is right at the threshold of being capable to support the C-130. The CBR value utilized for analysis was assumed from recent CBR test data for a nearby apron development. Runway specific CBR test was not performed.

Table 2-2. Taxiway descriptors

TAXIWAY ID	TYPE	LENGTH (FT)	WIDTH (FEET)	PCI
A	Parallel 8-28	6542	40	88-100
B	Connector	176	40	100
C	Connector	176	40	100
D	Connector	300	40	100
E	Connector	445	50	100
F	Connector	305	40	90
G	Connector	305	40	100
H	Connector	305	40	100
J	Parallel 13-31	3009	46	34
K	Connector	180	20	38

RUNWAY DATA

Table 2-3 summarizes the runway data for Runways 8/26 and 13/31.

Table 2-3. Airport & Runway Data

DESIGNATION	RUNWAY 8/26 B-II RDC	RUNWAY 13/31 A-I RDC
Percent Gradient	0.3%	1.38%
Pavement Type	Asphalt	Asphalt
Pavement Strength (in 1,000 lbs)	115 (DT), 66 (D), 55 (S)*	30 (S)
Length/Width (feet)	6,350′ x 150′	3,245′ x 50′
RUNWAY SAFETY AREA (RSA) (FEET)		
Required:	7,550′ x 300′	3,725 x 120′
Actual:	7,550′ x 500′	3,725 x 120′
OBJECT FREE AREA (OFA) (FEET)		
Required:	7,550′ x 800′	3,725′ x 250′
Actual:	7,550′ x 800′	3,725′ x 250′
Runway Lighting	MIRL	LIRL

RUNWAY END	8	26	13	31
Runway Approach Category	Precision	Visual	Visual	Visual
Runway Approach Slope	50:1	20:1	20:1	20:1
Runway Markings	Precision	Non-Precision	Visual	Visual
Instrumentation & Approach Aids	ILS NDB	RNAV GPS 26	None	None
Visual Aids	MALSR, VASI	PAPI	None	None

CRITICAL AIRCRAFT	CESSNA CITATION II/ BEECH KING AIR 200	CESSNA 172
Wingspan	48′-10″	36′
Weight	15,200 lbs	2,450 lbs
Approach Speed	108 knots	64 knots
Runway Design Code (RDC)	B-II	A-I

**DT = Dual-tandem gear, D = Dual-wheel gear, S = Single-wheel gear*

AIRFIELD LIGHTING AND NAVIGATIONAL AIDS

Runway 8 is equipped with an Instrument Landing System (ILS), which consists of a glide slope antenna, localizer antenna, and a Non-directional Beacon (NDB). The runway has precision runway markings, a Medium-Intensity Approach Lighting System with Runway Alignment Indicators (MALSR), and Visual Approach Slope Indicator (VASI) visual aids. (See **Table 2-3**.)

Runway 26 is equipped with non-precision runway markings, Runway End Identifier Lights (REILs), and PAPI visual aids. Runways 13 and 31 has visual runway markings but no visual aids.

Runway 8/26 is equipped with Medium-Intensity Runway Lights (MIRL). Runway 13/31 is equipped with Low Intensity Runway Lights (LIRL). Taxiways A through H have medium intensity taxiway lighting, while Taxiways J and K are equipped with reflectors.

SIGNAGE

The airport incorporates standard runway and taxiway signage and meets all FAA signage standards.

INVENTORY OF EXISTING RUNWAY RPZ CONDITIONS

The function of a Runway Protection Zone (RPZ) is to enhance the protection of people and property on the ground beyond the runway ends. RPZs are trapezoidal in shape and centered over the extended runway centerline. Based on an airport's geometry and threshold siting requirements, there may be two RPZs for each runway end: an approach RPZ and a departure RPZ. Approach RPZs extend from a point 200 feet from the runway threshold and their dimensions are a function of the Aircraft Approach Category (AAC) and the most demanding visibility minimums associated with the approach runway end. Departure RPZs begin 200 feet beyond the runway end or, if the declared Takeoff Runway Available (TORA) and the runway end are not the same, 200 feet beyond the far end of the TORA. Their dimensions are a function of the AAC and the size of aircraft.

Because Runway 26 has a 1,354 foot displaced threshold for landings, and takeoffs using Runway 8 (i.e., takeoffs to the east) can use the pavement beyond the displaced threshold, there are separate approach and departure RPZs for the Runway 26 end. **Table 2-4** provides the existing RPZ dimensions for the runway ends at CLM based on the existing instrument approach minimums, the AAC, and aircraft size.

Table 2-4. Runway Protection Zone Dimensions (in feet)

RUNWAY	WIDTH AT RUNWAY END	LENGTH	WIDTH AT OUTER END	AIRPORT CONTROLS ENTIRE LAND AREA
8	1,000	2,500	1,750	Yes
26 Approach	500	1,700	1,010	Yes
26 Departure	500	1,700	1,010	No
13	250	1,000	450	No
31	250	1,000	450	Yes

CLM does not own all the properties within the existing RPZs. The Runway 26 Approach RPZ extends east beyond airport property into Lincoln Park. The Runway 8 RPZ extends beyond airport property, but the properties not owned by the Port are controlled through an existing avigation easement. The Runway 13 RPZ extends beyond airport property into property that is not controlled through avigation easement.

EXISTING AIRFIELD FACILITIES DESIGN GROUP CRITERIA

CLM has a highest Runway Design Code of B-II. This was determined in the previous ALP Update using the criteria set forth in FAA Advisory Circular (AC) 150/5300-13A, Change 1, Airport Design. This category reflects the operating requirements of the most demanding aircraft that regularly use the airport (those that generate 500 or more itinerant operations per year).

Table 2-5. Airport Data

Airport Terminal Code:	CLM
Airport Elevation:	291 ft. MSL
Airport Reference Point:	Latitude: 48° 07′ 12.700″ N
	Longitude: 123° 29′ 58.900″ W
Mean Maximum Temperature (August):	69.1 Degrees (F)
Runway Design Code (RDC)	B II
Magnetic declination (year):	16° 38′ E (2015)

Sources: Airport Form 5010, AirNav, NOAA's Geophysical Data Center

INVENTORY OF CURRENT TRAFFIC PATTERNS

Aircraft operating within the airport traffic pattern follow a standard left-hand traffic pattern for Runways 8 and 13, with a nonstandard right-hand traffic pattern followed for Runways 26 and 31. Aircraft separation in the terminal area is maintained visually by pilots. According to information provided on the WSDOT Aviation website (www.wsdot.wa.gov/aviation), the flight pattern altitude for CLM is 1,300 feet Above Mean Sea Level (AMSL) (i.e., 1,009 feet Above Ground Level (AGL)). There are no voluntary noise abatement procedures established at CLM.

PUBLISHED INSTRUMENT APPROACHES

CLM's one published precision IAP is an ILS approach to Runway 8. There are two RNAV (GPS) non-precision IAPs, one to Runway 8 and one to Runway 26. **Exhibits 2-3, 2-4**, and **2-5** show the approach plates for each published IAP. **Table 2-6** provides operational ceiling and visibility minimums.

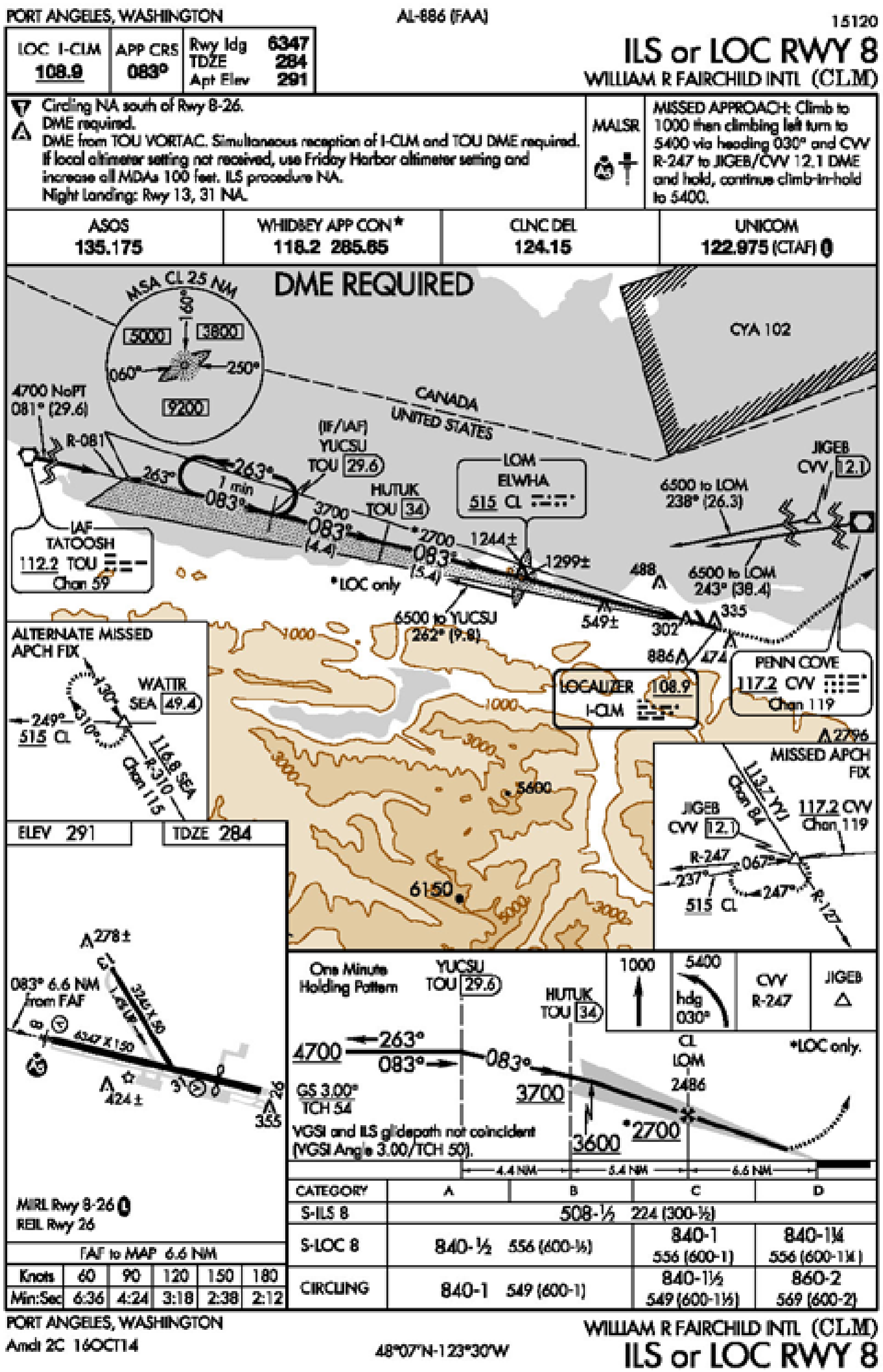
Runway 8 has nonstandard takeoff minimums of 300 feet AGL and one-mile visibility minimums. Runway 13 has standard takeoff minimums, with a climb rate of 454 feet per Nautical Mile (NM) to 1,100 feet AMSL.

Table 2-6. Instrument Approach Requirements

APPROACH	RUNWAY	MINIMUM DESCENT ALTITUDE	TOUCHDOWN ZONE ELEVATION (AMSL)	HEIGHT (AGL)	VISIBILITY – IN MILES
ILS	8	508′	284′	224′	½ (A, B, C, D)
LOC	8	840′	284′	556′	½ (A, B) 1 (C) 1 1/4(D)
RNAV (GPS)	8	596′	284′	312′	½ (A, B, C, D)
LNAV MDA	8	1,240′	284′	956′	¾ (A) 1 (B) 2 ½ (C, D)
RNAV (GPS)	26	940′	282′	658′	1 (A, B) 1 ¾ (C) 2 (D)

Visibility Letter is Aircraft Approach Speed Category

Exhibit 2-3. Runway 8 ILS Approach Plate

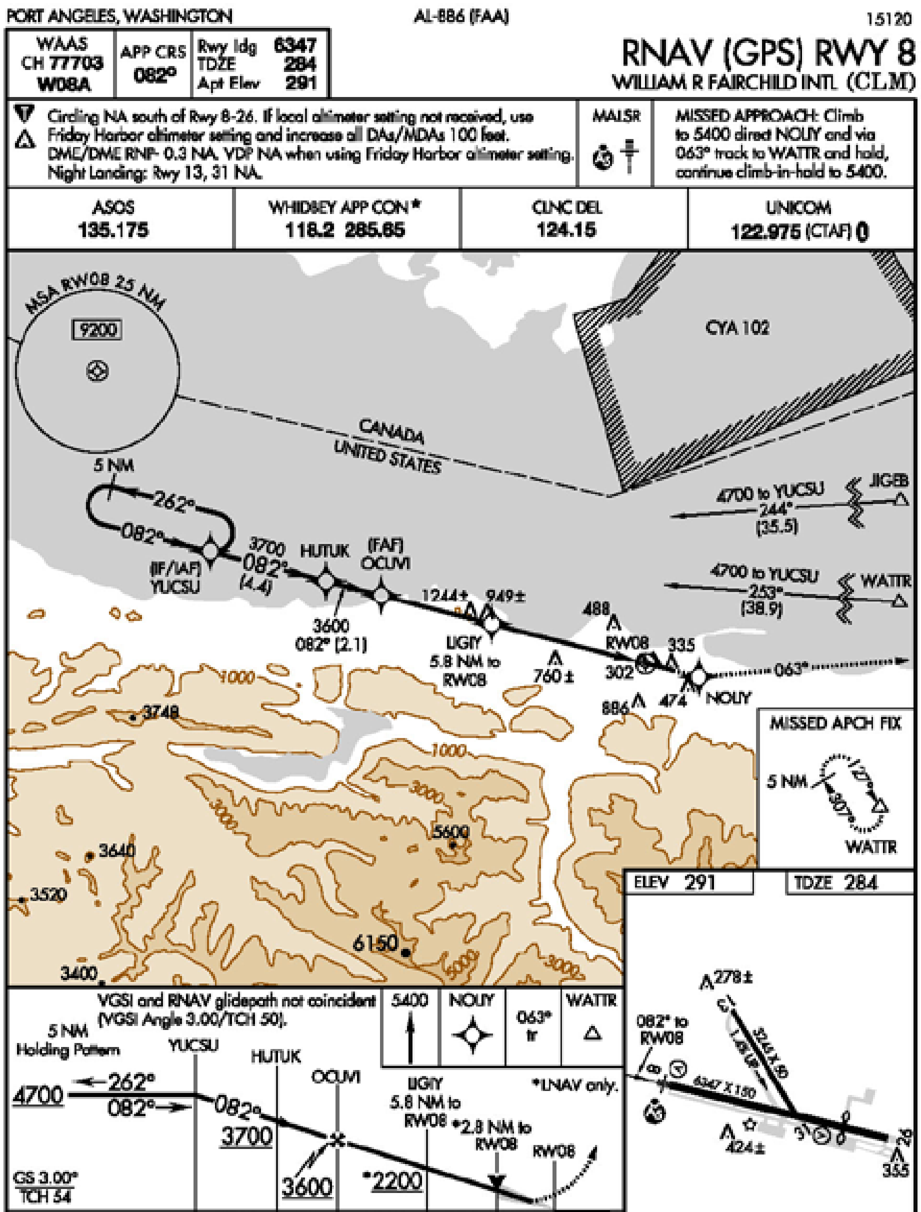


CATEGORY	A	B	C	D
S-ILS 8		508-½ 224 (300-½)		
S-LOC 8	840-½ 556 (600-½)		840-1 556 (600-1)	840-1¼ 556 (600-1¼)
CIRCLING	840-1 549 (600-1)		840-1½ 549 (600-1½)	860-2 569 (600-2)

FAF to MAP 6.6 NM

Knots	60	90	120	150	180
Min:Sec	6:36	4:24	3:18	2:38	2:12

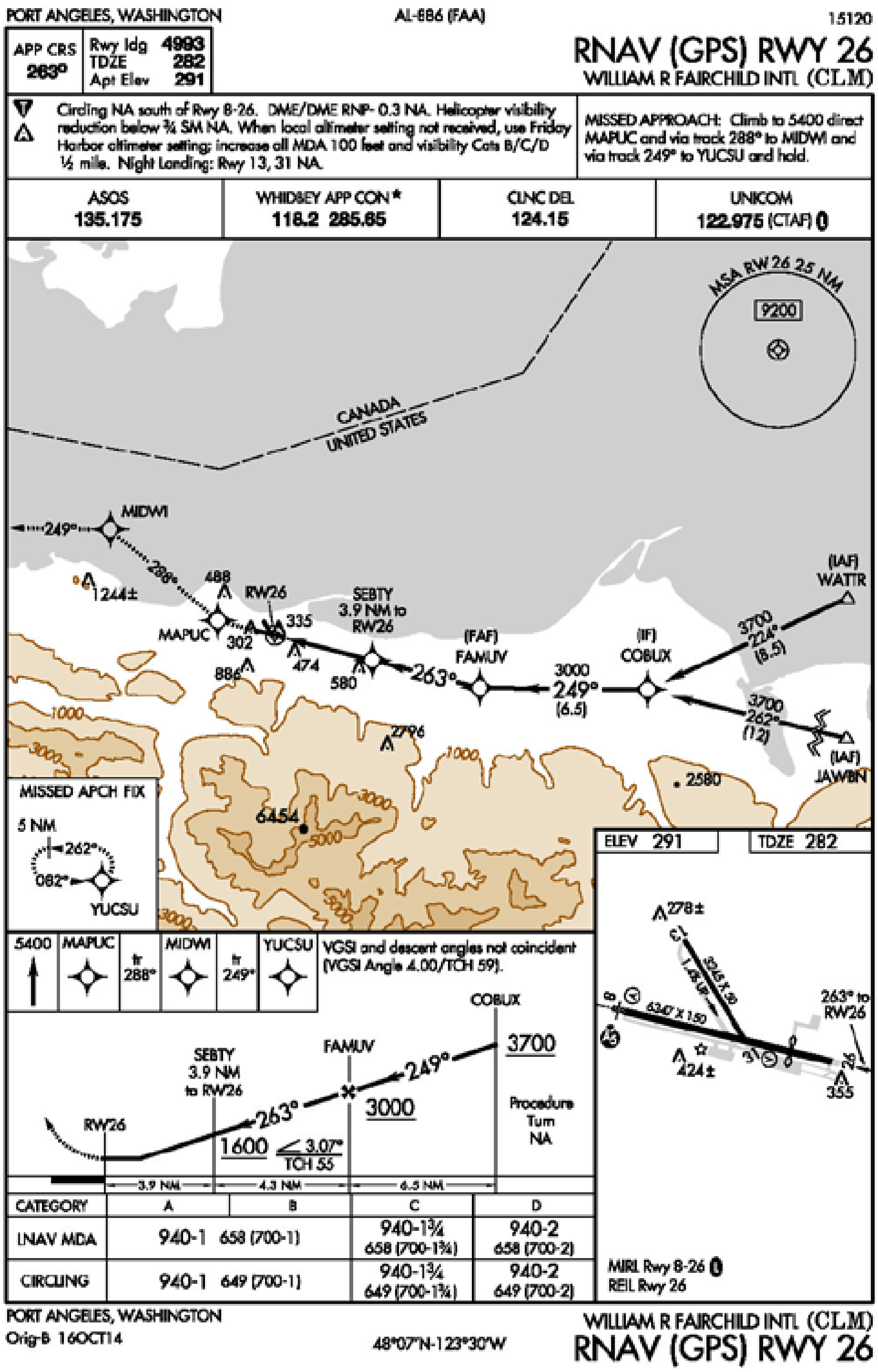
Exhibit 2-4. Runway 8 RNAV (GPS) Approach Plate



CATEGORY	A	B	C	D
LPV DA	596-½ 312 (400-½)			
LNAV MDA	1240-¾ 956 (1000-¾)	1240-1 956 (1000-1)	1240-2½ 956 (1000-2½)	
CIRCLING	1240-1¼ 949 (1000-1¼)	1240-1½ 949 (1000-1½)	1240-3 949 (1000-3)	

PORT ANGELES, WASHINGTON
Orig-C 16OCT14
48°07'N-123°30'W
WILLIAM R FAIRCHILD INTL (CLM)
RNAV (GPS) RWY 8

Exhibit 2-5. Runway 26 RNAV (GPS) Approach Plate



CATEGORY	A	B	C	D
LNAV MDA	940-1 658 (700-1)		940-1¾ 658 (700-1¾)	940-2 658 (700-2)
CIRCLING	940-1 649 (700-1)		940-1¾ 649 (700-1¾)	940-2 649 (700-2)

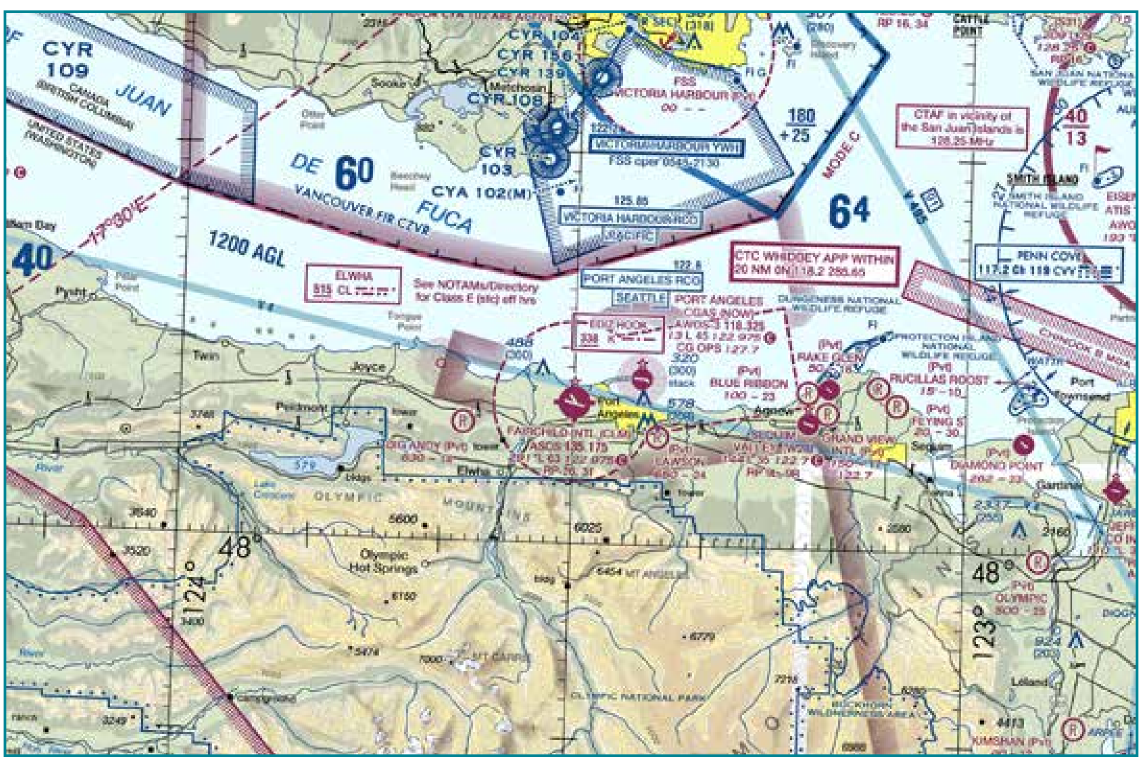
AIRSPACE & NAVAIDS

CLM functions within the local, regional, and national airspace system. Local controlled airspace surrounding the airport is designated Class E from 6:00 a.m. to 12:30 a.m.; outside of those hours it is designated Class G airspace. The configuration of each Class E airspace is tailored to individual airports, generally consisting of the immediate controlled airspace at airports without control towers and is intended to provide transition areas for instrument approaches. The Class E airspace surrounding CLM consists of the immediate airspace within a horizontal radius of 4 NM and extends from the surface up to but not including 18,000 feet AMSL. There is a rectangular extension of the Class E airspace to the east for roughly seven NM that is five NM wide. There is also a rectangular extension of Class E airspace with a floor level established at 700 feet AGL to the west that contains the IAP airspace to Runway 8. It is approximately three NM long and three NM wide.

The Chinook B Military Operations Area (MOA) is located east of the airport and the Olympic B MOA is located southwest of the airport. MOAs consist of airspace with defined vertical and lateral limits established to separate certain military training activities from other air traffic operating on Instrument Flight Rules flight plans. The Chinook B MOA airspace is established between 300 and 5,000 feet AMSL and is active intermittently, with two hours advance notice provided by Notice To Airmen (NOTAM). The Olympic B MOA airspace begins at 6,000 feet AMSL and terminates at 18,000 feet AMSL. It is active when notice is given by NOTAM.

Navigational Aids (NAVAIDS) available for use by pilots in the vicinity of CLM consist of the Elwha NDB (515 CL) and the Ediz Hook NDB (338 K). The airport is equipped with an Aeronautical Advisory Station (UNICOM) and Common Traffic Advisory Frequency (CTAF) on frequency 122.975. The Port Angeles Remote Communications Outlet (RCO) is on frequency 122.6, and the Seattle Center Approach and Departure Control is on frequency 128.3. The Automated Surface Observing System (ASOS) broadcasts on frequency 135.175. **Exhibit 2-6** depicts the regional airspace considerations surrounding the airport.

Exhibit 2-6. Airspace/NAVAIDS Summary



FAR PART 77 SURFACE PENETRATIONS

In 2006 a detailed survey was undertaken to identify each object that penetrated these surfaces in order to initiate an obstruction clearing program. This survey identified more than 4,000 penetrations to the primary, approach, and transitional surfaces for Runways 8/26 and 13/31 as shown on **Exhibits 2-7, 2-8,** and **2-9**. This survey did not include objects in the horizontal or conical surfaces. Most of the identified penetrations are trees, 1,850 of which are located on airport property. The remainder are located off airport property. In 2007 the Port initiated the obstruction removal process with a tree clearing project in the off-airport portions of the approach and transitional surfaces for Runway 26. It is the Port's intention to continue the clearing effort with initial concentration on the trees that are located on airport property, followed by the removal of any obstructions off-airport.

In August of 2015, an Airport Geographic Information System (AGIS) aerial survey was flown to create an updated map of the airport. The AGIS map also details penetrations to the Part 77 Surfaces. The aircraft operations forecast and resulting critical aircraft and runway length determination will result in runway configuration alternatives that may affect the location of the approach slopes and Part 77 surfaces. The determination of a preferred runway or airfield alternative will utilize the new AGIS data and consider the identified obstacle penetrations and the extent of the obstacles requiring removal or mitigation.

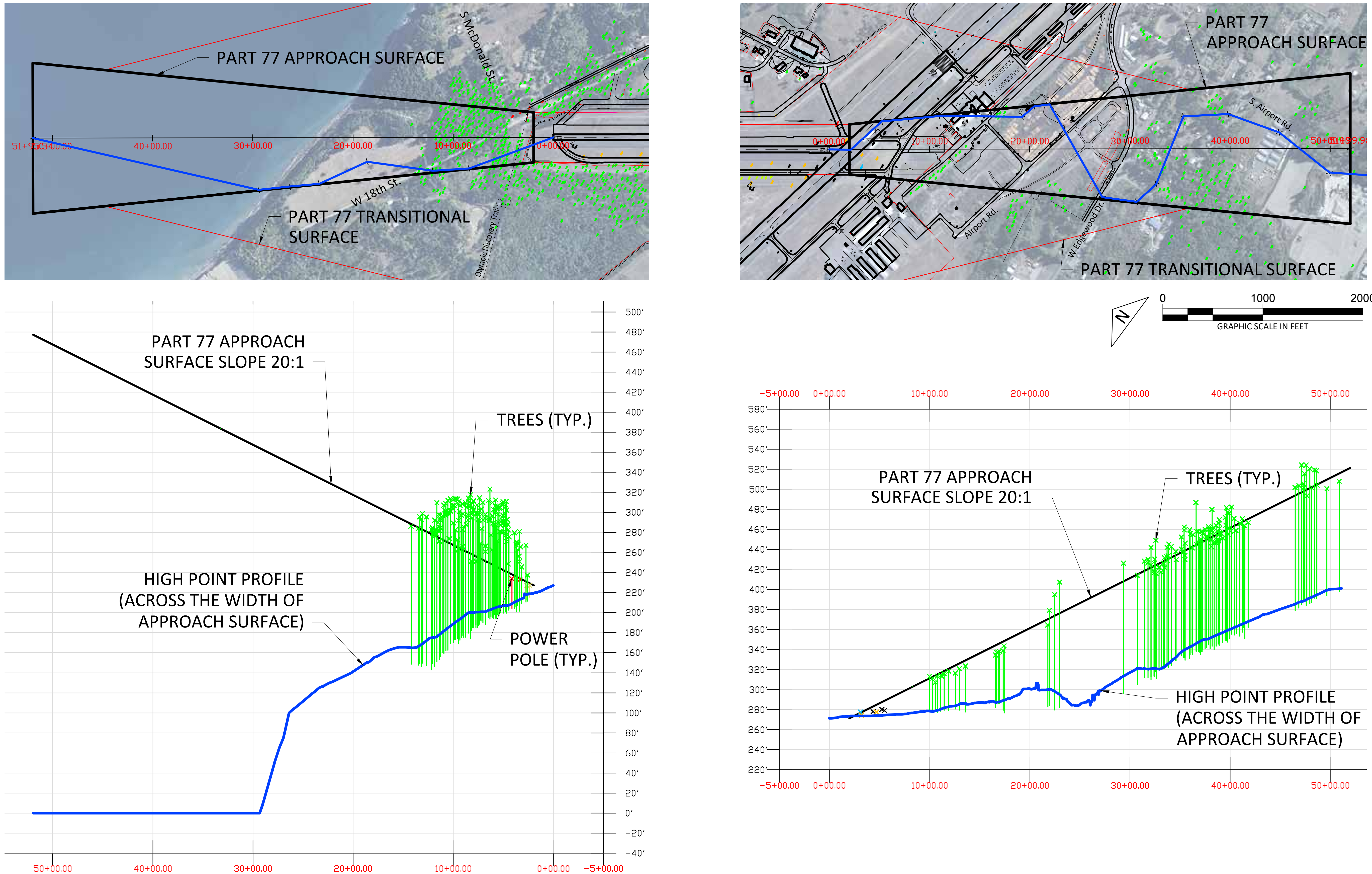


Exhibit 2-7. Exisiting Runway 13/31 Obstructions Map

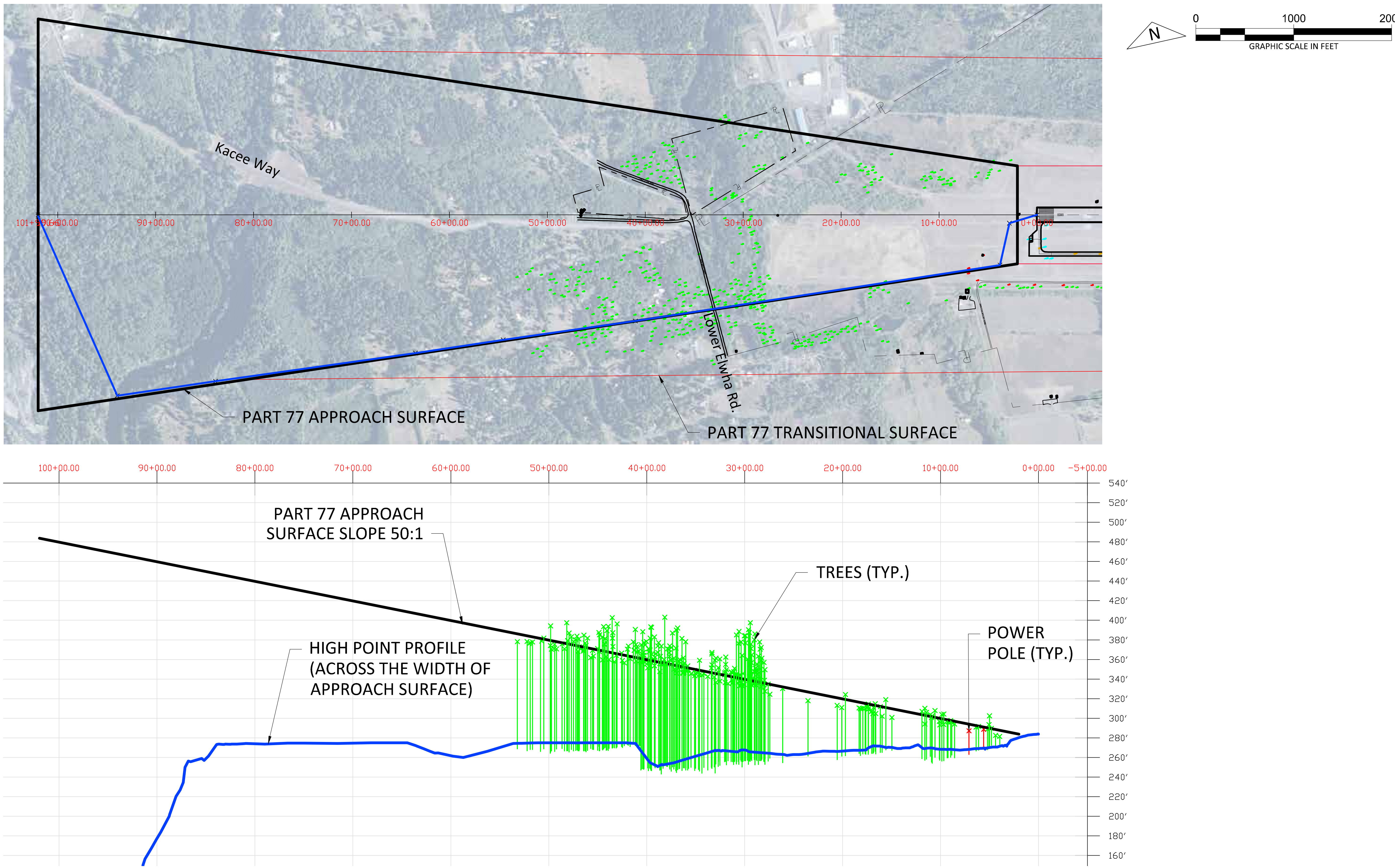


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Exhibit 2-8. Exisiting Runway 8 Obstructions Map

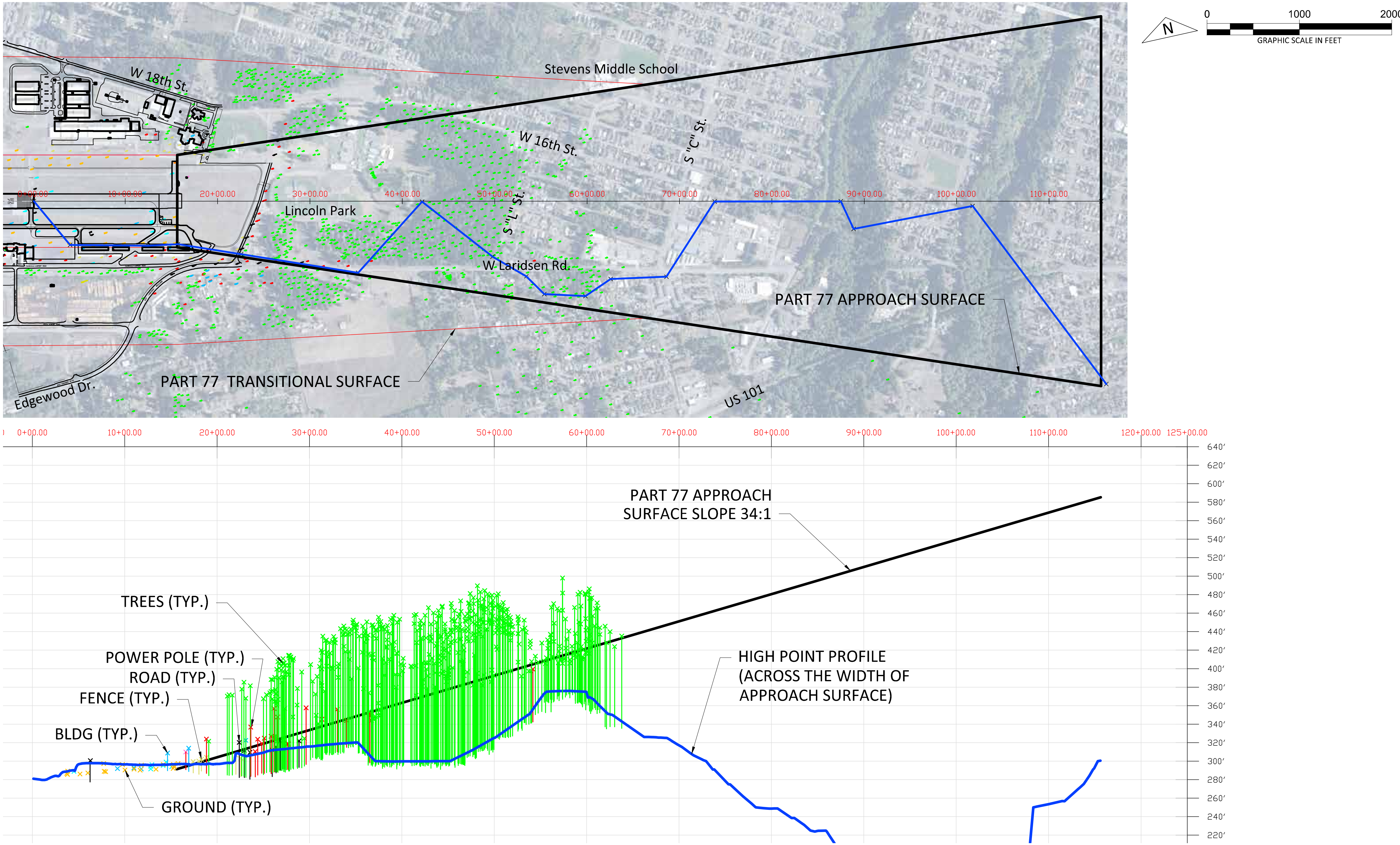

Exhibit 2-9. Exisiting Runway 26 Obstructions Map

LANDSIDE FACILITIES

TERMINAL FACILITIES

The terminal area at CLM is in the southeast portion of the airport. The passenger terminal building at the center of the terminal area was designed using a hangar building as a shell to facilitate reuse of the building should circumstances change. At one time, the terminal contained space for two airlines (ticket counters and office space), a restaurant/concessions area, restrooms, a passenger waiting area, and baggage processing facilities. Previous commercial service to and from Port Angeles connected with Boeing Field and passenger screening and Transportation Security Administration (TSA) security measures were not required. The terminal building has been remodeled to house Rite Bros. Aviation, the full service FBO serving CLM.

The terminal building is fronted to the north by the air carrier apron. This apron covers approximately 37,000 square feet and is sufficient to park two Cessna Caravan aircraft or one DeHavilland Dash 8. The auto parking lot to the south of the terminal building provides 85 paved and marked parking spaces directly in front of the terminal, with both short- and long-term parking. Additional parking is provided in unmarked gravel lots to the west and south of the paved parking area. The main airport entrance road, Airport Road, provides access to the terminal area. Airport Road intersects with West Edgewood Drive/West Lauridsen Boulevard approximately ¼ mile southeast of the terminal building.

The terminal also includes airport offices, an airport maintenance hangar, and an air cargo hangar. See **Exhibit 2-10** below for the Airport Terminal facilities.

All development within the terminal area infringes on the set-back distances from the runway and taxiway required to meet FAA B-II Design Criteria.

U.S. CUSTOMS AND BORDER PATROL

The U.S. Customs and Border Patrol operates from facilities adjacent to the FBO, where they are available to process international flights at the airport. Their on-airport facilities include office space and approximately 2,600 square feet of apron fronting the terminal reserved for incoming international aircraft parking.

GENERAL AVIATION FACILITIES

The general aviation (GA) area consists of all facilities required to service and support GA activity at CLM. As mentioned previously, Rite Bros. Aviation facilities are in the remodeled terminal building. Rite Bros Aviation is a full service FBO providing charter services, aircraft fueling (Jet A and 100LL), pilot training, and aircraft service and maintenance.

The GA apron and hangar areas to the south of Runway 8/26 include a total of 18,600 square yards for two tie-down aprons separated by the terminal area. The west GA apron includes space for 30 aircraft and the east GA apron has space for 36 aircraft. The west GA area also includes one T-shade hangar and one enclosed T-hangar owned by the Port, providing 14 shaded storage spaces and 14 enclosed spaces. There are four privately-owned enclosed T-hangars, providing 40 storage spaces. The east GA area includes four Port-owned enclosed T-hangars, providing 32 storage spaces.

Jet A and 100LL aircraft fuel is provided on the west GA apron by Rite Bros. Aviation. They operate two aboveground, 12,000-gallon-capacity storage tanks leased from the Port.

UTILITY SYSTEMS

Water: Water service is provided by an 8-inch connection located in the airport industrial park on the north side of the airport.

Sewer (Storm and Sanitary): In 2000 and 2002, a storm detention facility was constructed south and parallel to Taxiway A. The facility was designed and permitted to serve future airport development for approximately 80 acres of surface runoff.

Electric: The airport's electrical needs are served by Port Angeles City Light.

Telephone: Telephone service is provided by CenturyLink

Perimeter Fencing and Access Gates: The airport's Airport Operation Area (AOA) is completely enclosed by a perimeter security fence composed of 7- and 8-foot-high chain link fencing topped with 3-strand barbed wire.

Airport Industrial Park: The Airport Industrial Park, operated by the Port of Port Angeles, is located on the northeastern portion of the airport, east of Runway 13/31 and south of West 18th Street. Approximately 120 acres are available to lease for commercial or industrial purposes, with several existing tenants. Plans have been developed to expand these facilities to allow for more businesses. See **Exhibit 2-11** for Industrial Park layout.

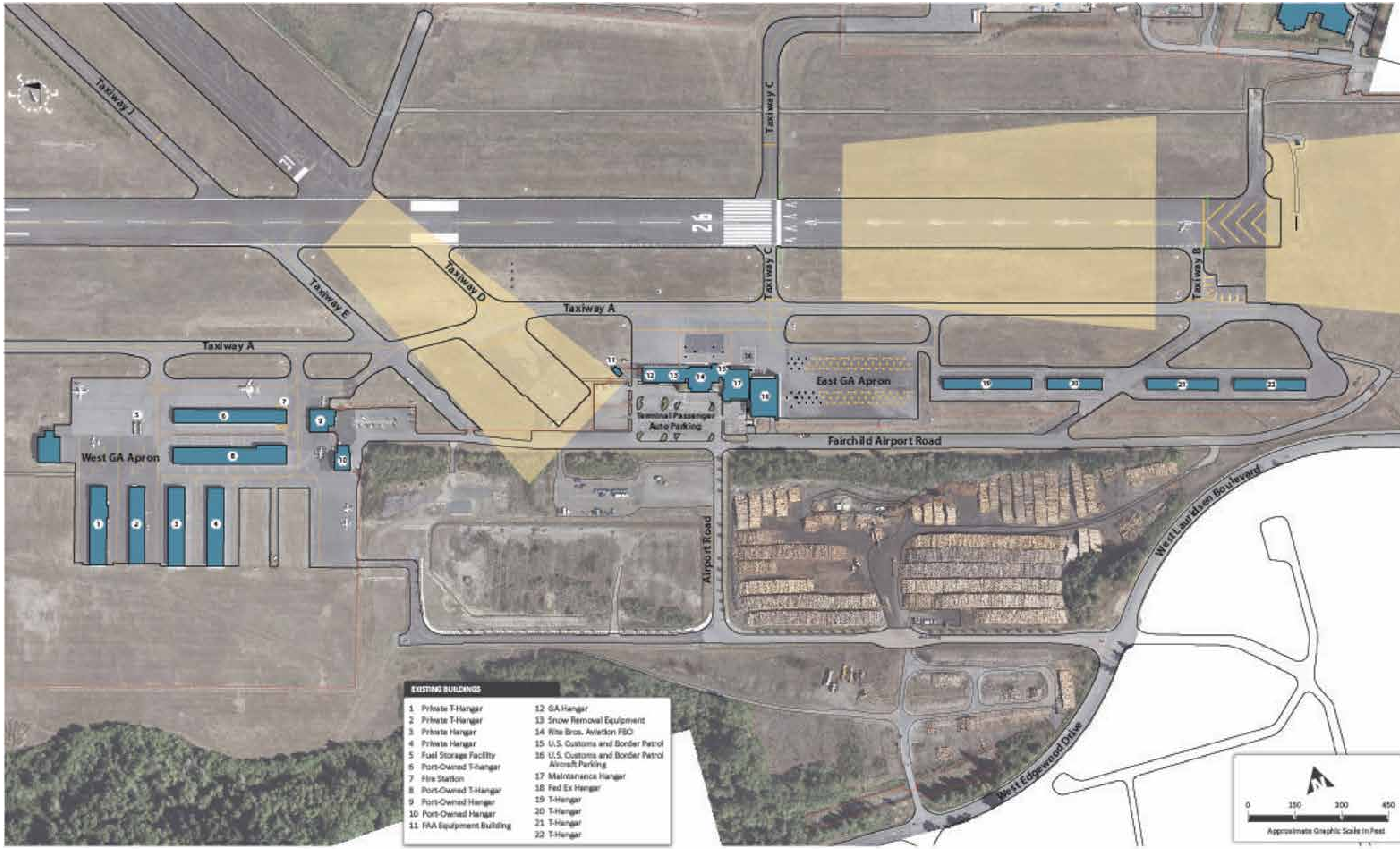

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Exhibit 2-10. Airport Terminal Area

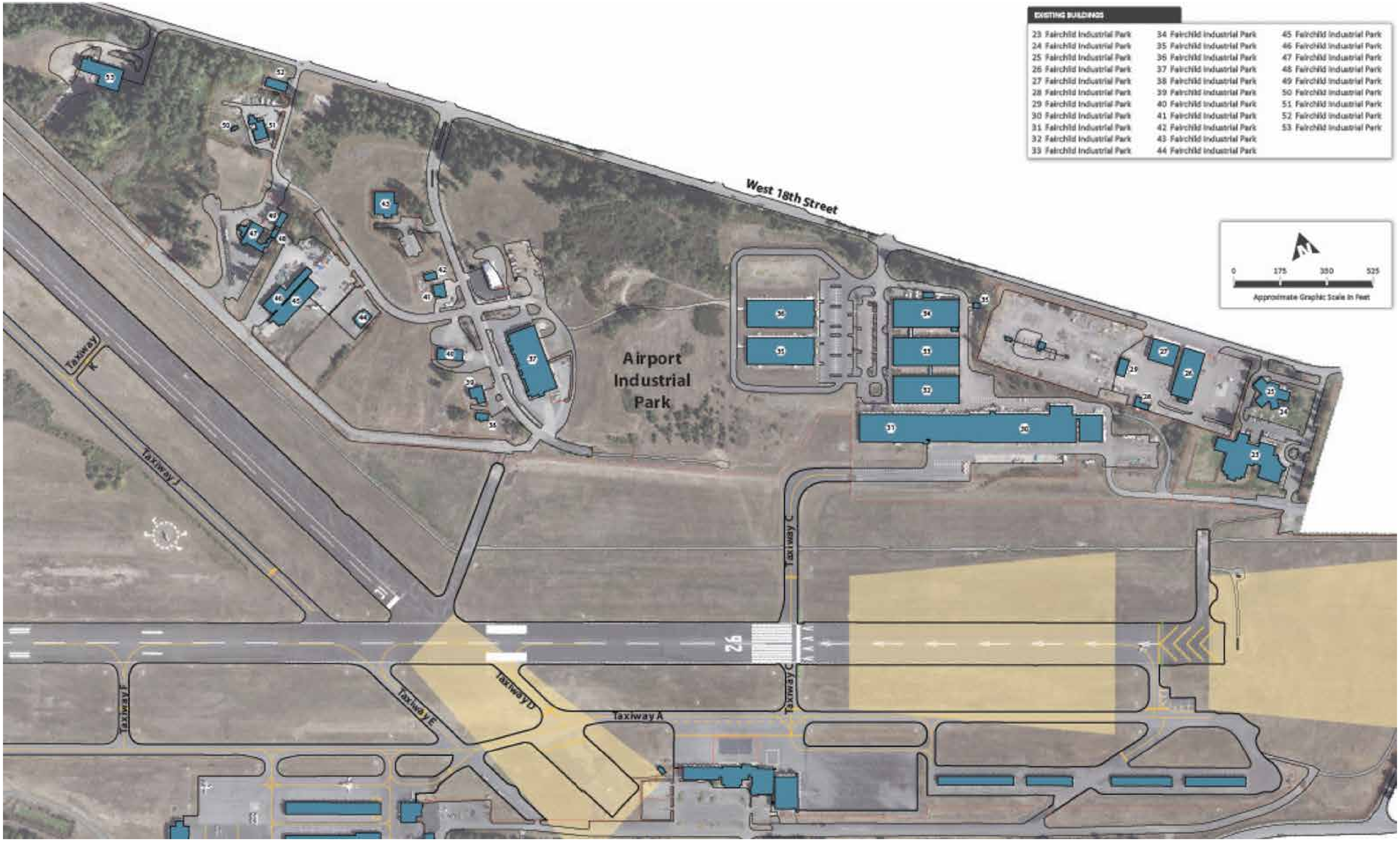

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Exhibit 2-11. Airport Industrial Park

William R. Fairchild International Airport — Master Plan Update — September 2019

INVENTORY OF EXISTING LAND USE, ZONING, & CRITICAL AREAS

An inventory of existing land use, zoning patterns, and the land use planning and control documents used to guide development of property surrounding the airport is an important element in the airport planning process. Land use compatibility with airport development is made through knowledge of what land uses are proposed and what, if any, changes need to be made.

ZONING

Pursuant to the Revised Code of Washington (RCW) 35.21.500 through 35.21.570, the City of Port Angeles has adopted zoning codes and districts in the Port Angeles Municipal Code (PAMC), Title 17, Zoning. The zoning code is intended to protect the character and maintain the stability of residential, commercial, manufacturing, and public areas within the City of Port Angeles, and to promote the orderly and appropriate development of such areas. **Exhibit 2-12** shows the existing zoning designations for properties in the airport vicinity.

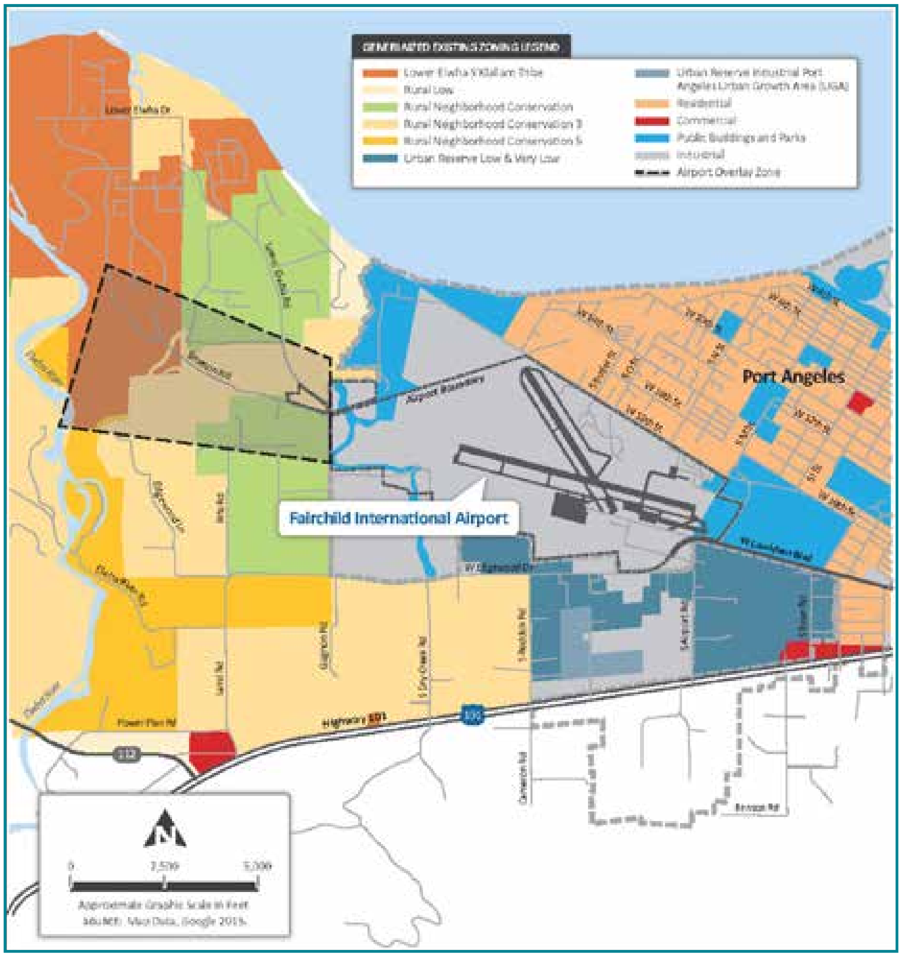
The adopted zoning map indicates that the majority of the airport is designated as an Industrial Light (IL) district. This district is an industrial zone intended to create and preserve areas for industrial uses that are largely devoid of exterior nuisance factors, such as noise, glare, air and water pollution, and fire and safety hazards on adjacent nonindustrial property, and do not have an exceptional demand on public facilities. Typical uses involve the manufacture of finished products from prefabricated materials, product wholesaling, and material storage.

The southern portion of the airport is designated as an Industrial Heavy (IH) district. This district is the least restrictive industrial zone, intended as an area where heavy industry can develop while causing the least impact on other land uses. This zone provides the basic urban land use pattern for heavy industrial uses, with direct access to major transportation facilities, design standards for greater truck traffic, and buffers for nonindustrial uses unless deemed impractical.

The properties located north of the airport, north of West 18th Street, vary in residential zoning density between Residential Single Family (RS-9 and RS-11), Residential Medium-Density (RMD), and Residential Trailer Park (RTP). RS-9 is a low-density residential zone intended to create and preserve urban, single-family residential neighborhoods consisting of predominantly single-family homes on larger than standard townsite-size lots. RS-11 is a low-density residential zone intended to create and preserve suburban-sized single-family residential neighborhoods consisting of predominantly single-family homes on larger than standard townsite-sized lots, while maintaining densities at or more than four dwelling units per acre. RMD is a medium-density residential zone that allows a mix of single-family homes, duplexes, and apartments at a density greater than single-family neighborhoods but less than the higher density residential zoning district. RTP is a medium-density residential zone intended for mobile home occupancies and regarded as essentially residential in character with few non-residential uses allowed.

To the east of the airport, property associated with Lincoln Park and the Clallam County Fairgrounds is zoned Public Buildings and Parks (PBP). This zoning designation is for publicly owned property or property less suitable for development by reason of topography, geology, or some unusual condition or situation. Typically, land with this designation is best left as "green belt." The primary intended uses are public utilities and large civic facilities; the zone provides the basic urban land use pattern for public facilities, open space, and environmentally sensitive areas where public interests are directly involved.

Exhibit 2-12. Generalized Existing Zoning



The properties located west of the airport have a mixture of IL and PBP zoning applied. The area to the north is dominated by PBP zoning; the area to the south is dominated by IL.

Most of the properties south of the airport are beyond the Port Angeles city limits but located within the designated Port Angeles Urban Growth Area (UGA) boundary. The Port Angeles UGA General Zoning Map, prepared by the Clallam County Planning Division of the Department of Community Development, indicates this area is a mixture of residential and industrial zoning.

Clallam County also zones property outside the UGA, which includes the area west of the airport beyond the Port Angeles city limits. These properties are primarily zoned Rural Character Conservation (RCC) or Rural Neighborhood Conservation (RNC). RCC is a zone intended to conserve and enhance the rural character by retaining large rural lot sizes and allowing productive woodlots, pasture lands, and other rural uses typically requiring more than five acres. RNC is purposed for maintaining low-density rural residential areas and associated uses consistent with the local character of the distinctive regions and neighborhoods found in the district. Land use is generally characterized by an existing wide range and variety of rural residential lot sizes, densities, and rural uses.

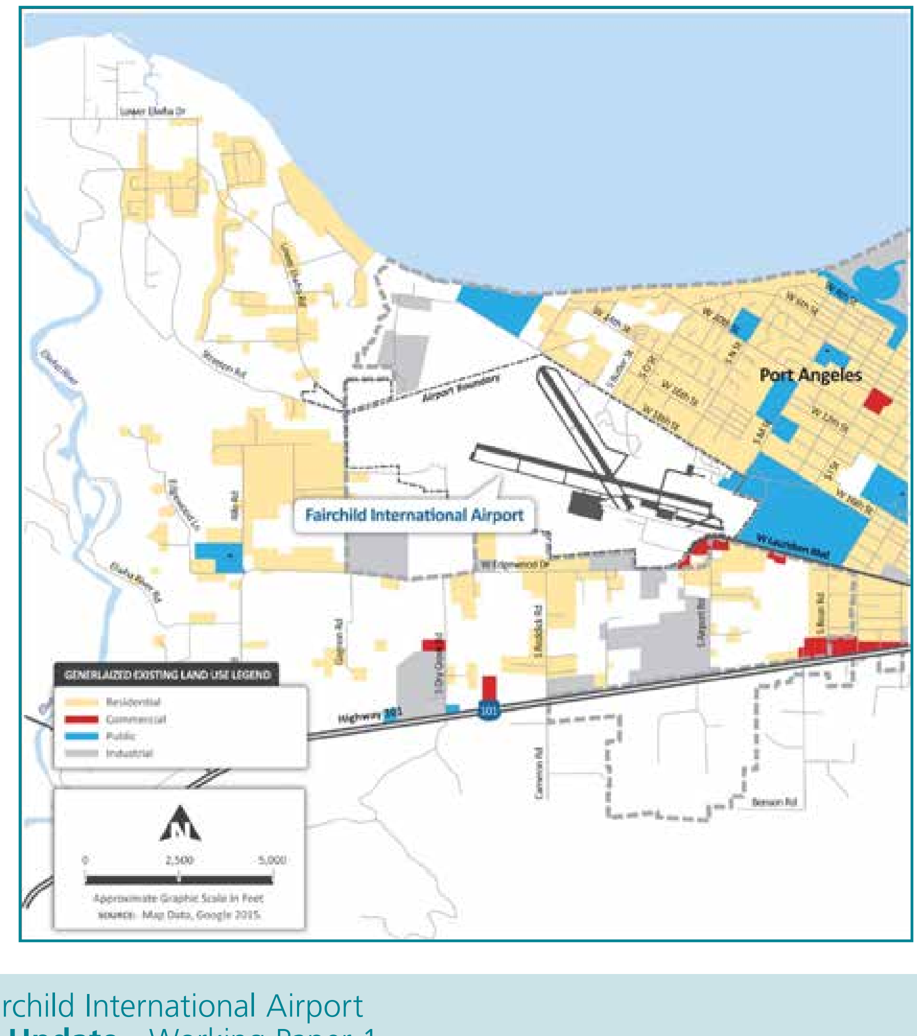
Clallam County comprehensive land use plan, in joint planning partnership with the City of Port Angeles and the Port of Port Angeles, has established airport overlay zoning regulations for designating land uses that are compatible with airport operations, including reducing hazards, protecting the viability of airports, promoting public use general aviation airports as essential public facilities, discouraging incompatible land uses that may impair future airport development and operation, protecting navigable airspace from obstructions, and promoting the public health, safety, and general welfare of County residents and aviation users. The provisions of the Airport Overlay District apply to unincorporated lands, and the overlay zones do not alter the underlying zoning designations. Development standards associated with the overlay zone shall be in addition to those of the underlying zone and, where explicitly noted, supersede the underlying zoning.

The Airport Overlay Zone adopted for CLM is to the west of the airport, beyond the Port Angeles city limits. This Airport Approach Clear Zone was created to limit the height of structures, pursuant to the FAA approach clearance standards.

EXISTING LAND USE

The existing land uses surrounding the airport follow the same general patterns as the zoning designations described above. To the north of the airport, residential land uses are dominant, except for Ocean View Cemetery, which is located northwest of Runway 13, between West 18th Street and the Strait of Juan de Fuca. Lincoln Park is the dominant land use east of the airport, but residential land uses exist north of West 16th Street and east of Lincoln Park. Southeast of the airport, south of Lauridsen Boulevard, land uses consist of residential or undeveloped land. Directly south of the airport, industrial and residential land uses are mixed. The area west of the airport is primarily scattered rural residential development but includes Dry Creek Elementary School. The existing generalized land uses are illustrated in **Exhibit 2-13**.

Exhibit 2-13. Generalized Existing Land Use



FUTURE LAND USE

The Comprehensive Plan for the City of Port Angeles serves as the core for land use controls and the basis upon which local governmental decisions are made. It sets forth the City's goals and policies and visualizes directions the City will take in the future. It is the foundation upon which the City's development regulations (Zoning, Critical Areas, and Subdivision Ordinances) and Urban Services Standards and Guidelines (Capital Facilities Plan and Urban Services and Utilities Plan) are based, and from which the City's future urban design will come. The Comprehensive Plan Land Use Map illustrates the desired urban design or development pattern for the city.

According to the map, the airport and most properties to the west will continue to be developed for industrial uses. The Comprehensive Plan has only one industrial use designation, providing flexibility to the City's Zoning Ordinance to regulate the types of industrial uses and permitted locations. There is a segment of designated open space land to the west of the airport associated with the Dry Creek drainage area. This category includes areas containing unique or major physical features, such as marine shorelines, bluffs, ravines, major streams, wetlands, critical wildlife habitat, and other natural areas deemed significant to the community, and includes park and recreational uses.

The area north of the airport, north of West 18th Street, is designated as a mixture of low- and medium-density residential uses. The low-density residential category allows an overall residential density of up to seven dwelling units per acre. It is intended for development of single family homes but provides for the development of duplexes and planned residential developments in accordance with the underlying zoning. The medium-density residential category allows for the development of multiple residential unit projects (such as duplexes, townhouses, condominiums, apartments, and planned residential development) at a density up to 13 dwelling units per acre. A stretch of open space designation is applied to the shoreline area north and west of the designated residential properties.

A large amount of open space designated to the east of the airport is associated with Lincoln Park and the Clallam County Fairground properties. North of the open space area, a low-density residential designation is applied. The properties south of the airport are primarily outside the Port Angeles city limits and have no future land use designation.

Clallam County has developed a Comprehensive Plan to identify the goals and policies for County-wide issues and provide the framework for adoption of regional comprehensive plans. The objective of a regional comprehensive plan is to provide specific means to refine and implement the general plan objectives of the county. The Port Angeles Regional Plan provides a guide for coordinated and orderly growth and development of the land and physical improvements in the unincorporated areas of the Port Angeles regional planning area, which shares its boundaries with the Port Angeles School District. While the Regional Plan provides implementation goals and policies for land use development, no physical land use map is provided. **Exhibit 2-14** shows a graphical presentation of the recommended future land use based on the Port Angeles Comprehensive Plan.

COMPATIBLE LAND USE

The compatibility of existing and planned land uses in the vicinity of an airport is typically determined in relation to the level of aircraft-generated noise but can also include other ramifications related to zoning, relocations, disruptions of communities, and induced socioeconomic impacts. Federal guidelines for a variety of compatible land uses are provided in the Code of Federal Regulations (CFR) under 14 CFR part 150, Appendix A, Table 1, Land Use Compatibility with Yearly Day Night Average Sound Levels, and included here as **Table 2-7**.

The table identifies land use types as compatible, incompatible, or compatible if conducted within a sound-attenuated structure. The table, developed by the FAA, acts as a guide to local municipalities for land use planning and control, and provides a tool to compare relative land use impacts resulting from planning alternatives. Existing noise contours were generated using the existing aircraft operational activity and fleet mix developed in Chapter 3. In the Noise section that follows, the noise contours are compared with the surrounding land uses to determine the compatible nature of the existing land uses. Additionally, future noise contours are generated using the projected aircraft operational activity and fleet mix from which to compare future incompatible land use impacts in Chapter 5.

Exhibit 2-14. Generalized Future Land Use

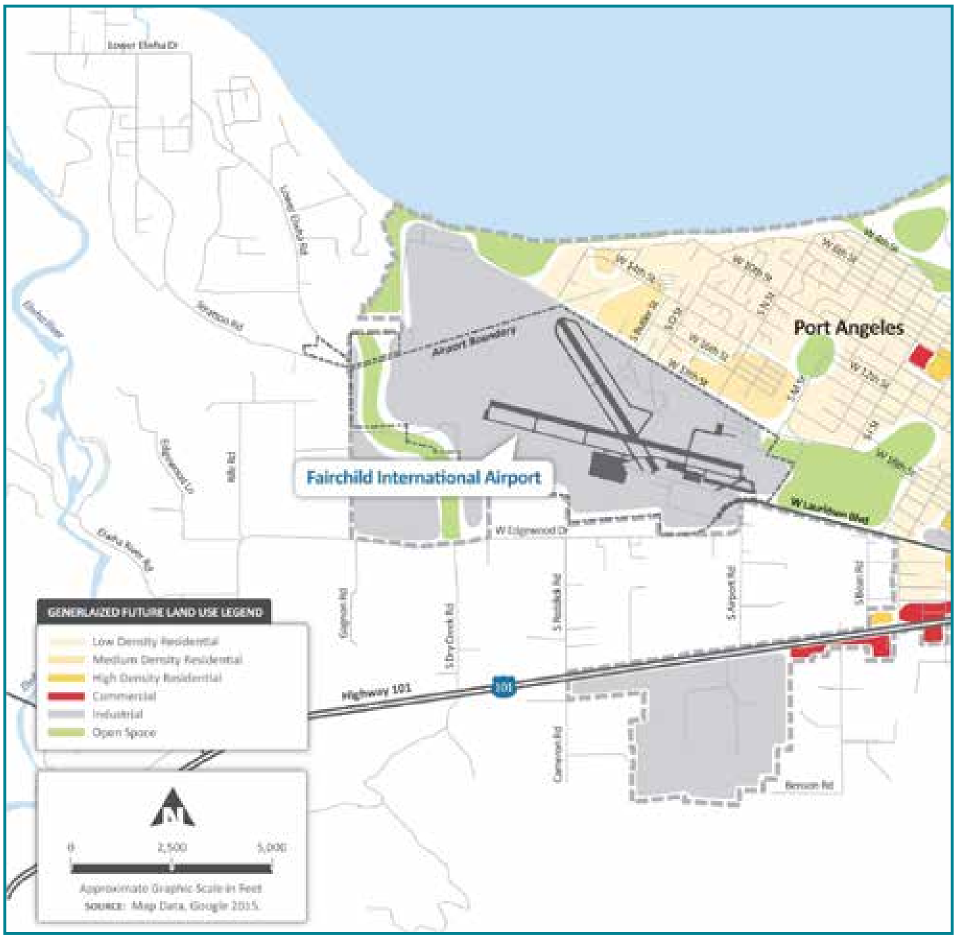


Table 2-7. Land Use Compatibility Matrix

LAND USE	BELOW 65	65-70	70-75	75-80	80-85	OVER 85
	YEARLY DAY-NIGHT NOISE LEVEL (DNL) IN DECIBELS					
RESIDENTIAL						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
PUBLIC USE						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
COMMERCIAL USE						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail-building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade-general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
MANUFACTURING AND PRODUCTION						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing resource production and extraction	Y	Y	Y	Y	Y	Y
RECREATIONAL						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

Numbers in parentheses refer to NOTES.

The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

TABLE KEY

SLUCM	Standard Land Use Coding Manual.
Y(Yes)	Land Use and related structures compatible without restrictions.
N(No)	Land Use and related structures are not compatible and should be prohibited.
NLR	Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30 or 35	Land Use and related structures generally compatible; measures to achieve NLR of 25, 30 or 35 dB must be incorporated into design and construction of structure.

NOTES

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB to 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(4) Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(5) Land use compatible provided that special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30.

(8) Residential buildings not permitted.

ENVIRONMENTAL CONDITIONS INVENTORY

AIR QUALITY

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for six criteria air pollutants: carbon monoxide (CO), ozone (O3), particulate matter (PM2.5), sulfur dioxide (SO2), nitrogen dioxide (NOx), and lead (Pb). According to the EPA, Port Angeles and Clallam County are designated as "in attainment" for all criteria pollutants under the NAAQS. An attainment area is one in which air pollution levels do not exceed the established NAAQS.

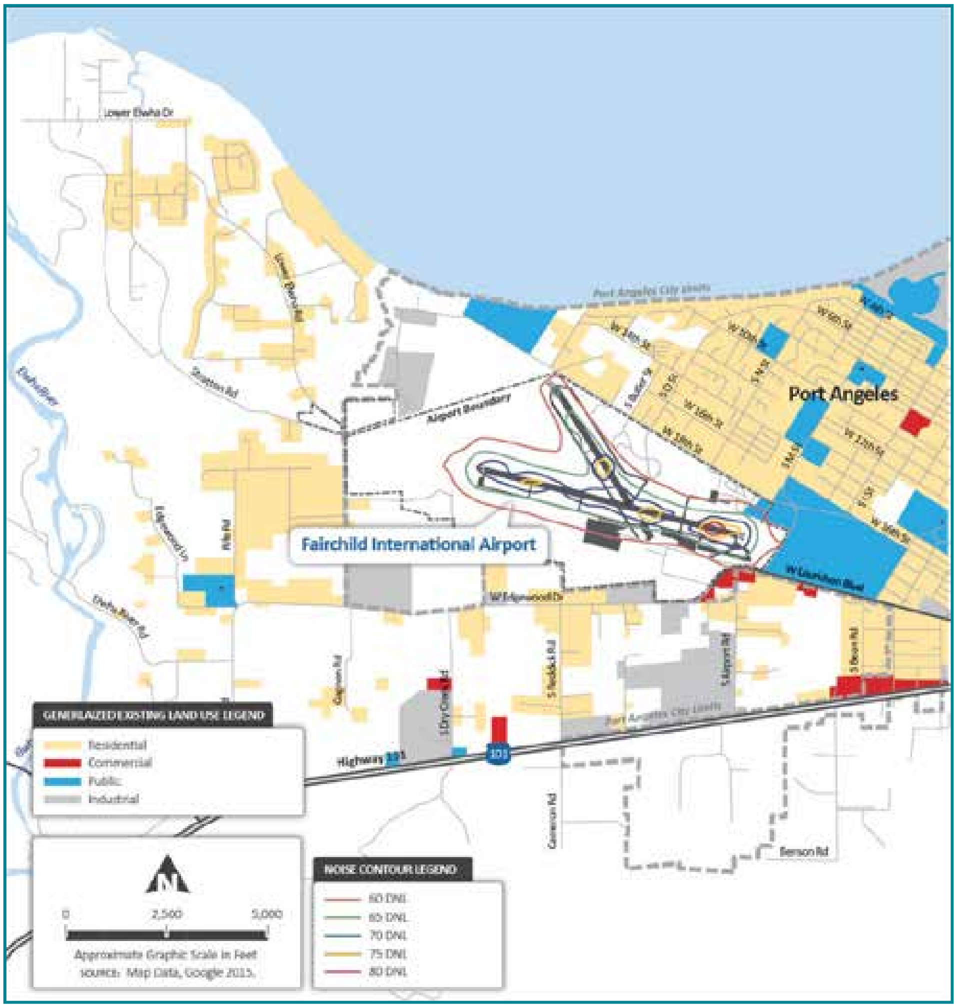
NOISE

Noise is generally defined as unwanted sound that can disturb routine activities (such as sleep, conversation, or student learning) and cause annoyance. The determination of acceptable levels is subjective. The standard unit of measurement for the loudness of sound is the decibel (dB). The FAA has determined that the cumulative noise energy exposure of individuals to noise resulting from aviation activity must be established in terms of a yearly day-night average sound level (DNL). DNL is a 24-hour, time-weighted energy average noise level based on the "A" weighted decibel dBA, in which "A" weighted refers to the sound scale pertaining to the human ear, or the overall noise energy level experienced during an entire day. Time-weighted refers to the fact that noise occurring between the hours of 10:00 p.m. and 7:00 a.m. is penalized by ten dBA to account for the higher sensitivity to noise during nighttime hours and the expected decrease in background noise levels.

DNL noise levels are depicted as noise contours, which show interpolations of noise levels based on the center of grid cells. Grid cells are squares of land of a specific size that are entirely characterized by a noise level. Noise contours connect the points of comparable noise levels, similar to topographical contours, and form concentric footprints around a noise source. These footprints surrounding an airport are used to predict community response to noise from aircraft using the airport.

As presented in **Table 2-7** earlier, FAA guidelines indicate that the 65 DNL noise contour is the threshold of significance for land use analysis. **Exhibit 2-15** provides the existing noise contours generated using aircraft operations data for 2015, overlaid on the existing land uses surrounding the Airport. As seen, the existing 65 DNL noise contour does not extend beyond airport property. The existing 60 DNL noise contour extends slightly beyond airport property to the east into commercial areas south of West Lauridsen Boulevard and into Clallam County Fairgrounds land west of South L Street and south of West 18th Street. Based on this, there are no land use incompatibilities associated with the existing noise levels generated by aircraft operations at CLM.

Exhibit 2-15. Existing (2015) Noise Contours with Existing Land Use



SECTION 4(F)

Section 4(f) of the federal Department of Transportation Act (23 CFR 774) states that agencies of the U.S. Department of Transportation cannot affect certain types of lands and resources (referred to here as "Section 4(f) resources" or "Section 4(f) properties") unless there is no feasible and prudent avoidance alternative. The action in question must also include all possible planning to minimize harm to the property in question or show that use of the property will have a de minimus or negligible impact. The following types of properties and resources are protected by Section 4(f):

- *Publicly-owned land of a park or recreation area of national, state, or local significance.*
- *Publicly-owned land of a wildlife refuge of national, state, or local significance.*
- *Land from a historic site of national, state, or local significance (defined as properties that are eligible for or listed in the National Register of Historic Places (NRHP)), unless the lead federal agency determines an exception under FAA Order 1050.1F, Policies and Procedures for Considering Environmental Impacts (FAA 2015).*

Parks and Recreation Areas: There are several park or recreation areas in the vicinity of CLM (see **Table 2-8**). With the exception of the Radio-Controlled Modelers Flying Field, these properties are publicly-owned and open to the public. No publicly-owned wildlife refuges of national, state, or local significance are on or adjacent to CLM property. Any part of a Section 4(f) property is presumed to be significant unless a statement of insignificance has been issued for the entire property by the official having jurisdiction over the site and the statement of insignificance is agreed upon by consulting parties, including the FAA.

Table 2-8. Historic Sites, Parks, & Recreation Facilities in the CLM Vicinity

FACILITY NAME	ADDRESS	ASSOCIATION WITH CLM	FACILITY DESCRIPTION
Ocean View Cemetery	3127 W. 18th St., Port Angeles, WA 98362	0.2 mi NW	Cemetery and View
Crown Park	1921 W. 4th St., Port Angeles, WA 98362	0.95 mi NE	BBQ pits, Playground, View Parking, Open Grass Areas, Picnic Tables
Shane Park	613 S. G St., Port Angeles, WA 98362	0.75 mi NW	Basketball Court, Open Field, Parking, Playground, Restrooms, Soccer Field, Softball Diamond, Walking Paths
Volunteer Field	1602 S. L St., Port Angeles, WA 98362	Adjacent E End	Baseball Field, Open Field, Restrooms, Soccer Field
Lincoln Park	1469 and 1737 W Lauridsen Blvd, Port Angeles, WA 98363	Adjacent E End	BMX Track, Clubhouse, Disc Golf Course, Dog Park, Loomis (Log Cabins) Rentals, Open Field, Picnic Tables, Playground, Restrooms, Trails, Water, Youth Baseball Field
Clallam County Fairgrounds	1608 W 16th St., Port Angeles, WA 98363	Adjacent E End	40.6-acre site with RV hookups, two large heated buildings with kitchen and restroom facilities, a grandstand, four arenas, many barns
Olympic Discovery Trail	Segment adjacent to Airport is between Lower Elwha Rd. and W 18th St.	Adjacent NW End	Paved trail and several parking areas
Olympic Radio-Controlled Modelers Flying Field	S Critchfield Road	Within SW End	Not open to the public

Historic and Archeological Properties: Section 4(f) protects only those historic or archeological properties that are listed or eligible for inclusion in the NRHP. Historic sites are normally identified during the process required under Section 106 of the National Historic Preservation Act (NHPA). In addition to the sites listed in **Table 2-10**, the potential cultural resources in **Table 2-10** (Numbers 1-14) identified during preliminary assessment under Section 106 of the NHPA are also potential Section 4(f) properties. If any of the facilities or potential cultural resources are determined to be Section 4(f) properties, there is the potential for physical use, constructive use, or de minimus use.

SECTION 106 HISTORICAL, ARCHITECTURAL, ARCHAEOLOGICAL, & CULTURAL RESOURCES

Development of CLM began in 1934, with WPA support, and continued during World War II as an outlying field for Coast Guard Air Station Port Angeles. The Thirteenth Naval District transferred ownership of CLM to Clallam County in 1948. The current airport layout dates to the World War II design, but extensive alterations to the property and adjacent facilities have occurred since that time (Howard et al. 2009; Port of Port Angeles 2015; U.S. Engineer Office 1942). Airport elements related to CLM's historical design, as well as other historical, architectural, and archaeological cultural resources, remain on CLM property.

Section 106 of the NHPA requires federal agencies, or their designated representatives, to consider the effects of their projects or undertakings on historic properties. These include districts, sites, buildings, structures, or objects that are included in or eligible for inclusion in the NRHP. The FAA is the agency responsible for carrying out Section 106 as it relates to the development of CLM, and the Port of Port Angeles is their designated representative.

Existing Conditions: No historic districts, buildings, structures, or objects have been recorded on CLM property, but much of the airport has not been studied for historical, architectural, archaeological, and cultural resources. A few limited subsurface archaeological and geotechnical investigations have been completed on CLM property along the Olympic Trail and at the airport entrance (**Exhibit 2-16**). These previously-surveyed areas do not require additional cultural resources investigation.

According to the Washington State Department of Archaeology and Historic Preservation (DAHP), there are six known archaeological sites recorded within approximately one mile of CLM (**Table 2-9**). While none of these are listed in the NRHP, some have not been evaluated for eligibility. Four of the recorded archaeological sites are within or adjacent to CLM property, including two isolated pre-contact stone (lithic) artifacts, the Ocean View Cemetery, and a segment of the historic Chicago, Milwaukee, and St. Paul Railroad main line grade (CMSP&P RR) that is now used as part of the recreational Olympic Discovery Trail.

Table 2-9. Previously-Recorded Sites within Approximately 1 mile of CLM Property

SITE NO.	DESCRIPTION	AGE	NRHP STATUS	RELATION TO CLM PROPERTY	REFERENCE
45CA553	Historic orchard	Ethnohistoric/ Historic	Not Evaluated	1 mi NW	Parvey 2006
45CA554	Lithic scatter	Pre-contact	Not Eligible	0.9 mi NW	Gillis 2006
45CA458	Chicago, Milwaukee, St. Paul & Pacific Railroad Grade	ca. 1916-1952	Not Evaluated	Adjacent	Speulda et al. 1994; Beery 2010a, 2010b; Ferland 2010a; Rinck and Heideman 2015
45CA636	Lithic isolate	Pre-contact	Not Eligible	Within	Ferland 2009a
45CA637	Lithic isolate	Pre-contact	Not Eligible	Within	Ferland 2009b
45CA609	Ocean View Cemetery	1894	Not Evaluated	0.2 mi N	DAHP 2015

Field Reconnaissance: A preliminary field reconnaissance of CLM and adjacent property was completed to identify historical, architectural, archaeological, and cultural resources that may be eligible for the NRHP. This included built-environment resources that appear to be at least 50 years of age and areas with potential for significant archaeological resources. **Table 2-10** details the 16 resources identified. Thirteen of these are built-environment resources on or adjacent to CLM property (**Exhibit 2-16**).

Table 2-10. Summary of Potential Cultural Resources on CLM Property Identified During Preliminary Assessment

NO.	RESOURCE	RELATION TO CLM PROPERTY	DESCRIPTION
1	Historic Airport (Coast Guard Air Station Port Angeles - Outlying Field/Clallam County Municipal Landing Field)	Within and Adjacent	Includes runways, taxiways and former taxiways, hangars, apron, tie-downs, at least seven remaining hardstands, a tetrahedron, abandoned road segments, and any other built or engineered historic resources that are associated with the historic airport
2	Lincoln Park and Clallam County Fairgrounds	Adjacent East	Park and Fairgrounds, including numerous buildings, structures, and landscape features over 50 years old
3	Historic outbuildings, foundations, and fruit trees near Dry Creek	Within	Includes at least four outbuildings, at least one foundation, and more than a dozen fruit trees along the southwest airport property line
4	Chicago, Milwaukee, St. Paul and Pacific Railroad grade	Adjacent West and Intersects	Railroad grade with ties and rails removed; may include culverts or other features
5	Clallam County Juvenile Correctional Facility building at 1912 W 18th St.	Within	1950's era building
6	Twin Peaks Brewery Building at 2506 W 19th St.	Within	Age unknown, but appears older than 50 years in age
7	Foundation at S corner of intersection between S Butler St. and W 18th St.	Within	Age unknown
8	Building at W corner of intersection between S Butler St. and W 18th St.	Within	Age unknown, but appears older than 50 years in age
9	Unidentified metal cylinders adjacent to fence along Olympic Discovery Trail	Within	Age unknown, but corrugated steel cylinders with plane seats and steel cylinder storage tanks may be more than 50 years old
10	Trailers at intersection of Kacee Way and Estates Way	Within	Age unknown, but appears older than 50 years in age
11	Inaccessible Building 1 north of Lower Elwha Rd	Within	Age unknown
12	Inaccessible Building 2 off Lower Elwha Rd in logging area	Within	Age unknown
13	Inaccessible Building 3 within Port Gates along eastern extension of W Saddle Club Rd	Within	Age unknown
14	Prefabricated office near logging area	Within	Age unknown
15	45CA636	Adjacent	Pre-contact Lithic Isolate
16	45CA637	Adjacent	Pre-contact Lithic Isolate

Future Cultural Resources Investigations: Future work to fulfill Section 106 requirements regarding the built-environment of CLM will likely include recording all buildings, structures, and features on CLM property that are associated with World War II-era design (such as runways, taxiways, hangars, garages, sheds, aprons, tie downs, and hardstands within or outside of the existing perimeter fence). Similar efforts to record all buildings, structures, landscape elements, and features over 50 years old related to Lincoln Park and the Clallam County Fairgrounds may be warranted, depending on project design and associated effects. The historical outbuildings, foundation, and orchard identified during the reconnaissance survey may also need to be considered as historical and possible archaeological resources. In addition, the Chicago, Milwaukee, St. Paul and Pacific Railroad grade site form will likely need to be updated and the site may need to be evaluated.

Several structures on CLM property may be older than 50 years of age. To identify all potential historic properties, the construction dates of all structures on CLM property need to be obtained from the National Archives and Records Administration (NARA), the Washington State Archives, Clallam County, the Port of Port Angeles, or other repositories. If any structures were built prior to 1965, they will need to be recorded on inventory forms. If future CLM development proposes a potential adverse effect to a recorded cultural resource, the NRHP significance of the recorded resource should be evaluated.

This preliminary assessment also considered the potential for encountering buried archaeological resources on CLM property. A designation of low, medium, or high potential for encountering archaeological resources was assigned across CLM property based on geomorphology and land development history (**Exhibit 2-16**). The designations will help guide future efforts to identify archaeological resources on CLM property, following Section 106 of the NHPA. For example, an Inadvertent Discovery Plan can be developed and applied to construction in previously developed portions of CLM property designated as having low sensitivity for archaeological resources. Subsurface surveys can be conducted at applicable intervals in areas with moderate and high sensitivity for archaeological resources, as needed based on project plans. The pre contact lithic isolates were previously determined not eligible for listing in the NRHP and their locations were disturbed in 2011 during water line installation, so no additional work related to these two archaeological sites will be required.

FARMLANDS

There are no areas of active or known historic farming within CLM property; however, according to the Soil Map for Clallam County, Washington, prepared by the National Resources Conservation Service (NRCS), most of the airport property is composed of soils considered prime farmland if irrigated or drained. The majority of airport property is composed of Clallam gravelly sandy loam with 0 to 15 percent slopes (**Table 2-11**). If irrigated, this soil is considered prime farmland. Fields south of CLM property are currently farmed or have been farmed in the past. NRCS consultation will be required to determine if the Farmland Protection Policy Act (FPPA) applies to any land converted from nonagricultural use by CLM development.

Table 2-11. Prime Farmlands within the Airport Boundary

UNIT	SOIL TYPE	NRCS RATING
12	Clallam gravelly sandy loam, 0 to 15 percent slopes	Prime farmland if drained
23	Hoypus gravelly sandy loam, 0 to 15 percent slopes	Prime farmland if irrigated
4	Bellingham silty clay loam	
43	Mukilteo muck	Prime farmland if drained
42	McKenna gravelly silt loam	Prime farmland if drained

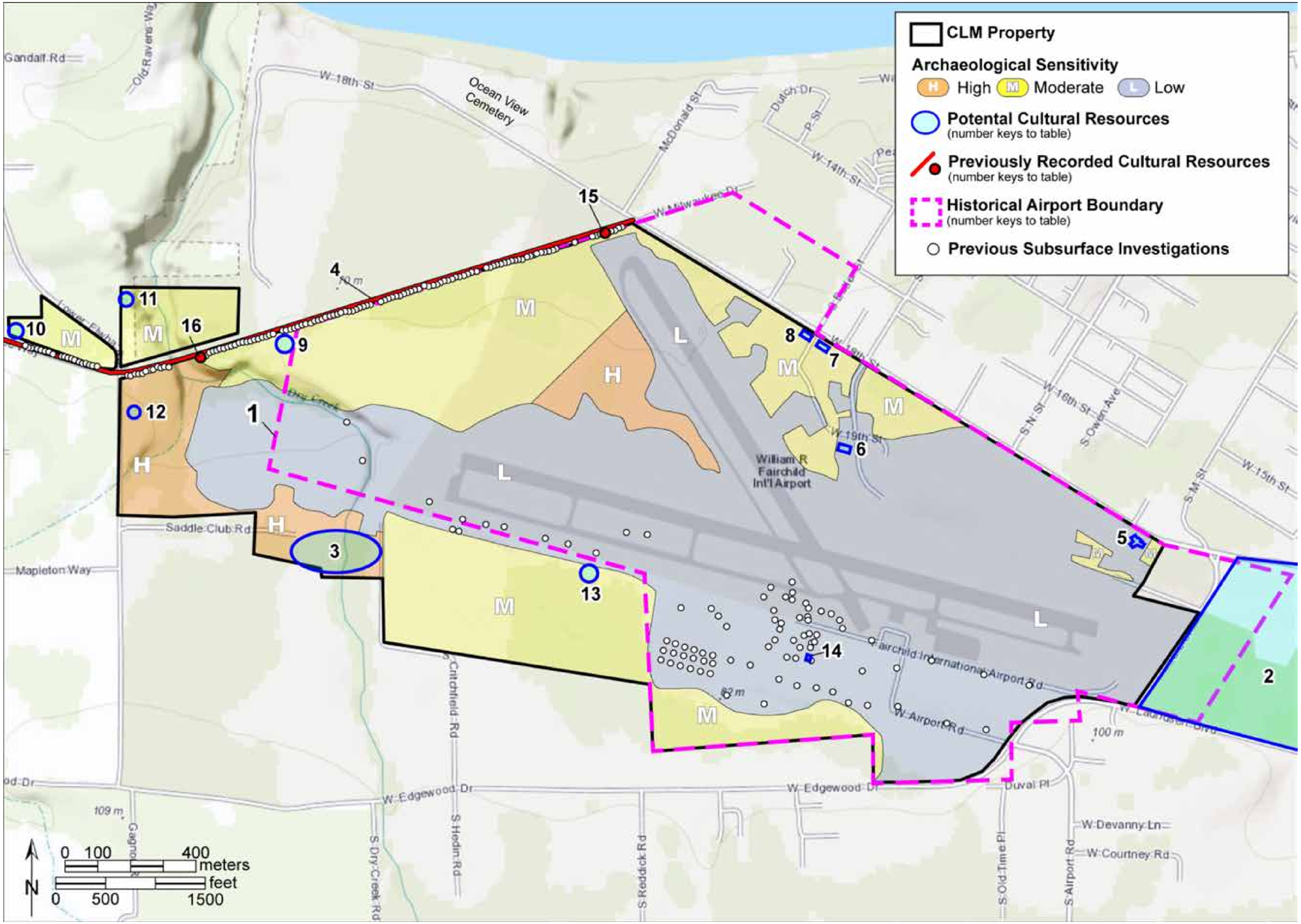


Exhibit 2-16. Summary of Previous Subsurface Investigations, Potentially Historic Built-Environment Resources, & Archaeological Sensitivity

CRITICAL AREAS

The State of Washington Growth Management Act (GMA) identifies five types of critical areas: wetlands, frequently flooded areas, geologically hazardous areas, aquifer recharge areas, and fish and wildlife conservation areas. Local jurisdictions are required by the GMA, at a minimum, to designate and protect critical areas through policies, rules, and regulations. The CLM property is in the limits of the City of Port Angeles and unincorporated Clallam County (**Exhibit 2-17**). Information to complete this critical areas assessment and the following natural resources discussions was collected from the City of Port Angeles (2015), City of Port Angeles Department of Community and Economic Development (2010), Clallam County (2015), Federal Emergency Management Agency (FEMA) (2015), and Washington Department of Fish & Wildlife (WDFW) (2015).

Critical areas located in unincorporated Clallam County are regulated under Clallam County Code (CCC) Chapter 21.12, "Critical Areas." In addition to the five GMA-mandated critical areas, the County regulates "aquatic habitat conservation areas," such as streams. Critical areas located on parcels or in rights-of-way within the City of Port Angeles are regulated under PAMC Chapter 15.20, "Environmentally Sensitive Areas Protection," and PAMC Chapter 15.24, "Wetlands." The City of Port Angeles also designates surface streams and locally unique features, such as ravines, marine bluffs, and beaches, as environmentally sensitive areas of special concern to the City.

For the purpose of this inventory, "Critical Areas" include aquifer recharge areas, streams, frequently flooded areas, geologically hazardous areas, habitat areas for priority fish and wildlife, and locally unique features within the City. Wetlands are regulated as critical areas under both City and County codes, but wetlands are discussed separately in the following inventory.

Aquatic Habitat Conservation Areas (Streams): The CLM property is bisected by several designated streams (**Exhibit 2-17**). A small unnamed intermittent tributary is mapped within the forested north central portion of the airport, west of Runway 13/31 and north of Runway 8/26. The stream channel is mapped crossing under the Olympic Discovery Trail and then flowing generally northward to the Strait of Juan de Fuca. This stream is classified as a Type 4 or 5 stream under PAMC.

Dry Creek and several Dry Creek tributaries bisect CLM property south and west of Runway 8/26 (**Exhibit 2-17**). Ravines occur at Dry Creek and an unnamed second-order tributary at the west end of Runway 8/26. A portion of Dry Creek within CLM property was realigned and the existing channel was filled and piped (tightlined) in the mid to late 1990s, but a portion of the channel remains, extending west from the end of Runway 8/26. Dry Creek and its primary tributary are classified as Type 3 streams within CLM property under both PAMC and CCC. Other second-order tributaries located southwest of CLM are classified as Type 4 or 5 streams (**Exhibit 2-17**).

Both PAMC and CCC require buffer setbacks for streams. PAMC requires 150 foot and 100 foot stream buffers for Type 3 and Type 4 streams, respectively. Type 5 channels within the City do not have additional buffer setbacks. Steam buffer requirements pursuant to CCC vary by the type of proposed development, but for the level and type of development likely as part of an airport project, stream buffer requirements would be 100 feet for Type 3 and 50 feet for Type 4 and 5 streams. **Exhibit 2-17** conservatively identifies portions of the study area that may be additionally encumbered by critical area buffers. Site-specific evaluations are required for each stream to determine the setback. In addition to stream type, buffer setbacks may vary depending on the topography, slope, and proposed land use.

Frequently Flooded Areas: Frequently flooded areas (not including streams or wetlands) are defined under PAMC and CCC as areas within flood hazard zones delineated on Flood Insurance Rate Maps (FIRMs) maintained by FEMA. FEMA FIRMs identify two 100-year flood zones (Zone A) on CLM property. The current and historic channel for Dry Creek, at the west end of Runway 8/26, is mapped as Zone A. Areas within and adjacent to a wetland complex north of West Edgewood Drive, along the south edge of CLM, is also mapped as Zone A (**Exhibit 2-17**). The Dry Creek stream channel was filled in the 1990s, but there is no record of a map update or letter of map revision to remove the 100-year flood zone designation from this portion of CLM property.

Geologic Hazard Areas: Erosion hazards, seismic hazards, and landslide hazards are mapped on CLM property. Areas mapped as erosion and landslide hazards occur within and adjacent to the two ravines conveying Dry Creek and a tributary along the west edge of CLM property. A seismic hazard area is mapped within and adjacent to a wetland complex north of West Edgewood Drive, along the south CLM property boundary, which is also mapped as a flood hazard zone (**Exhibit 2-17**).

Aquifer Recharge Areas: Several areas on CLM property are mapped as critical aquifer recharge areas. These areas include the central and north central portion of CLM, extending north from the south security fence to West 18th Street and beyond. The mapped critical aquifer recharge area includes the west half of the Industrial Park south of West 18th Street. Smaller critical aquifer recharge areas are mapped in the southwest corner of CLM property, north of West Lauridsen Boulevard and west of South L Street. An aquifer recharge area is also mapped within the Dry Creek ravine that bisects the west end of CLM.

Locally Unique Features (City of Port Angeles): All locally unique features on CLM property are otherwise identified as another type of critical area. The ravines associated with Dry Creek along the west edge of CLM include several types of critical areas and are also regulated as locally unique features for the portion within the City limits.

WETLANDS

Wetlands are regulated by the Corps of Engineers under Section 404 of the Clean Water Act. The U.S. Army Corps of Engineers (Corps) defines wetlands as areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions.

According to the National Wetlands Inventory (NWI), there are two freshwater forested/shrub wetlands and one freshwater emergent wetland on CLM property. Consultant staff conducted a reconnaissance-level site investigation to verify the NWI resource mapping, and the field inventory found that wetlands on CLM property are larger and more extensive than delineated by the NWI. The site inventory found six unmapped wetland areas (**Exhibit 2-17**). These additional wetland areas were determined to be regulated wetlands by investigating soils, vegetation, and hydrology. Both PAMC and CCC require buffer setbacks for wetlands. **Exhibit 2-17** conservatively identifies portions of the study area that may be additionally encumbered by critical area buffers. Site-specific delineations and ratings are required for wetlands to determine each setback. In addition to wetland rating, buffer setback distances may vary depending on the topography, slope, and proposed land use.

THREATENED & ENDANGERED SPECIES

The federal Endangered Species Act (ESA) requires federal agencies to ensure that any action authorized, funded, or carried out by such agency does not jeopardize the continued existence of any species listed as endangered or threatened under the ESA and does not result in the destruction or adverse modification of critical habitat. According to the U.S. Fish and Wildlife Service (USFWS), twelve species listed as endangered or threatened under the ESA are known to occur within Clallam County. Additionally, there is one candidate species and two species under federal review in the county.

According to the USFWS Critical Habitat Mapper, there are no ESA-designated Critical Habitats on CLM property. The National Oceanic and Atmospheric Administration Marine Fisheries Service (NMFS) lists the lower reach of Dry Creek, north of CLM property, as proposed Critical Habitat for Steelhead Trout. Habitats located within CLM property include grassland; low-elevation forest and riparian woodlands; scrub-shrub, forested, and emergent wetlands; and perennial and intermittent streams. Based on the presence of these general habitat types, it is possible that nine ESA-regulated or potentially regulated species could occur within CLM property (**Table 2-13**). These include the marbled murrelet, yellow-billed cuckoo, northern spotted owl, bull trout, dolly varden, Taylor's check-

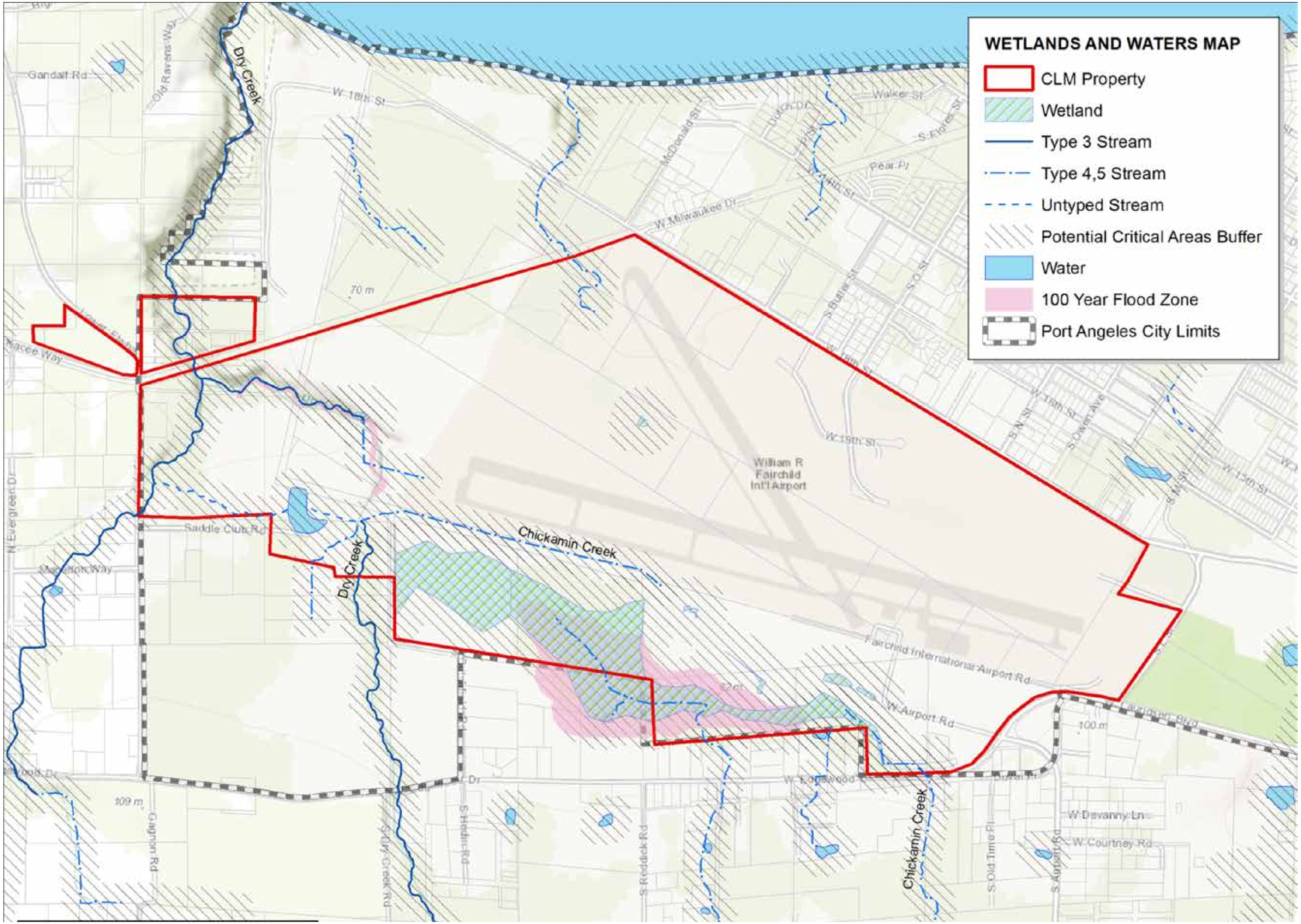


Exhibit 2-17. Map Showing Wetlands and Waters on CLM Property

erspot, Burrington jumping-slug, and Hoko vertigo. However, lacking a formal ESA Critical Habitat designation, the presence of potentially suitable habitat does not indicate ESA species occur on CLM property. A determination of the presence or absence of these species must be made prior to undertaking development projects at CLM.

In addition to the federal ESA, Washington State has several laws regarding endangered species and local regulating agencies. The WDFW Priority Habitats and Species (PHS) List identifies eighteen priority areas for six species occurring on or near CLM property (**Table 2-12**). These priority areas include occurrences, migration corridors, breeding areas, and management buffers for coho, cutthroat, chum, steelhead, northern spotted owl, and Townsend's big-eared bat. Both PAMC and CCC require a submittal of a habitat management plan to mitigate for potential impacts to priority species for development proposals.

Table 2-12. Clallam County Threatened, Endangered, Candidate, & Priority Species[1]

GROUP	COMMON NAME	SCIENTIFIC NAME	STATUS
Birds	Short-tailed Albatross	Phoebastria albatrus	Federal Endangered
Birds	Marbled Murrelet*	Brachyramphus marmoratus	Federal Threatened
Birds	Yellow-billed Cuckoo*	Coccyzus americanus	Federal Threatened
Birds	Northern Spotted Owl*	Strix occidentalis caurina	Federal Threatened, State Endangered, PHS Listed
Fishes	Bull Trout*	Salvelinus confluentus	Federal Threatened
Fishes	Dolly Varden*	Salvelinus malma	Federal Proposed Threatened
Fishes	Chinook Salmon	Oncorhynchus tshawytscha	Federal Threatened
Fishes	Fall Chum*	Oncorhynchus keta	PHS Listed
Fishes	Sockeye Salmon	Oncorhynchus nerka	Federal Threatened
Fishes	Coho Salmon*	Oncorhynchus kisutch	PHS Listed
Fishes	Cutthroat Trout*	Oncorhynchus clarki	PHS Listed
Fishes	Steelhead Trout*	Oncorhynchus mykiss	Federal Proposed Threatened, PHS Listed
Insects	Taylor's Checkerspot*	Euphydryas editha taylori	Federal Endangered
Insects	Sand-verbena Moth	Copablepharon fuscum	Federal Under Review
Mammals	Townsend's Big-eared Bat*	Corynorhinus townsendii	State Candidate, PHS Listed
Plants	Whitebark Pine	Pinus albicaulis	Federal Candidate
Reptiles	Leatherback Sea Turtle	Dermochelys coriacea	Federal Endangered
Reptiles	Green Sea Turtle	Chelonia mydas	Federal Threatened
Snails	Burrington Jumping-slug*	Hemphillia burringtoni	Federal Under Review
Snails	Hoko Vertigo*	Vertigo sp.	Federal Under Review

Notes: 1 USFWS 2015 and WDFW 2015

** species with potential habitat within study area.*

FLOODPLAINS

Frequently flooded areas are regulated as critical areas under City and County code. Floodplains are also regulated separately under federal policy. Executive Order 11988 directs federal agencies to take action to reduce the risk of flood loss; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. The CLM property contains two geographic areas within the 100-year floodplain (**Exhibit 2-17**).

Chapter 3

Aviation Demand Forecasts

INTRODUCTION

This chapter develops forecasts of aviation activity for CLM. Forecasts are a key element in the airport planning process and are used in determining future airport requirements, analyzing alternative development plans, assessing the possible environmental effects of proposed plans, and determining the economic implications of future growth and development. While forecasting is not an exact science, it can identify general parameters for development and provide a defined rationale for development activities. The forecasts presented in this chapter are prepared for short-, intermediate-, and long-range time frames using 2015 as the base year.

HISTORIC FORECASTS

Aviation activity forecasting commences by utilizing the present time as an initial point, supplemented with historic data obtained from various sources, and compared to trends and forecasts. Forecasts used for comparison purposes in this Master Plan Update include the most recent CLM Airport Master Plan (2012), the WSDOT Aviation Division Long-Term Air Transportation Study (LATS) (2009), the FAA's Terminal Area Forecast (TAF) (2015), and the FAA Aerospace Forecasts 2015-2035.

The most recent Airport Master Plan prepared for CLM was published in September of 2011, using 2007 as the base year for forecasts. The forecasts predicted continued growth in enplanements, scheduled commercial aircraft operations, corporate operations, and general aviation operations and a summary of the forecasts are presented in **Table 3-1**. A comparison of the predictions contained in the Airport Master Plan for the year 2012 with the actual airport activity presented in **Table 3-2** indicates that commercial service aircraft operations and general aviation aircraft operation matched fairly well, air cargo aircraft operations were below actual conditions, and enplanements, air cargo tonnage, based aircraft, and military operations were well above actual conditions. Recent changes in the operational levels at the airport, especially the loss of scheduled commercial service when Kenmore Air withdrew service to Port Angeles in November 2014, call for a reevaluation of aviation forecasts.

The WSDOT Aviation Division prepared the LATS in 2009 using 2005 base year data to assess the statewide aviation system capacity and formulate an implementation plan to address future air transportation needs. As a part of LATS, forecasts of future activity were developed at the statewide level, with commercial air service and air cargo activity forecasts determined for individual airports provided with air service, including CLM. However, because of the age of the LATS forecast and the many changes transpiring within the aviation industry during the intervening years, caution must be used when using or comparing LATS with the forecasting efforts of this Master Plan Update..

Table 3-1. Summary of the 2011 William R. Fairchild International Airport Master Plan Aviation Forecasts

ACTIVITY	2007	2012	2017	2022	2027
Commercial Activity					
Annual Enplaned Passengers	15,860	16,866	17,937	19,079	20,295
Total Annual Passengers	31,720	33,732	35,875	38,158	40,590
Commercial Aircraft Operations	6,205	6,205	6,205	6,205	6,205
Air Cargo Activity					
Annual Enplaned Tonnage	519	659	807	967	1,165
Air Cargo Aircraft Operations	624	624	624	624	728
General Aviation Activity					
Based Aircraft	98	104	111	119	126
Single Engine Piston	92	94	94	95	95
Multi Engine Piston	6	7	9	12	15
Turbojet	0	2	6	8	11
Rotor	0	1	2	4	5
General Aviation Operations	46,100	49,506	52,390	55,003	57,861
Military	675	675	675	675	675
Total Operations	53,604	57,010	59,894	62,507	65,469

HISTORIC & EXISTING AIRPORT ACTIVITY

With no on-site Airport Traffic Control Tower (ATCT), there are limited historical records that provide accurate aviation activity information for CLM. A tabulation of the best available historical aviation information is presented in **Table 3-2**, which combines data from estimates from the FAA's Terminal Area Forecasts (TAF), results from a recent user survey, and estimates provided by the airport's sole Fixed Base Operator (FBO) and airport personnel. It should be noted that TAF data at non-towered airports is dependent on information contained on the airport's FAA Form 5010, which is typically updated by generalized estimates provided by airport sponsors. It is not unusual for 5010 Forms, and consequently TAF data, to contain inaccurate and repeated data from year to year, as contained in **Table 3-2**. This is a result of the time required to "count" activity (e.g., daily, weekly, or annually) is just not available for most personnel.

Therefore, for this Master Plan Update, thorough discussions with FBO and airport personnel were conducted that led to the activity estimates provided for 2015. The personnel were quizzed on the daily, weekly, monthly, or seasonal activity occurring at CLM and asked to provide their perspective on the activity. Being the sole FBO, Rite Bros. Aviation personnel provide flight instruction, aircraft rental, charter flights, as well as the fueling and maintenance of virtually all aircraft at the airport, either based or transient. From January through August 2015, FBO personnel maintained a fuel log of gallons of fuel sold, company name purchasing the fuel, and type of aircraft. Having a virtual around-the-clock presence at CLM provides a unique perspective that is unmatched and the ability to offer accurate, reasonable, and professional judgment on aviation activity at CLM. CLM personnel also conducted a survey of based aircraft at the airport in Port-owned and privately-owned hangars in November 2015.

Table 3-2. Historical Aviation Activity, 2005-2015

YEAR	ENPLA-NEMENTS	AIR TAXI OPERATIONS	GA OPERATIONS	MILITARY OPERATIONS	TOTAL OPERATIONS	BASED AIRCRAFT
2005[1]	18,790	6,205	46,100	370	52,675	85
2006[1]	15,657	6,205	46,100	370	52,675	85
2007[1]	14,763	6,205	46,100	675	52,980	98
2008[1]	12,468	6,205	46,100	675	52,980	98
2009[1]	12,978	6,205	46,100	675	52,980	85
2010[1]	10,266	6,205	46,100	675	52,980	85
2011[1]	8,538	6,205	46,100	675	52,980	85
2012[1]	6,019	6,205	50,000	370	56,575	85
2013	2,0855	6,205[1]	50,000[1]	370[1]	56,575[1]	85[1]
2014	4,2335	6,205[1]	50,000[1]	370[1]	56,575[1]	86[1]
2015	---	4,958[2,3]	20,000[2]	2,100[2]	27,058[2]	70[4]

Sources: 1 FAA TAF, January 2015.
2 FBO estimate, verified by CLM personnel, November 2015.
3 Includes air cargo aircraft operations.
4 CLM personnel survey of based aircraft, November 2015.
5 FAA Air Carrier Activity Information System (ACAIS) database, November 2015.

Additionally, a user survey was prepared and distributed to based aircraft owners, airport tenants, and corporate transient users of CLM using records provided by airport personnel. Because a limited number of survey responses were received, it is thought that the results from the survey are not as indicative of actual airport activity as the estimates provided by FBO and airport personnel. The results do provide insight into the various aircraft types using CLM and the needs and desires of aircraft owners.

FBO and CLM personnel believe that the historic data provided in the table through 2014 is inaccurate. FBO personnel estimate that air taxi and general aviation operational levels for 2005 to 2008 were actually higher than the historic numbers presented. Both CLM and FBO personnel estimate that when the economic recession began in 2008, operational activity decreased consequently through 2014. For these reasons, it is believed that the 2015 estimates provided by FBO personnel and verified by CLM personnel presented in **Table 3-2** are more reliable, accurate, and reflective of existing airport activity than those historically contained in the TAF.

ENPLANEMENTS

CLM is the only airport on the Olympic Peninsula where commercial airline service has been available historically, with continuous service provided from the 1970s through 2014 by various airlines such as Alaska Airlines (via Horizon Airlines) West Isle Air, and most recently Kenmore Air. Until they withdrew service in late 2014, Kenmore Air provided service from CLM to King County International Airport/Boeing Field in Seattle. Currently, there is no regularly-scheduled commercial airline service at the airport. According to the TAF data presented in **Table 3-2**, enplanements at CLM steadily declined from 18,790 in 2005 to 3,604 in 2014, when Kenmore Air withdrew service.

AIRCRAFT OPERATIONS

Historically, commercial airline service has been provided at CLM using the 19-seat Swearingen Metroliner, the 35-seat Bombardier Dash 8-Q200, and the 9-seat Cessna Caravan aircraft. Air cargo operations consist of the regularly scheduled daily flights by FEDEX and UPS (using contractors) operating turbine-powered single engine Cessna Caravan aircraft, as well as the non-scheduled carriers that periodically serve the airport. CLM is the premier general aviation airport on the entire Olympic Peninsula, providing two runways, instrumentation for operating in inclement weather conditions, and a full service FBO. Tourism associated with the Olympic National Park and the Puget Sound/Strait of Juan de Fuca entices some additional general aviation activity in the summer months through scenic flight service, park visitors, and deep-sea fishing. It is a critical and necessary component for emergency operations planning purposes, medical flights, search and rescue mission, forest fire fighting, and government-related activities such as drug interdiction, Elwha dam restoration, and U.S. Coast Guard and Army helicopter training. The TAF estimated that the airport had 52,675 annual aircraft operations in 2005 (an operation is defined as a takeoff or a landing; if an aircraft performs a touch-and-go, it is counted as two operations). A decade later, in 2015, according to estimates provided by CLM and FBO personnel, the airport had an estimated 27,058 annual aircraft operations. While this would appear to be a large decrease in operations, as presented earlier, the estimate provided for 2015 is deemed more accurate and reflective of actual airport activity than estimates provided historically in the TAF.

BASED AIRCRAFT

Based aircraft have fluctuated throughout the timeframe represented in the table, increasing from 85 in 2005 to a high of 98 in 2007 to 2008, before decreasing to the 70 aircraft currently based at CLM. Airport personnel provided an up-to-date count (November 2015) of aircraft based at CLM into basedaircraft.com, and as with aircraft operations, the more accurate accounting explains the seemingly drastic decrease compared to previous years.

EXISTING AIRCRAFT OPERATIONS BY AIRCRAFT TYPE

Table 3-3 provides the existing number and percentage of operations at CLM for each aircraft type. Air taxi aircraft operations are generally classified as any company or individual performing air passenger and/or air cargo transportation service on a nonscheduled basis over unspecified routes, although the historical data presented in the previous table also includes the scheduled commercial airline aircraft operations conducted at CLM in the past. The air cargo operations recorded in **Table 3-3** include non-scheduled air cargo carriers that periodically serve CLM.

Table 3-3. Existing Operations by Aircraft Type, 2015

AIRCRAFT TYPE	OPERATIONS	PERCENTAGE
Air Taxi	**3,800**	**14.0%**
Single Engine	3,500	92.1%
Multi-Engine Piston	50	1.3%
Multi-Engine Turboprop	75	2.0%
Business Jet	125	3.3%
Helicopter	50	1.3%
Air Cargo	**1,158**	**4.3%**
Single Engine Turboprop	1,083	93.5%
Multi-Engine Piston	50	4.3%
Multi- Engine Turboprop	25	2.2%
General Aviation	**20,000**	**73.9%**
Single Engine	17,500	87.5%
Multi-Engine Piston	400	2.0%
Multi-Engine Turboprop	600	3.0%
Business Jet	500	2.5%
Helicopter	1,000	5.0%
Military	**2,100**	**7.8%**
Fixed Wing	100	4.8%
Helicopter	2,000	95.2%
Total	**27,058**	

Source: FBO and CLM personnel estimates, November 2015.

FACTORS AFFECTING AVIATION ACTIVITY

The amount and kind of aviation activity expected at an airport, while dependent on multiple factors, are typically reflective of the general economic conditions prevalent within the surrounding area, the services available to aircraft operators, and the businesses located on the airport or within the region. The meteorological conditions under which the airport operates (both daily and seasonally), the expected aviation regulatory climate, the prominence an airport has within the region, and tourist attractions within the region also have an effect on the anticipated aircraft activity.

SOCIOECONOMIC CONDITIONS

Historically, airport activity has been influenced by national, regional, and local trends in population, income, and employment (i.e., socioeconomic conditions). Population figures indicate the general number of persons served by the airport and, therefore, the potential customer base. Employment levels are a gauge of economic activity and vitality of a particular region. Income levels indicate the degree to which the airport's customer base has sufficient disposable income to spend on aviation activities (such as purchasing tickets, owning aircraft, and chartering or renting aircraft).

POPULATION

The historic and projected population changes for Clallam County, Jefferson County, the State of Washington, and the United States are present in **Table 3-4**. Clallam and Jefferson Counties are expected to increase in population through 2040, but at significantly different rates.

Table 3-4. Population Comparison – Historic & Projected Growth

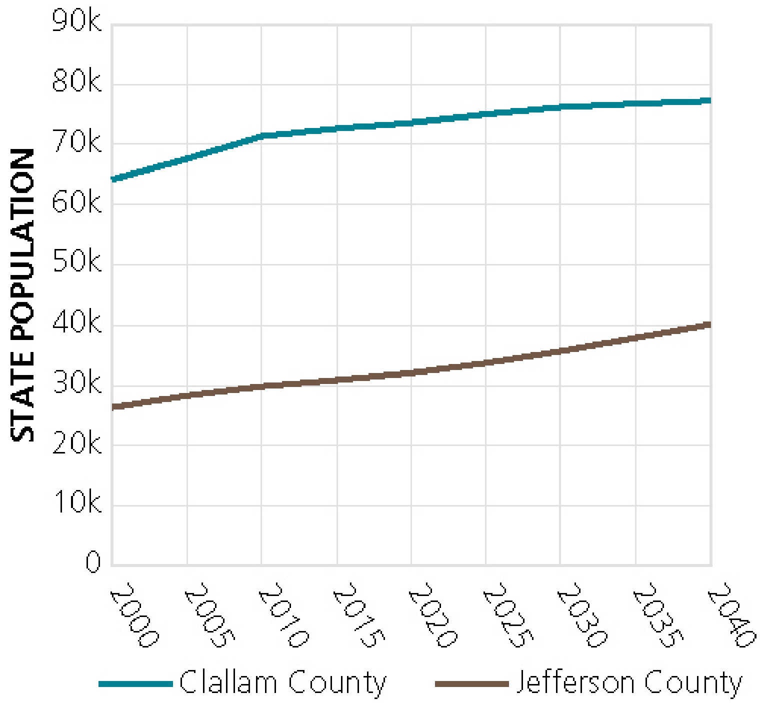
YEAR	Clallam County	% Change	Jefferson County	% Change	State of Washington	% Change	United States[1]	% Change
2000	64,179		26,299		5,894,143		281,424.6	
2005	67,672	5.4%	28,356	7.8%	6,298,816	6.9%	265,516.6	5.0%
2010	71,404	5.5%	29,872	5.3%	6,724,540	6.8%	309,349.7	4.7%
2015	72,650	1.7%	30,880	3.4%	7,061,410	5.0%	321,369.0	3.9%
Growth Rate	0.8%		1.1%		1.2%		0.9%	
2020	73,616	1.3%	32,017	3.7%	7,411,977	5.0%	334,503.0	4.1%
2025	75,022	1.9%	33,678	5.2%	7,793,173	5.1%	347,335.0	3.8%
2030	76,112	1.5%	35,657	5.9%	8,154,193	4.6%	359,402.0	3.5%
2035	76,786	0.9%	37,914	6.3%	8,483,628	4.0%	370,338.0	3.0%
2040	77,224	0.6%	40,093	5.7%	8,790,981	3.6%	380,219.0	2.7%
Growth Rate	0.2%		1.0%		0.9%		0.7%	

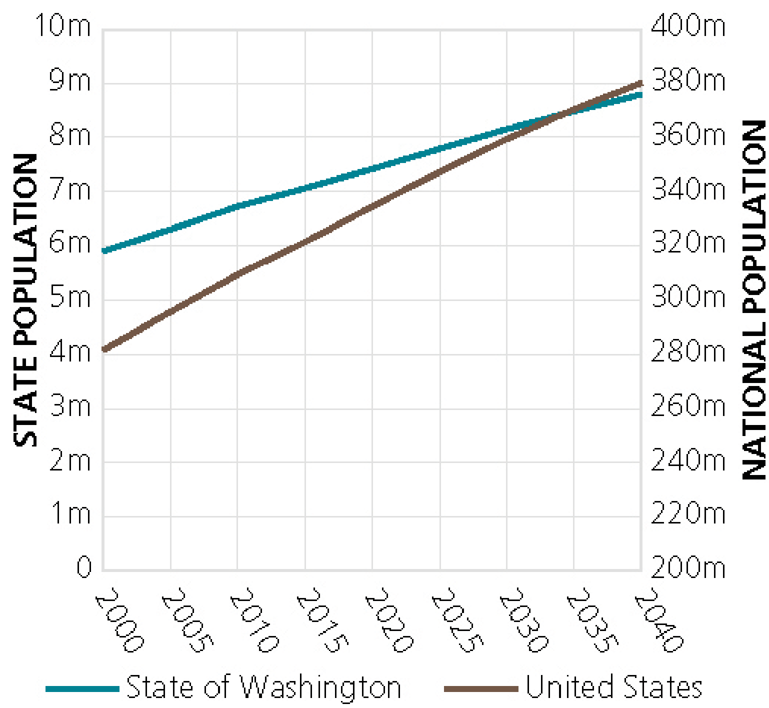
Source: *Washington State Office of Financial Management (OFM).*

1 In thousands.

Exhibit 3-1 provides a graphic illustration of the historic and forecasted population for Clallam and Jefferson Counties, the State of Washington, and the United States.

Exhibit 3-1. Population Comparison, 2000-2040





INCOME

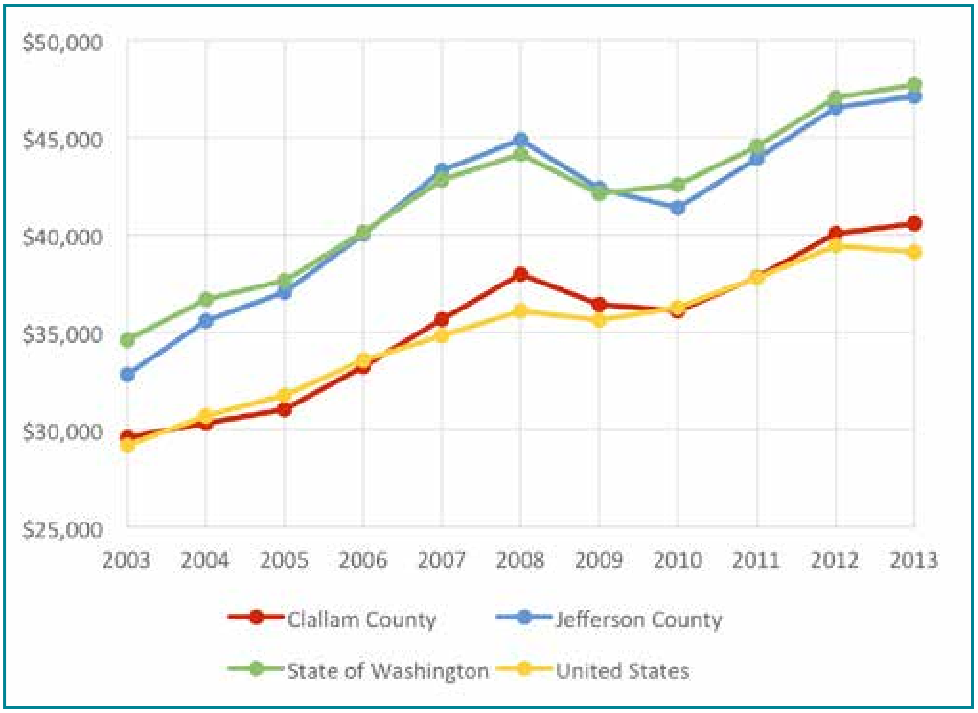
The historic income changes for Clallam and Jefferson Counties, the State of Washington, and the United States are provided in **Table 3-5**. The data shows that the Jefferson County per capita personal income grew at a faster rate than Clallam County, the State of Washington, and the United States, and that income levels for Clallam County have historically been below Jefferson County and the state, but for the most part have mirrored the national averages.

Table 3-5. Historic Per Capita Personal Income, 2003-2013

YEAR	CLALLAM COUNTY	JEFFERSON COUNTY	STATE OF WASHINGTON	UNITED STATES
2003	$29,607	$32,822	$34,609	$29,198
2004	$30,346	$35,598	$36,689	$30,697
2005	$31,029	$37,054	$37,638	$31,760
2006	$33,226	$40,018	$40,127	$33,589
2007	$35,667	$43,284	$42,829	$34,826
2008	$37,962	$44,893	$44,143	$36,101
2009	$36,428	$42,393	$42,137	$35,616
2010	$36,109	$41,380	$42,547	$36,274
2011	$37,828	$43,925	$44,565	$37,804
2012	$40,052	$46,532	$47,055	$39,440
2013	$40,586	$47,111	$47,717	$39,123
Growth Rate	3.2%	3.7%	3.3%	3.0%

Source: Bureau of Economic Analysis, "Table CA1-3 Personal Income Summary." Website accessed November 2015.

Exhibit 3-2. Per Capita Personal Income Comparison, 2003-2012



EMPLOYMENT

Table 3-6 provides the historic employed persons, unemployed persons, and the unemployment rates within Clallam and Jefferson Counties, the State of Washington, and the United States. The table shows that the unemployment rates have been consistently higher in Clallam and Jefferson Counties than the State of Washington and the United States.

Table 3-6. Historic Employment Data, 2005-2014

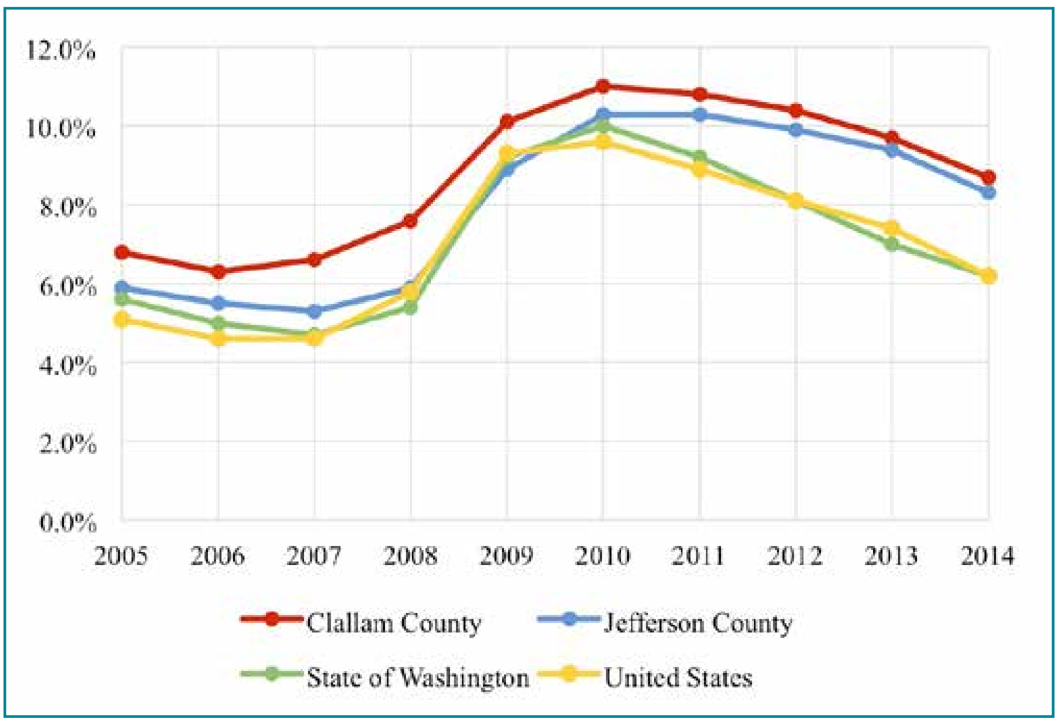
	CLALLAM COUNTY			JEFFERSON COUNTY			STATE OF WASHINGTON			UNITED STATES[1]		
Year	Employment	Unemployment	Unemployment Rate	Employment	Unemployment	Unemployment Rate	Employment	Unemployment	Unemployment Rate	Employment	Unemployment	Unemployment Rate
2005	27,521	2,005	6.8%	12,798	800	5.9%	3,082,399	181,304	5.6%	141,730	7,591	5.1%
2006	27,739	1,880	6.3%	12,861	742	5.5%	3,156,626	167,312	5.0%	144,427	7,001	4.6%
2007	28,041	1,966	6.6%	12,968	728	5.3%	3,243,308	159,855	4.7%	146,047	7,078	4.6%
2008	27,811	2,272	7.6%	12,906	810	5.9%	3,291,309	187,268	5.4%	145,362	8,924	5.8%

	CLALLAM COUNTY			JEFFERSON COUNTY			STATE OF WASHINGTON			UNITED STATES[1]		
2009	27,306	3,068	10.1%	11,995	1,176	8.9%	3,211,649	323,551	9.2%	139,844	14,265	9.3%
2010	26,352	3,269	11.0%	11,436	1,314	10.3%	3,160,544	350,782	10.0%	139,064	14,825	9.6%
2011	25,376	3,071	10.8%	10,812	1,245	10.3%	3,139,999	319,201	9.2%	139,869	13,747	8.9%
2012	25,219	2,922	10.4%	10,744	1,179	9.9%	3,190,015	281,143	8.1%	142,469	12,506	8.1%
2013	24,641	2,649	9.7%	10,322	1,075	9.4%	3,216,966	243,072	7.0%	143,929	11,460	7.4%
2014	24,620	2,334	8.7%	10,242	931	8.3%	3,270,362	217,821	6.2%	146,305	9,617	6.2%

Source: Bureau of Labor Statistics, "Local Area Unemployment Statistics." Website accessed November 2015.
1 In thousands.

Exhibit 3-3 provides a graphic illustration of the unemployment rates for Clallam County, Jefferson County,Washington, and the United States.

Exhibit 3-3. Unemployment Rates Comparison, 2005-2014



Major employment sector in Clallam County include Government, Retail Trade, Education and Health Services, Leisure and Hospitality, Mining, Logging, and Construction, and Manufacturing. Major employers in the county include government and quasi-government entities (i.e., schools, hospital, city government, county government, Port of Port Angeles, and Peninsula College), Westport Shipyards, ACTI, Nippon Paper Industries, Interfor, Green Crow, Walmart, Lakeside Industries, Hermann Brothers Logging, and Bruch & Bruch Construction.

The companies and facilities at the Port of Port Angeles are major economic generators within Clallam County, providing a total of approximately $213.1 million in direct business revenue and 2,069 jobs in 2012. It is estimated that when including direct, indirect, and induced impacts, the Port and its tenants generated 4,091 jobs in Clallam County alone, and a total of 4,579 jobs within Washington State[1].

While Clallam and Jefferson Counties have been adversely affected by the recent economic recession and slow recovery that began in late 2007, the Port facilities and tenants are expected to remain stable throughout the forecast period, as evidenced by the recent decreases of the unemployment rate at the county, state, and national level. Additionally, the Port of Port Angeles has embarked on a two-year redevelopment of the waterfront, is establishing of a marine trades industry, and has recently broke ground of the Composite Recycling Technology Center, a 25,000-square foot facility housing offices, laboratories, classrooms, and manufacturing space for the recycling center and the Peninsula College's Advanced Manufacturing-Composite Technology training program[2].

REGULATORY CLIMATE

For forecasting purposes in this Master Plan Update, it is assumed that the Federal regulatory climate of the aviation industry in general will not change dramatically during the forecast time period. Specifically, it is assumed that Federal aircraft noise and emission requirements will remain within the bounds prescribed by current rules and regulations, no new Federal or local user fees will be imposed on general aviation aircraft, and that access to airports and airspace will not be limited or constrained. Additionally, it is expected that general aviation airports will not be subject to security restrictions that are currently imposed at commercial service airports.

1 BST Associates (April 8, 2014). ***Port of Port Angeles 2012 Economic Impact Study.***

2 Sloan, Jeff (September 28, 2015). ***Port of Port Angeles breaks ground on composites recycling center. Retrieved from http://www.compositesworld.com/news/port-of-port-angeles-breaks-ground-on-composites-recycling-center***

AVIATION ACTIVITY FORECASTS

FORECAST METHODOLOGIES

A wide variety of forecasting techniques have been developed to address aviation activity and overall demand. A technique's effectiveness depends on the availability and accuracy of the data. The three most common methodologies are briefly described below.

REGRESSION ANALYSIS

In a regression analysis forecast, the value being estimated or forecast (the dependent variable) is related to other variables (the independent or explanatory variables, which "explain" the estimated value[3]). A correlation coefficient is calculated for each pairing of dependent to independent variables to quantify this link. One major advantage of regression analysis is that if the independent variables are more readily projected than the forecast or dependent variable, then deriving a forecast is relatively easy.

MARKET SHARE ANALYSIS

A market share analysis is a relatively easy method to use and can be applied to any measure for which a reliable higher-level (i.e., larger aggregate) forecast is available. Historical shares are calculated and used as a basis for projecting future shares. This approach is a "top-down" method of forecasting, since forecasts of larger aggregates (i.e., national aviation forecasts) are used to derive forecasts for smaller areas (i.e., individual airport aviation forecasts).[4]

TREND ANALYSIS

Trend analysis relies on projecting historic trends into the future. In trend analysis, a regression equation is used, with time as the independent variable. It is one of the fundamental techniques used to analyze and forecast aviation activity. While it is frequently used as a back-up or expedient technique, it is highly valuable because it is simple to apply. Sometimes trend analysis can be used as a reasonable method of projecting variables that would be complicated to project by other means.[5]

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3 FORECASTING AVIATION ACTIVITY BY AIRPORT. *Federal Aviation Administration Office of Aviation Policy and Plans Statistics and Forecast Branch (APO-110) Washington, DC (2001).*

4 ibid

5 ibid

COMMERCIAL SERVICE FORECASTS

For this analysis, forecasts will be provided for enplaned passengers (enplanements), commercial service aircraft fleet mix, and the commercial service aircraft operations.

Commercial passenger service was provided at CLM from the 1970s through 2014. Until they withdrew service in late 2014, Kenmore Air provided service from CLM to King County International Airport/Boeing Field in Seattle. Currently, there is no regularly-scheduled commercial airline service at the airport.

The Port of Port Angeles conducted an Air Service Market Study in early 2015 that analyzed the potential for a return of scheduled commercial airline service to CLM. The study determined that the "catchment" area for CLM consisted of eight zip codes within an approximately 30-mile radius from the airport, as presented in **Exhibit 3-1**. This area encompasses a population base of 88,623 people, annual originating passengers of 66,670, and a true market demand of 107,455 passengers. It ranges from Port Angeles on the north to the Clallam/Jefferson County line to the south, from near Forks in the west to Hood Canal in the east, comprised mainly of Clallam County but including portions of northeastern Jefferson County. The Market Study concluded that SeaPort Airlines was the most likely airline to provide service to CLM.

Exhibit 3-1. 2014 Air Service Market Study Catchment Area

In October 2015, SeaPort Airlines announced that it would provide service from CLM to Seattle-Tacoma International Airport (Sea-Tac) beginning on March 1, 2016. Initial service would consist of five roundtrips to Sea-Tac each weekday, with three trips each on Saturdays and Sundays. All flights would be operated with 9-passenger Cessna Caravan turbine-powered single engine aircraft. The initial flights will be operated on a non-secure basis (i.e., no TSA screening), with passengers being required to pass through Sea-Tac terminal security screening prior to boarding connecting flights; however, CLM has future plans to add a TSA security screening station to improve the level of service for CLM passengers.

PASSENGER ENPLANEMENT FORECAST

Table 3-7 provides the historical (2005-2014) enplanements at CLM compared to those for the State of Washington and the FAA's Airports Northwest Mountain Region (which includes the states of Washington, Oregon, Utah, Idaho, Montana, Wyoming, and Colorado), and shows the respective market share of CLM compared to each region. The table shows a steady decline in the market share of CLM compared to the State of Washington and the Northwest Mountain Region, consistent with the steady decline in the enplanements at CLM between 2005 and 2014. Based on the discrepancy between declining enplanements trend at CLM and the increasing enplanement trends within the State of Washington and the Northwest Mountain Region, there does not appear to be a consistent trend that can be used for forecasting; therefore, traditional forecasting methodologies for enplanements that employ trend analysis or market share analysis are not reliable and would not be applicable.

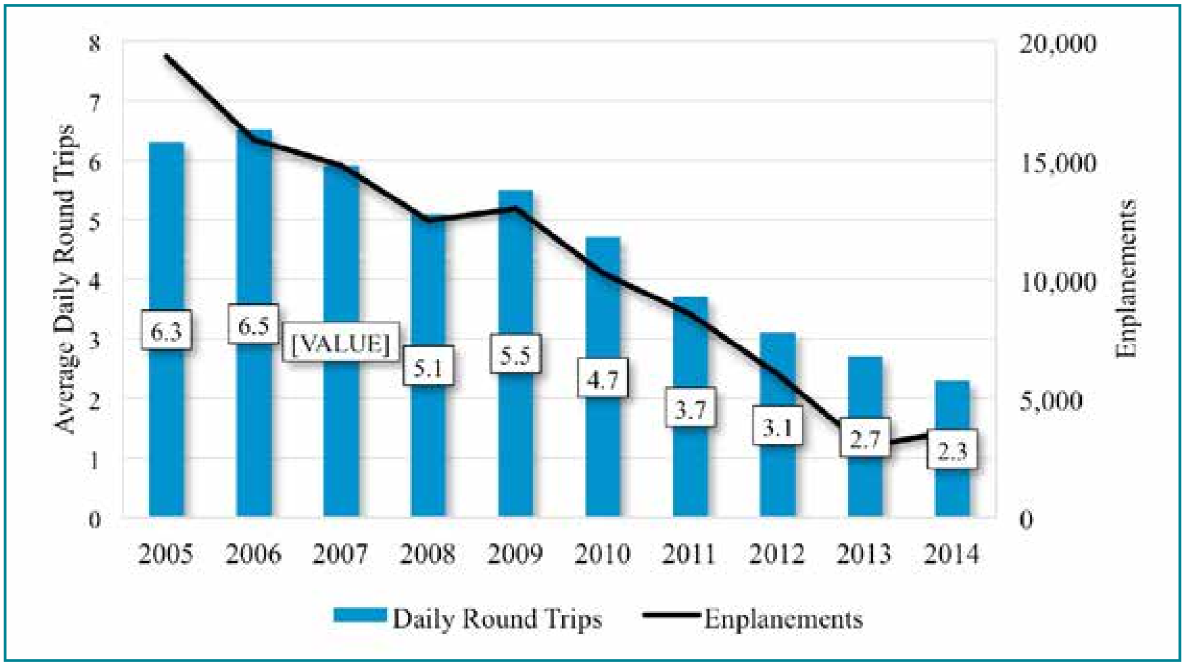
Table 3-7. Historical Enplanements Comparison

YEAR	CLM	STATE OF WASHINGTON	CLM MARKET SHARE	NORTHWEST MOUNTAIN REGION	CLM MARKET SHARE
2005	19,367	16,374,531	0.1183%	60,896,618	0.0318%
2006	15,860	16,778,067	0.0945%	63,436,986	0.0250%
2007	14,763	17,481,569	0.0844%	66,185,320	0.0223%
2008	12,468	18,497,508	0.0674%	67,655,054	0.0184%
2009	12,978	17,530,971	0.0740%	64,247,237	0.0202%
2010	10,266	17,658,548	0.0581%	65,451,243	0.0157%
2011	8,538	18,432,030	0.0463%	67,510,844	0.0126%
2012	6,019	18,664,260	0.0322%	67,863,588	0.0089%
2013	2,085	19,085,989	0.0109%	68,249,733	0.0031%
2014	4,233	19,621,171	0.0216%	69,874,233	0.0061%
	Average Market Share	0.0608%		0.0164%	

Source: *FAA's Terminal Area Forecast (TAF), January 2015.*

Exhibit 3-4 provides a comparison of historic CLM enplanements with the average daily roundtrip flights provided by Kenmore Air. This data confirms a strong correlation between historic enplanements at CLM and airline schedules, consistency, and reliability of service. Correlation is measured by the correlation coefficient, which ranges from -1 to +1, and is a method for determining the linkages between variables and how closely the variables change in proportion to one another. A correlation coefficient score close to +/-1 suggests stronger positive and/or negative correlation; a score closer to the zero suggests the two variables are not correlated. The correlation coefficient of historic enplanements and average daily round trips at CLM is 0.97, a strong correlation.

Exhibit 3-4. Comparison of Enplanements and Round Trips



Source: *FAA's TAF, January 2015, and Air Service Market Study, 2015.*

Because there are no existing passenger enplanements from which to initiate a forecast, assumptions are required for establishing the potential first-year enplanements at CLM. It is estimated that SeaPort Airlines will have a 60 percent Boarding Load Factor[6] (BLF) during the first year of operations, established on Kenmore Air averaging 62 percent BLF from 2005 through 2014. Based on the scheduled 31 weekly departures by 9-seat Cessna Caravan aircraft operating from March 1 through the end of the year, a total of 7,254 enplanements for CY 2016 have been calculated. This estimate is generally consistent with enplanements recorded in the past five years when a dependable schedule and reliable service were present.

Forecasts of passenger enplanements have been produced for various scenarios and are presented in **Table 3-8**. Also presented for comparison are the enplanements forecast prepared in the 2011 William R. Fairchild International Airport Master Plan, forecasts prepared by WSDOT Aviation Division LATS, and the forecast generated in the TAF for CLM. As can be seen, the forecast prepared for the 2011 Master Plan indicated an average annual growth rate of 1.2 percent; the LATS forecast an average annual growth rate of 1.4 percent, and the TAF projects no future growth.

The three scenarios developed for this Master Plan Update employ population modeling, which is a type of regression analysis using forecast population growth for a given region to project future enplanements. Population is a commonly accepted indicator of potential enplanement growth. For this analysis, the projected population growth rates for both Clallam and Jefferson Counties have been used from population projections provided by the State of Washington Office of Financial Management (OFM). Both Clallam and Jefferson Counties were used since portions of each have been identified as the catchment area in the Air Service Market Study. Future projections of employment activity and income levels are not available at the microscale level of the CLM catchment area (i.e., county level), so regression forecast methodologies utilizing these indicators as independent variables are not warranted.

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6 Boarding Load Factor (BLF) is a ratio of seats available compared to the number of passers actually boarding. ***If an aircraft has 50 seats and 25 passengers board, then the BLF equals 50 percent.***

Using the combined counties projected annual growth rate of 0.5 percent, applied to the 2016 estimated enplanement levels, enplanement forecasts would be produced that are consistent with the expected population growth in the service area. However, an additional element was factored into each forecast scenario - an increasing percentage of the catchment area's 66,670 annual originating passenger's utilization of CLM. In other words, each scenario estimates that, over time, an increasing percentage of passengers per year within the catchment area will elect to use airline service at CLM instead of choosing to drive two and a half hours to Sea-Tac or four hours to Portland International Airport (PDX).

Given the alternatives to air transportation for potential airline passengers in the CLM catchment area (i.e. driving and ferries), the cost of airline tickets, the non-secure basis of the initial SeaPort Airlines service, and the flying public's preference for larger commercial service aircraft, it is understood that a majority of the potential passengers will continue to drive or ride ferries to Sea-Tac or PDX. However, based on the strong historic correlation between consistent and reliable airline service and enplanements, it appears that there is a potential passenger base that could be captured with the appropriate airline scheduling, marketing, and ticket pricing.

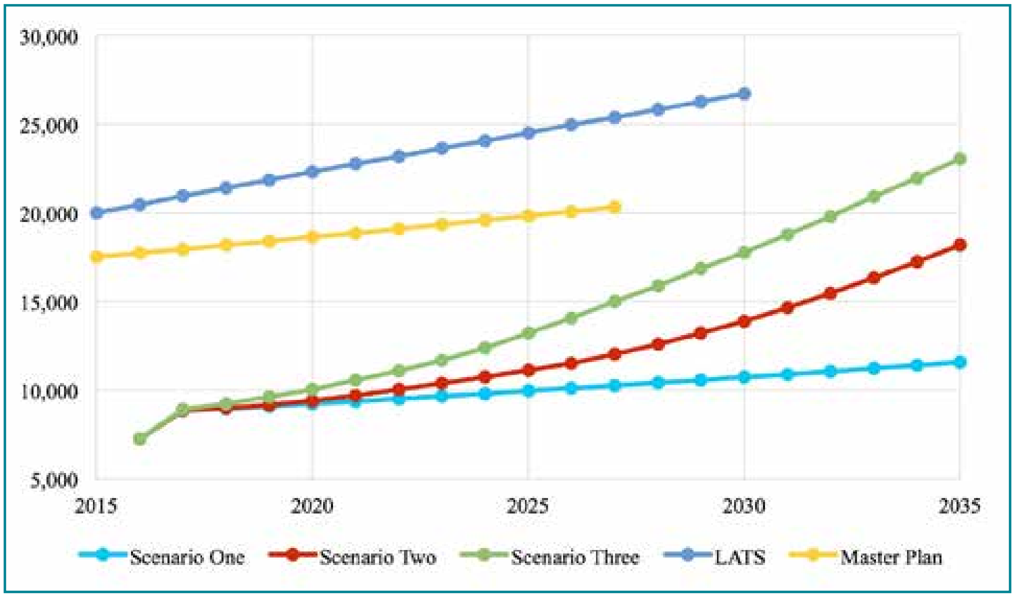
Table 3-8. Passenger Enplanement Forecasts, 2015-2035

YEAR	MP	LATS	TAF	SCENARIO ONE	SCENARIO TWO	SCENARIO THREE
2015	---	20,000	---	---	---	---
2016	---	---	3,604	7,254	7,254	7,254
2017	17,937	---	3,604	8,836	8,845	8,923
2018	---	---	3,604	8,969	9,000	9,237
2019	---	---	3,604	9,104	9,181	9,608
2020	---	22,300	3,604	9,241	9,411	10,042
2022	19,079	---	3,604	---	---	---
2025	---	24,500	3,604	9,957	11,131	13,202
2027	20,295	---	3,604	---	---	---
2030	---	26,700	3,604	10,730	13,884	17,774
2035	---	---	3,604	11,562	18,167	23,036
Growth Rate	1.2%	1.4%	0.0%	2.5%	5.0%	6.3%

Source: Reid Middleton, Inc., and Mead & Hunt.

Exhibit 3-5 graphically illustrates the three forecast scenarios developed for this Master Plan Update as compared to those presented in the 2011 Master Plan and the WSDOT Aviation Division LATS.

Exhibit 3-5. Passenger Enplanement Forecasts



Scenario One: This scenario applies the combined counties' population annual growth rate of 0.5 percent and factors an additional 1 percent per year increase based on a slow, but steady acceptance of the catchment area's potential passengers electing to use CLM for airline service. This results in an overall increase to 11,562 enplanements, reflecting an annual average growth rate of 2.5 percent. However, when evaluating the first complete year of operation by SeaPort Airlines (2017) through the end of the forecast period, the annual average growth rate is 1.5 percent, a more realistic year-to-year comparison rate of growth.

Scenario Two: Scenario Two applies the combined counties' population annual growth rate of 0.5 percent and factors an accelerated, but steady additional increase of slightly above 1 percent per year at the beginning of the planning period to approximately 5.0 percent per year at the end. This is based on the catchment area's potential passengers acceptance of airline service and willingness to use CLM occurring at a faster pace than reflected in Scenario One, which would be in response to demonstrated reliable, stable, and successful airline service. This results in an overall increase to 18,167 enplanements, for an annual average growth rate of 5.0 percent. When the first complete year of operation by SeaPort Airlines (2017) is evaluated through the end of the forecast period, the annual average growth rate is 4.1 percent.

Scenario Three: This scenario also applies the combined counties' population annual growth rate of 0.5 percent but factors a more accelerated additional increase of 2.0 percent per year at the beginning of the planning period to approximately 6.0 percent per year in the middle portion of the forecast period. However, during the latter time period, the growth rate increase would moderate somewhat to 4.5 percent per year. This is based on the catchment area's potential passengers acceptance of airline service and willingness to use CLM occurring at a more rapid pace early in the forecast period compared to Scenarios One and Two, but that this rate of increase would not continue throughout the entirety of the forecast period. As with Scenario Two, the more rapid pace of acceptance would be based on a demonstrated reliable, stable, and successful airline service. This results in an overall increase to 23,036 enplanements, reflecting an annual average growth rate of 6.3 percent. Comparing the first complete year of operation by SeaPort Airlines (2017) to the end of the forecast period, the annual average growth rate is 5.4 percent.

It is recommended that Scenario Two be selected as the preferred enplanements forecast, as it reflects a steady, progressive, and realistic increase. Connecting the population growth of the two-county region with the proven potential passenger market base that exists within the catchment area produces a forecast that is tailored to the airport's region and market area.

COMMERCIAL SERVICE AIRCRAFT OPERATIONS FORECAST

Forecasts of commercial service aircraft operations were prepared using the enplanements forecast presented previously and assumptions of future fleet mix and load factors. Based on the relatively low level of forecast enplanements and the findings of the 2014 Air Service Market Study prepared for the Port of Port Angeles, it is assumed that service will continue to be provided in much the same manner as it will be provided by SeaPort Airlines starting in March 2016.

The relationship between passenger enplanements and commercial service operation can vary significantly. Enplanements can increase without a corresponding increase in operations, or even increase following a decrease in operations, which often results from the use of larger aircraft with greater seating capacity and/or more efficient scheduling with increasing passenger load factors. These variables make commercial service operational forecasting challenging.

Fleet Mix

Scheduled commercial service at CLM will be provided using 9-seat, turbine-powered Cessna Caravans. It is expected that this size aircraft will continue to be used at CLM throughout the forecast period.

Load Factors

In FAA Aerospace Forecasts Fiscal Years 2015-2035, the FAA reports that the commercial carrier domestic load factor was 84.4 percent in 2014, an all-time high, and the regional carriers' domestic load factor was 80.0 percent. It is forecast that the regional carriers' domestic load factor will dip slightly to 79.7 percent in the early stages of the forecast period but will eventually increase to 80.0 percent by 2035. This indicates that airlines have been accommodating additional passengers without an equal increase in capacity, which has aided airline profitability. Full flights are anticipated to continue for the foreseeable future. It is anticipated that the BLF at CLM will increase significantly during the forecast period to be more in line with that of regional carriers.

The development of a commercial service aircraft operations forecast process involves the determination of the type of aircraft expected to provide the service, the formulation of known seating capacities and expected load factors, and equating a quantity of aircraft operations that will be required to accommodate the selected forecast enplanements presented above. The commercial service operational forecasts for CLM are presented in **Table 3-9**, showing commercial service aircraft operations are projected to increase to 4,992 by 2035, or by a 2.3 percent average annual growth rate.

Table 3-9. Commercial Service Aircraft Operations Forecast, 2016-2035

	2016	2020	2025	2030	2035
Weekly Departures	31	31	31	38	48
Average Seats per Departure	9	9	9	9	9
Annual Seats	14,508	14,508	14,508	17,784	22,464
Enplanements	7,254	9,411	11,131	13,884	18,167
BLF	60%	65%	77%	78%	81%
Annual Departures	1,612	1,612	1,612	1,976	2,496
Total Operations	3,224	3,224	3,224	3,952	4,992

Source: Reid Middleton, Inc., and Mead & Hunt.

AIR CARGO ACTIVITY FORECAST

Table 3-10 provides the historic quantity of total air cargo handled and aircraft operations occurring at CLM provided by the regularly scheduled air cargo operators (i.e., FEDEX and UPS) from 2009 through 2015; it does not include data from the non-scheduled air cargo carriers that periodically serve the airport. . It should be noted that data for 2015 is extrapolated through the remainder of the year from available year-to-date information.

Table 3-10. Historic Air Cargo Activity, 2009-2015

YEAR	ENPLANED FREIGHT *(IN TONS)*	DEPLANED FREIGHT *(IN TONS)*	TOTAL FREIGHT *(IN TONS)*	AIRCRAFT OPERATIONS
2009	142.6	247.8	390.4	1,046
2010	144.8	254.4	399.2	1,048
2011	136.3	251.8	388.1	1,038
2012	138.2	251.8	390.0	1,046
2013	134.6	295.2	429.8	1,048
2014	135.6	308.2	443.8	1,064
2015[1]	113.4	279.3	392.7	1,055

Source: CLM personnel, November and December 2015.

1 Data extrapolated from year-to-date information.

No discernible trends can be established from the historical air cargo data, except that enplaned freight has decreased by an average annual rate of 3.7 percent, deplaned freight increased by an average annual rate of 2.0 percent, and total freight increased by an average annual rate of 0.1 percent. Nationwide air cargo activity has historically tracked with the national Gross Domestic Product (GDP). According to the FAA Aerospace Forecast Fiscal Years 2015-2035, additional factors affecting air cargo growth are fuel price volatility, movement of real yields, and globalization. The FAA Aerospace Forecast predicts that domestic air cargo revenue ton miles will increase by 1.7 percent in 2015 but will only increase by 0.5 percent between 2015 and 2035. Assumptions used in the formulation of the FAA's forecast include the security restrictions on air cargo transportation will remain in place, most of the shift from air to ground transportation of cargo has transpired, and long-term cargo activity will continue to be tied to economic growth.

Since GDP is not measured at the micro scale county level, another methodology is required for forecasting air cargo activity. The service area for air cargo activity at CLM is assumed to be the same as that for commercial service activity of Clallam and Jefferson Counties, so the population growth rate for the two-county area (0.5 percent) is a reasonable assumption for projecting air cargo forecast. However, given that this growth rate is below both the state and national projected population growth rates (0.9 percent and 0.7 percent, respectively), the relative low cargo volumes transported, and the stable but not booming economic activity occurring within the area, a tempered growth rate is deemed more realistic. Therefore, a growth rate of 0.4 percent is applied to the air cargo shipped at CLM throughout the forecast period, as provided in **Table 3-11**. For comparison purposes, the forecasts contained in the 2011 William R. Fairchild International Airport Master Plan and the WSDOT LATS are also presented, showing the forecasts prepared for the 2011 Master Plan indicated an average annual growth rate of 3.7 percent and the LATS forecast an average annual growth rate of 4.1 percent.

Table 3-11. Air Cargo Activity Forecast (In Tons), 2015-2035

YEAR	MP	LATS	MPU
2015	---	743	392.7
2016	---	---	394.3
2017	807	---	395.9
2018	---	---	397.4
2019	---	---	399.0
2020	---	---	400.6
2022	967	---	---
2025	---	1,063	408.7
2027	1,165	---	---
2030	---	1,272	416.9
2035	---	---	425.3
Growth Rate	**3.7%**	**4.1%**	**0.4%**

Source: *Reid Middleton, Inc. and Mead & Hunt.*

As the amount of annual air cargo tonnage increases, air cargo carriers either increase the size of the aircraft that they use to serve the market or increase the number of daily flights to and from the airport. If the carriers continue to use the Cessna Caravan at CLM, they will not need to increase the number of daily flights. Since the payload capacity of the Caravan is 1.8 tons, the existing number of annual flights would be sufficient to accommodate the anticipated increased air cargo volume throughout the planning period. It is expected that the air cargo carriers using CLM will continue to be linked to the air carriers' hub operation at either Sea-Tac or King County International Airport/Boeing Field (BFI), and that any seasonal increases experienced that exceed the Caravan's hauling capabilities would be accommodated by a slight increase in the number of flights rather than increase the size of the aircraft. Therefore, for this analysis, the forecast assumes that the regional cargo carriers will continue to operate small, dependable aircraft such as the Cessna Caravan and maintain their existing daily flight schedules. It is also anticipated that the non-scheduled air cargo carriers will continue to serve CLM periodically using a range of aircraft from single engine piston-powered aircraft to multi-engine turboprop aircraft. **Table 3-12** presents the forecasted scheduled air cargo carrier aircraft operations, annual air cargo freight transported, and the tons per aircraft operation.

Table 3-12. Scheduled Air Cargo Aircraft Operations Forecast, 2015-2035

YEAR	ANNUAL TONS	ANNUAL OPERATIONS	TONS/OPERATION
2015	392.7	1,055	0.4
2020	400.6	1,055	0.4
2025	408.7	1,055	0.4
2030	416.9	1,055	0.4
2035	425.3	1,055	0.4

Source: *Reid Middleton, Inc. and Mead & Hunt.*

GENERAL AVIATION ACTIVITY FORECAST

In developing the general aviation forecasts, it is necessary to review and understand the trends and general aviation forecasts at the local and national level and how they can influence the forecast at CLM. With accurate and reliable historical aviation activity data unavailable, it is difficult to ascertain historical local trends with any degree of certainty; however, activity trends and forecasts at the national level have a trickle-down effect on the local level and provide insight into potential future aviation activity.

FAA NATIONAL AVIATION FORECASTS

On an annual basis, the FAA publishes aviation forecasts that summarize anticipated trends in all components of aviation activity. For general aviation, the FAA forecasts the active fleet and hours flown for single-engine and multi-engine piston aircraft, turboprops, turbojets, piston and turbine powered rotorcraft, and light sport, experimental, and "other" (which consist of gliders and lighter than air vehicles) aircraft. Many factors are considered in the FAA's development of aviation forecasts, some of the most important of which are U.S. and international economic forecasts and anticipated trends in fuel cost. The most recent projections found in FAA Aerospace Forecast Fiscal Years 2015-2035 are summarized below.

- *On a quarter-by-quarter basis, U.S. economic growth is projected to range between 2.1 to 3.1 percent on an annualized basis for the next two years. During the next three-year period, U.S. economic growth is project to average 2.6 percent per year. For the remaining years of the forecast period, real GDP is assumed to slow to around 2.4 percent annually.*
- *The FAA estimates that the active general aviation aircraft fleet will grow from an estimated 198,860 aircraft in 2014 to 214,260 aircraft by 2035, which is equal to an average annual growth rate of 0.4 percent.*
- *The FAA estimates that the number of general aviation hours flown will increase at an average annual growth rate of 1.4 percent through 2035.*
- *The number of active piston-powered fixed-wing aircraft is projected to decrease at an annual rate of 0.6 percent through 2035. Active single-engine piston-powered aircraft, more numerous within this group, are forecast to decline at a rate of 0.6 percent annually, while multi-engine piston-powered aircraft are projected to decline by 0.4 percent per year.*
- *Active turboprop fixed-wing aircraft are expected to increase at an annual growth rate of 1.5 percent during the forecast period. Business jets are projected to increase at an average annual rate of 2.8 percent.*
- *Active rotorcraft aircraft are projected to increase by 2.5 percent annually, with piston-powered rotorcraft expected to increase 2.1 percent per year and turbine-powered rotorcraft forecast to increase 2.8 percent annually.*
- *Active light sport aircraft (i.e., aircraft with weight, capacity, and performance restrictions) are expected to increase significantly by 4.3 percent annually by 2035.*
- *Hours flown by piston-powered fixed wing aircraft (both single-engine and multi-engine) are projected to decrease 0.5 percent per year through 2035. Hours flown by turbine-powered fixed-wing aircraft are expected to increase at an annual rate of 0.9 percent during the forecast period. Rotorcraft hours flown is expected to increase 2.0 percent annually by 2035. Light sport aircraft utilization is expected to increase 5.1 percent during the forecast period.*

INDUSTRY TRENDS

According to the General Aviation Manufacturers Association (GAMA) data, provided in **Table 3-13**, the number of general aviation aircraft manufactured and shipped worldwide from 2005-2014 decreased from a high of 4,277 in 2007 to a low of 2,024 in 2010. The low point in 2010 corresponds with the worldwide recession that began in late 2007, which was the worst in the post-World War II era. However, since 2010, shipments of general aviation aircraft have steadily, if slowly, increased to 2,454 in 2014. The table also reveals that more turbine-powered aircraft are being produced than piston-powered aircraft every year since 2009. This data suggests that turbine-powered aircraft, both turboprop and business jet, will continue to comprise a growing proportion of the overall general aviation fleet in the future.

Table 3-13. General Aviation Aircraft Manufactured Worldwide

YEAR	TOTAL SHIPMENTS	SINGLE-ENGINE PISTON	MULTI-ENGINE PISTON	TOTAL PISTON	% CHANGE	TURBO-PROP	BUSINESS JET	TOTAL TURBINE	% CHANGE
2005	3,590	2,326	139	2,465		375	750	1,125	
2006	4,054	2,513	242	2,755	11.8%	412	887	1,299	15.5%
2007	4,277	2,417	258	2,675	-2.9%	465	1,137	1,602	23.3%
2008	3,974	1,943	176	2,119	-20.8%	538	1,317	1,855	15.8%
2009	2,283	893	70	963	-54.6%	446	874	1,320	-28.8%
2010	2,024	781	108	889	-7.7%	368	767	1,135	-14.0%
2011	2,120	761	137	898	1.0%	526	696	1,222	7.7%
2012	2,164	817	91	908	1.1%	584	672	1,256	2.8%
2013	2,353	908	122	1,030	13.4%	645	678	1,323	5.3%
2014	2,454	986	143	1,129	9.6%	603	722	1,325	0.2%

Source: General Aviation Manufacturers Association, 2015.

Another factor to consider is the average age of general aviation aircraft. According to data from GAMA, the average age of single engine piston-powered aircraft is over 40 years, while for multi engine piston-powered aircraft it is almost 39 years. The average age of multi-engine turboprop aircraft is just over 25 years, while the average age for business jets is just under 15 years. It is anticipated that the number of piston-powered aircraft being retired will continue to accelerate in future years as they reach the end of their useful lives. This reinforces the trend that multi-engine turboprop and business jet aircraft will continue to increase as a proportion of the total general aviation aircraft fleet.

Business and corporate aviation will continue to play a valuable role in the business community. Many areas of the country do not have scheduled air service, and those that do are seeing airlines reduce capacity and schedules. The relative cost-effectiveness of business aviation is likely to retain its advantages when compared to additional costs associated with surface transport, including travel time and expenses. Using aircraft, a company can send a team of executives into a community, conduct business, and return home the same day. In comparison, the cost of an overnight business trip for multiple individuals relying on surface transportation or commercial airline service will consume more time.

The efficiencies and benefits of business aircraft ownership will help offset higher operating costs. This is supported by the yacht-building sector of the Port Angeles economy. This sector draws customers frequently while the yacht is under construction, and many use corporate jets for their visits. Since this industry is expected to maintain economic stability, this sector of airport operations is likely to remain healthy as well. Additionally, Port Angeles is more than 130 miles (two and a half hours) from Sea-Tac, which is the closest alternative for major commercial airline service. Business jet users will continue to need direct access to the airport, since air carrier service direct to CLM from originating cities (other than Seattle) is not provided.

The fractional aircraft ownership program is another trend cited as a potential growth factor in general aviation forecasting. These programs allow individuals or businesses to purchase partial ownership of an aircraft, usually business jets. The purchaser receives access to the aircraft for an established number of flight hours, in direct proportion to the percentage of the aircraft they purchase. The benefit of these programs is that they allow companies that could not previously take advantage of the convenience of private aircraft ownership to get into the market at a lower cost than buying an aircraft outright.

Very Light Jets (VLJs) are defined as a type of small business jet that generally weigh less than 10,000 pounds and cost between $1 and $4 million. The Cessna Mustang, Embraer Phenom, and the Eclipse 500/550 are examples of VLJs currently on the market. It was thought that the lower acquisition and operating costs of VLJs compared to more traditional business jets was going to expand air taxi services to a much broader market. While the forecasts for VLJ aircraft deliveries to number over 7,000 aircraft never materialized, it is thought that the continued presence and use of VLJs will have a positive influence on aviation activity nationwide and locally at CLM.

BASED AIRCRAFT FORECAST

The number and type of aircraft expected to base at an airport is dependent on factors such as communications, available facilities, airport services, airport proximity and access, aircraft basing capacity available at nearby airports, and other similar considerations. General aviation aircraft operators are particularly sensitive to both the quality and location of their basing facilities, with proximity of home and work often identified as the primary considerations in the selection of an aircraft basing location.

Table 3-14 provides historical (2005-2015) based aircraft data at CLM compared to based aircraft recorded within the State of Washington and the FAA's Airports Northwest Mountain Region, and the respective market share of CLM compared to both areas. The table shows a consistent market share of based aircraft at CLM and based aircraft within the state and region.

Table 3-14. Historical Based Aircraft Comparison

YEAR	CLM	STATE OF WASHINGTON	CLM MARKET SHARE	NORTHWEST MOUNTAIN REGION	CLM MARKET SHARE
2005	85	6,631	1.2819%	23,970	0.3546%
2006	85	6,845	1.2418%	24,280	0.3501%
2007	98	7,121	1.3762%	25,489	0.3845%
2008	98	6,048	1.6204%	23,002	0.4260%
2009	85	6,148	1.3826%	23,453	0.3624%

YEAR	CLM	STATE OF WASHINGTON	CLM MARKET SHARE	NORTHWEST MOUNTAIN REGION	CLM MARKET SHARE
2010	85	5,963	1.4255%	22,427	0.3790%
2011	85	5,637	1.5079%	21,991	0.3865%
2012	85	5,529	1.5373%	21,998	0.3864%
2013	85	5,651	1.5042%	22,507	0.3777%
2014	86	5,700	1.5088%	22,710	0.3787%
2015	70[1]	5,762	1.2149%	22,940	0.3836%
	Average Market Share	1.4467%		0.3051%	

Source: FAA's Terminal Area Forecast (TAF), January 2015.
1 Actual, as provided by CLM personnel, November 2015.

Table 3-15 presents the based aircraft forecast scenarios prepared for this Master Plan Update along with the forecasts developed in the 2011 William R. Fairchild International Airport Master Plan, the trend projection based on historical data (2005-2015), and the forecast generated in the TAF for CLM. The forecasts prepared for the 2011 Master Plan indicate an average annual growth rate of 1.3 percent, the trend growth rate decreases at an annual average rate of 1.2 percent, and the TAF projects a growth rate of 0.7 percent. It should be noted that the WSDOT Aviation Division LATS forecasts did not project general aviation activity by individual airport, so no comparison is provided. Again, no future projections of employment activity or income levels are available at the microscale level of the CLM catchment area (i.e., county level), so regression forecast methodologies using these indicators as independent variables are not warranted.

Table 3-15. Based Aircraft Forecasts, 2015-2035

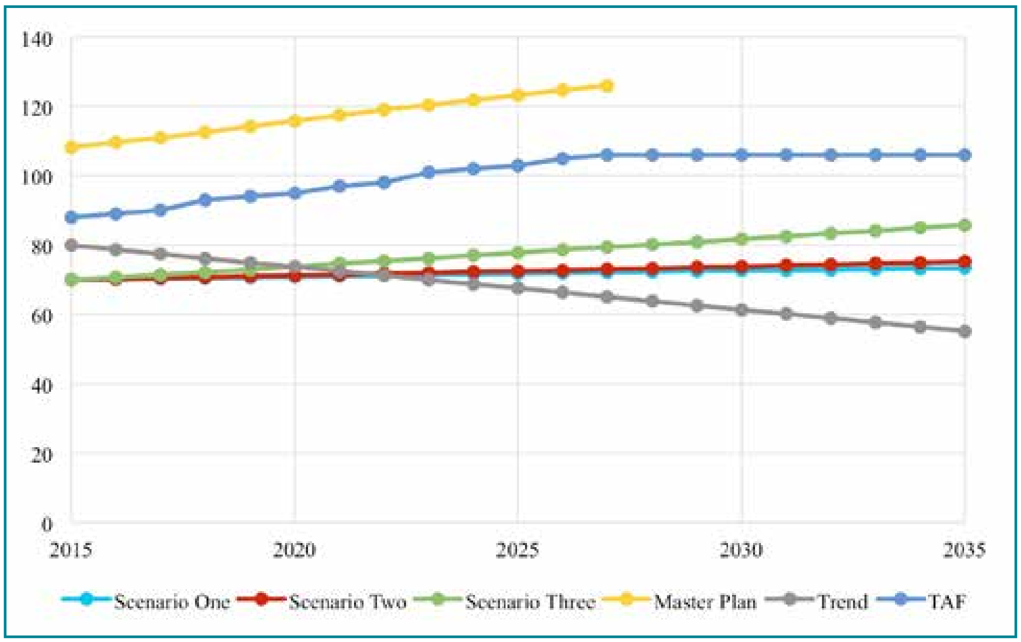
YEAR	MP	LATS	TAF	SCENARIO ONE	SCENARIO TWO	SCENARIO THREE
2015	---	70	88	70	70	70
2016	---	79	89	70	70	71
2017	111	77	90	70	70	71
2018	---	76	93	71	71	72
2019	---	75	94	71	71	73
2020	---	74	95	71	71	74
2022	119	71	98	---	---	---
2025	---	68	103	72	73	78

YEAR	MP	LATS	TAF	SCENARIO ONE	SCENARIO TWO	SCENARIO THREE
2027	126	65	106	---	---	---
2030	---	61	106	73	74	82
2035	---	55	106	74	75	86
Growth Rate	1.3%	-1.2%	0.7%	0.2%	0.4%	1.0%

Source: Reid Middleton, Inc., and Mead & Hunt.

Exhibit 3-6 graphically compares the based aircraft forecasts prepared for this Master Plan Update with the forecasts developed for the 2011 Master Plan, the historical data trend projection, and the TAF.

Exhibit 3-6. Based Aircraft Forecasts



Scenario One: This scenario is a standard regression analysis forecast utilizing the future population forecasts (2015-2040) for Clallam County provided by OFM. While it has long been assumed that population is a strong indicator of based aircraft at an airport, standard regression analysis methodologies relying on population as an independent variable are proven to have low correlation values and are considered unreliable. This is expressed historically in the steady population increase experienced in Clallam County over the past decade but with the airport experiencing fluctuating and decreasing numbers of based aircraft resulting in a correlation coefficient of -0.4. This forecast is included for comparison purposes to reflect local growth conditions.

Scenario Two: Scenario Two is a market share analysis developed using the FAA Aerospace Forecasts Fiscal Years 2015-2040. This forecast projects a nationwide growth rate for active general aviation aircraft of 0.4 percent annually. By applying this annual rate to the existing based aircraft at CLM, an increase to 75 aircraft is realized by 2035.

Scenario Three: This scenario is also a market share analysis developed using the FAA's TAF. Because the historic based aircraft at CLM has demonstrated a correlation with the based aircraft of Washington State, the 2015 CLM market share of the state (1.2149 percent) has been applied to the based aircraft forecast for the state provided in the TAF. This results in an increase to 86 aircraft, reflecting an average annual growth rate of 1.0 percent.

It is recommended that Scenario Three be selected as the preferred based aircraft forecast. Although the historic data trend has been decreasing, it seems reasonable that an additional 16 aircraft owners (less than one per year) will elect to base their aircraft at CLM during the planning period. The 86 total based aircraft projected by this scenario is only one more than the 85 based aircraft reported at CLM within the last five years. This scenario provides for continued growth at CLM, expecting based aircraft to mirror and slightly exceed the nationwide active general aviation aircraft expectations throughout the time period.

BASED AIRCRAFT FORECAST BY AIRCRAFT TYPE

The based aircraft fleet mix for incremental periods is shown in **Table 3-16**. The existing based aircraft fleet mix at CLM consists almost exclusively of single engine piston-powered aircraft. It is expected that the percentage of turbine-powered fixed-wing aircraft and helicopters will increase as a part of the total based aircraft population at the airport in correlation with the overall nationwide changes reflected in aircraft manufacturing, delivery, and use trends. This trend is equally indicative of the potential growth of the local and regional economy. The "Other" category includes two light sport aircraft and three ultralights. The expected increase percentage of future light sport aircraft will offset some of the expected decrease in percentage of traditional single engine aircraft.

Table 3-16. Based Aircraft Forecast By Type, 2015-2035

AIRCRAFT TYPE	2015[1]	2020	2025	2030	2035
Single Engine	63	65	67	68	69
Multi-Engine Piston	1	1	0	0	0
Multi-Engine Turboprop	0	0	1	2	2
Business Jet	1	1	2	2	3
Other[2]	5	6	7	8	9
Helicopter	0	1	1	2	3
Total Aircraft	**70**	**74**	**78**	**82**	**86**

Source: Reid Middleton, Inc., and Mead & Hunt.

1 Actual, as provided by CLM personnel, November 2015.

2 Includes light sport aircraft and ultralights.

GENERAL AVIATION AIRCRAFT OPERATIONS FORECAST

Unlike the historical data for based aircraft, the historical data for general aviation aircraft operations at CLM have not exhibited a consistent correlation with the state or the region. **Table 3-17** shows a steady decrease in general aviation operations locally, statewide, and within the region. As stated previously, the reason for the seemingly drastic decrease in general aviation aircraft operations at CLM in 2015 is due to more accurate accounting provided by FBO and airport personnel compared to the previous recording procedures used in the TAF.

TTable 3-17. Historical General Aviation Aircraft Operations Comparison

YEAR	CLM	STATE OF WASHINGTON	CLM MARKET SHARE	NORTHWEST MOUNTAIN REGION	CLM MARKET SHARE
2005	46,100	2,456,674	1.8765%	8,941,932	0.5155%
2006	46,100	2,407,849	1.9146%	8,936,785	0.5158%
2007	46,100	2,409,766	1.9130%	8,954,305	0.5148%
2008	46,100	2,405,450	1.9165%	8,614,768	0.5351%
2009	46,100	2,255,755	2.0437%	8,045,622	0.5730%
2010	46,100	2,232,918	2.0646%	7,839,931	0.5880%
2011	46,100	2,150,842	2.1433%	7,679,704	0.6003%
2012	50,000	2,061,141	2.4258%	7,487,934	0.6677%
2013	50,000	2,054,379	2.4338%	7,319,956	0.6831%
2014	50,000	2,093,465	2.3884%	7,385,722	0.6770%
2015	20,000[1]	2,159,945	0.9259%	7,425,698	0.2693%
	Average Market Share	2.0042%		0.5582%	

Source: *FAA's Terminal Area Forecast (TAF), January 2015.*

1 Actual, as estimated by FBO and CLM personnel, November 2015.

Generally, a relationship exists between based aircraft and general aviation aircraft activity, stated in terms of operations per based aircraft (OPBA). A trend may be established from historical information when reliable information for both based aircraft and operations is available. The national trend is changing, with more aircraft used for business purposes and less for pleasure flying. This impacts the OPBA in that business aircraft are usually flown more often than recreational or pleasure aircraft. Currently, the 2015 OPBA at CLM is 286, with a historical average OPBA of 518.

Table 3-18 shows the three general aviation operations forecast scenarios prepared for this Master Plan Update and includes the forecasts developed in the 2011 William R. Fairchild International Airport Master Plan, the trend projection based on historical data (2005-2015), and the forecast contained in the TAF for comparison. The 2011 Master Plan forecast expected an average annual growth rate of 1.1 percent. The trend projection indicates an average annual growth rate of 0.7 percent when compared to estimated 2015 operations. Recall that the actual numbers of general aviation operations are decreasing relative to the historical data because the forecasts were drastically higher than the existing estimate. The TAF projects no growth throughout the forecast time period. Again, no future projections of employment activity or income levels are available at the microscale level of the CLM catchment area (i.e., county level), so regression forecast methodologies using these indicators as independent variables are not warranted.

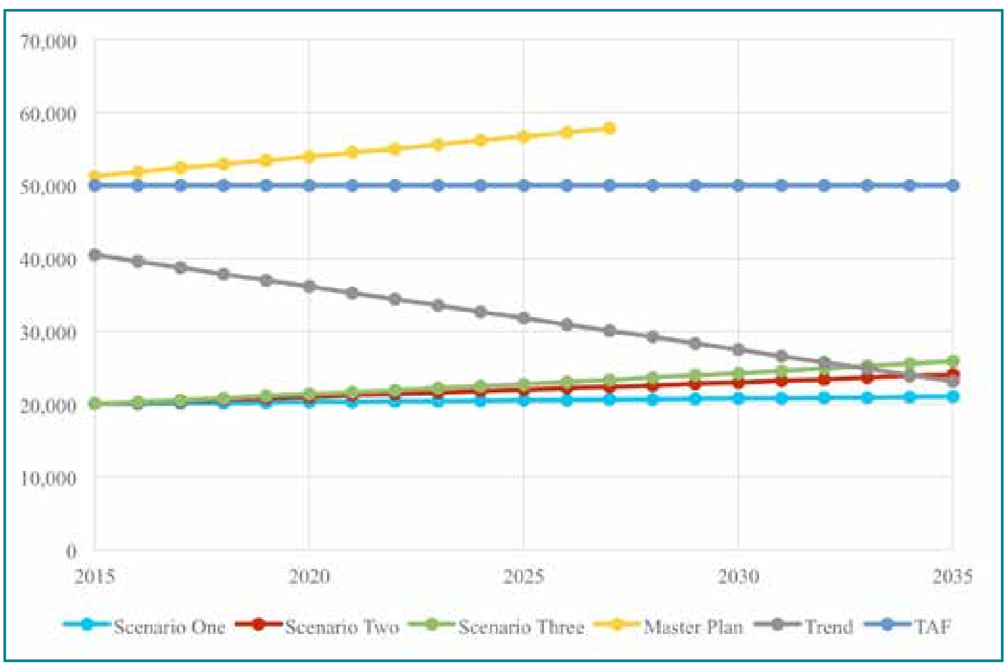
Table 3-18. General Aviation Aircraft Operations Forecasts, 2015-2035

YEAR	MP	TREND	TAF	SCENARIO ONE	SCENARIO TWO	SCENARIO THREE
2015	---	20,000	50,000	20,000	20,000	20,000
2016	---	39,857	50,000	20,049	20,192	20,270
2017	52,390	38,720	50,000	20,098	20,384	20,547
2018	---	37,853	50,000	20,147	20,578	20,823
2019	---	36,985	50,000	20,196	20,773	21,098
2020	---	36,118	50,000	20,246	20,969	21,372
2022	55,003	34,384	50,000	---	---	---
2025	---	31,782	50,000	20,494	21,967	22,745
2027	57,861	30,047	50,000	---	---	---
2030	---	27,445	50,000	20,746	22,993	24,245
2035	---	23,109	50,000	21,001	24,049	25,905
Growth Rate	**1.1%**	**0.7%**	**0.0%**	**0.2%**	**0.9%**	**1.3%**

Source: Reid Middleton, Inc., and Mead & Hunt

Exhibit 3-7 graphically presents the three general aviation aircraft operations forecast scenarios prepared for this Master Plan Update compared to the forecasts developed for the 2011 Master Plan, the historical data trend projection, and the TAF.

Exhibit 3-7. General Aviation Aircraft Forecasts



Scenario One: Scenario One is a standard regression analysis forecast using the future population forecasts (2015-2040) for Clallam County provided by OFM. As with the based aircraft forecast, population was thought to be a strong indicator of potential general aviation operations at an airport, but standard regression analysis methodologies relying on population as an independent variable are proven to have low correlation values and considered unreliable. The historically steady population increase experienced in Clallam County over the past decade has not resulted in increased general aviation aircraft operations at CLM (i.e., -0.2 correlation coefficient). This forecast is included for comparison purposes to reflect the potential local growth conditions.

Scenario Two: This scenario is a regression analysis using an increasing OPBA applied to the selected based aircraft forecast developed in the preceding section. Over the forecast time period, the existing OPBA of 286 is increased to 320. The increase mirrors the nationwide trend of an increasing amount of general aviation aircraft being used for business purposes and less for pleasure and recreational flying, resulting in an increasing OPBA. This scenario results in an increase to 24,049 operations and an average annual growth rate of 0.9 percent.

Scenario Three: Scenario Three is a market share analysis developed using the FAA's TAF for the State of Washington. While the historic general aviation aircraft operations at CLM have not demonstrated a strong correlation with general aviation aircraft operations in the state, this scenario applies CLM's market share of the state (0.9259 percent) to the general aviation aircraft operations forecast for the state provided in the TAF. It is included to provide a comparison of CLM operations to the average operations expected to occur in the state, resulting in an increase to 25,905 operations and an average annual growth rate of 1.3 percent. It also closely resembles the nationwide average annual growth rate for hours flown (1.4 percent), as projected in the FAA Aerospace Forecasts Fiscal Years 2015-2040.

It is recommended that Scenario Two be selected as the preferred general aviation aircraft operations forecast. This scenario correlates the nationwide expectation regarding the increasing trend in aircraft utilization (i.e., OPBA) with the selected based aircraft forecast in the preceding section. It provides for positive and realistic growth at CLM, acknowledging that the stable and improving economic conditions associated with the Port of Port Angeles facilities will help offset the expected lower-than-state-average population growth rate.

AIR TAXI OPERATIONS FORECAST

Air taxi aircraft operations are generally classified as any company or individual performing air passenger and/or air cargo transportation service on a nonscheduled basis over unspecified routes. The aircraft conducting air taxi operations at CLM are general aviation types (i.e., single engine piston, multi-engine piston, multi-engine turboprop, business jet, and helicopters). It is expected that the forecast activity by air taxi aircraft will follow the same overall trends as outlined for general aviation aircraft, although at a slightly smaller percent increase (0.4 percent average annual growth rate compared to the 0.9 percent). This translates to an increasing percentage of turbine-powered aircraft replacing the traditional piston-powered aircraft that have historically been used at CLM. **Table 3-19** shows the air taxi aircraft operations breakdown by aircraft type forecast to use CLM.

Table 3-19. Air Taxi Aircraft Operations Forecast By Type, 2015-2035

AIRCRAFT TYPE	2015[1]	2020	2025	2030	2035
Single Engine	3,500	3,550	3,600	3,650	3,700
Multi-Engine Piston	50	40	10	0	0
Multi-Engine Turboprop	75	75	90	100	115
Business Jet	125	150	175	200	225
Helicopter	50	60	80	100	110
Total Operations	**3,800**	**3,875**	**3,955**	**4,050**	**4,150**

Source: Reid Middleton, Inc., and Mead & Hunt.
1 Actual, as estimated by FBO and CLM personnel.

MILITARY ACTIVITY FORECAST

There are three components in determining military aircraft activity at an airport: the amount of Department of Defense (DOD) funding, which can vary from year to year but has been declining in recent years; the fueling contract the airport or an FBO may have with the DOD; and the proximity of the airport location to adjacent aviation-related military bases or training areas.

At this time, no airport entity has a government fueling contract. Historic activity reveals that CLM is not a primary destination training facility for military aircraft; military aircraft operations have historically averaged approximately 1.5 percent of all airport activity. However, the Port Angeles Coast Guard Air Station is located approximately three nautical miles northeast of CLM, and airport personnel report that Coast Guard helicopters conducted approximately 1,500 training operations in 2015. They also report approximately 2,100 total military operations at CLM, which represents almost 8.0 percent of all aircraft operations for 2015. When analyzed by type of aircraft, Coast Guard and U.S. Army helicopters (i.e., Eurocopter H-65, Sikorsky SH-60 Seahawk, Eurocopter EC-135, Sikorsky UH-60 Blackhawk, and Boeing CH-47 Chinook) comprise 95 percent of military operations, with fixed wing aircraft such as the PC-3, F/A-18, C-21, and C-12 aircraft comprising the remaining 5.0 percent.

It is likely that military operations will continue to fluctuate in response to changing DOD funding, missions, and training levels, but no significant increase or decrease in flight operations is expected at the airport through the 20-year forecasting period.

OPERATIONS FORECAST BY AIRCRAFT TYPE

Knowledge of the types of aircraft expected to use CLM will assist in determining the amount and type of facilities needed to meet aviation demand. **Table 3-20** depicts the approximate level of use by aircraft type projected to use the airport. As expected nationally, the use of turbine-powered general aviation aircraft is forecasted to increase more rapidly than the use of smaller general aviation aircraft.

Table 3-20. Summary of Operations Forecast By Aircraft Type, 2015-2035

AIRCRAFT TYPE	2015[1]	2020	2025	2030	2035
Commercial Service	**---**	**3,224**	**3,224**	**3,952**	**4,992**
Single Engine	---	3,224	3,224	3,952	4,992
Air Taxi	**3,800**	**3,875**	**3,955**	**4,050**	**4,150**
Single Engine	3,500	3,550	3,600	3,650	3,700
Multi-Engine Piston	50	40	10	0	0
Multi-Engine Turboprop	75	75	90	100	115
Business Jet	125	150	175	200	225
Helicopter	50	60	80	100	110
Air Cargo	**1,158**	**1,160**	**1,160**	**1,160**	**1,160**
Single Engine	1,083	1,085	1,085	1,085	1,085
Multi-Engine Piston	50	50	50	50	50
Turboprop	25	25	25	25	25
General Aviation	**20,000**	**20,969**	**21,967**	**22,993**	**24,049**
Single Engine	17,500	18,180	18,803	19,406	20,081
Multi-Engine Piston	400	398	395	368	385
Multi-Engine Turboprop	600	692	769	920	1,034
Business Jet	500	629	791	966	1,106
Helicopter	1,000	1,069	1,208	1,334	1,443
Military	**2,100**	**2,100**	**2,100**	**2,100**	**2,100**
Fixed Wing	100	100	100	100	100
Helicopter	2,000	2,000	2,000	2,000	2,000
Total Operations	**27,058**	**31,328**	**32,406**	**34,255**	**36,451**

Source: Reid Middleton, Inc. and Mead & Hunt.

1 Actual, as estimated by FBO and CLM personnel, November 2015.

OPERATIONS FORECAST BY RUNWAY DESIGN CODE (RDC)

The types of aircraft using and projected to use the airport are important elements for appropriately planning airport facilities. Runways must be designed according to the Runway Design Code (RDC) standards described in AC 150/5300-13A, Change 1, Airport Design. The RDC is a coding system used to relate and compare design criteria to the operational and physical characteristics of the aircraft intended to operate on the runway.

The RDC has two components that relate to the airport's "Design Aircraft" or "Critical Aircraft." The first aircraft component, depicted by a letter (A, B, C, D, or E), is the aircraft approach category and relates to the aircraft approach speed based on operational characteristics. The second aircraft component, depicted by a roman numeral (I, II, III, IV, V, or VI), is the airplane design group, which relates to the aircraft wingspan and tail height.

Data from an analysis of the based aircraft, FAA records, fueling reports, input received from the airport's FBO, and the responses from CLM's email survey of airport users and their runway length requirements were used to determine the RDC aircraft utilization for CLM.

Currently, over 97 percent of CLM's based aircraft are general aviation single engine aircraft in the RDC A I or A II categories. Other aircraft based at the airport include a multi-engine piston powered Beech Baron with an RDC of A-I and an Eclipse 500 business jet with an RDC of B-I.

An examination of fuel logs compiled by FBO personnel indicates that greater than 30.4 percent of the fixed-wing, non-military aircraft fueled at CLM in 2015 (see Appendix One) were in the RDC B-I category, 24.4 percent were in the RDC A-II category, and 20.7 percent were in the B II category. When analyzed as groups, aircraft approach category B comprises approximately 51.1 percent and airplane design group II includes approximately 54.1 percent.

The FAA data used in this analysis was obtained from the Traffic Flow Management System Counts (TFMSC), which is compiled from IFR filed flight plans to or from a particular airport, and/or when flights are detected by the National Airspace System, usually through RADAR (see Appendix Two). While it excludes most VFR and some non-enroute IFR traffic, making it an incomplete data source, it can provide a rough gauge of the percentage of aircraft types operating at CLM, especially the larger and more sophisticated aircraft. According to this data, the majority of 2015 aircraft operations (data available through September 30, 2015) were by RDC category A-II (48.3 percent), followed by category A-I at 24.6 percent and B-I at 10.6 percent. When this data is analyzed by separate groups, aircraft approach category A encompasses the majority of aircraft (72.9 percent) and airplane design group II contains 60.2 percent.

Table 3-21 provides an evaluation of the existing 2015 data by the individual aircraft make and model. Using the TFMSC data indicates that the Cessna Caravan (RDC A-II) conducts the majority of existing operations followed by the Eclipse 500 (RDC B-I), the Beech King Air 90 (RDC B-II), and the Beech Super King Air 200/350 (RDC B-II). Recognizing that the TFMSC data is incomplete and that a number of the larger aircraft owners request the flight information not be reported for privacy reasons, and based on responses to CLM's email survey of airport users and their runway length requirements (see Appendix Three), the data has been revised to reflect the estimates provided by FBO and airport personnel. Therefore, the 2015 data has been revised and is reflected in **Table 3-21**. The 2035 forecasts of the individual aircraft operations are also included.

Table 3-21. Existing Operations by Individual Aircraft, 2015

AIRCRAFT TYPE	RDC	TFMSC 2015[1]	REVISED 2015[2]	2035
Cessna 208 Caravan	A-II	244	2,785	8,365
Beech Super King Air 200/350	B-II	21	252	350
Beech King Air 90	B-II	22	240	200
Eclipse 500	B-I	51	125	200
Cessna Citation I/CJ1	B-I	31	72	20
Learjet 31/35/36	D-I	23	60	20
Gulfstream GV/G500	D-III	8	50	90
Cessna Citation II/Bravo	B-II	13	36	20
Raytheon Beechjet 400	C-I	13	32	26
Learjet 60	D-I	9	26	40
Cessna CJ3	B-II	8	25	20
Cessna Citation V/Ultra/Encore	B-II	10	25	10
Learjet 45	D-I	8	24	10
Cessna Citation Excel/XLS	C-II	6	24	40
Bombardier Canadair Challenger 300	C-II	12	22	36
BAe Hawker 800	C-II	12	20	40
Cessna Citation Mustang	B-I	4	18	50
Dassault Falcon 900	B-II	6	18	24
Bombardier Canadair Challenger 600/601/604	C-II	6	14	20
Gulfstream GIV/G400	D-II	2	14	20
Cessna CJ4	B-II	4	12	12
Cessna Citation X	C-II	5	12	30
Embraer Phenom 300	B-II	4	10	30
Dassault Falcon 2000	C-II	4	10	16
Cessna CJ2	B-II	2	6	0
Raytheon Premier 1	B-I	2	4	10
IAI Astra 1125	B-II	2	4	0
Gulfstream G200	C-II	2	4	0
Boeing B 737-700	C-III	1	1	1
Boeing B 737-800	D-III	1	1	1

Source: Reid Middleton, Inc. and Mead & Hunt.

1 Actual, as recorded in Traffic Flow Management System Counts (TFMSC), November 2015.

2 Revised to reflect aircraft operations estimate provided by FBO and CLM personnel.

Combining the various data sources, **Table 3-22** presents the estimate of existing and forecast aircraft operations by RDC. FAA guidance defines a "substantial use threshold" on federally funded projects for the "Design Aircraft" to have at least 500 annual itinerant operations by a specific aircraft model or composite of several different aircraft to determine the representative RDC. Using the data in **Table 3-21** suggests that the Beech Super King Air 200 is the appropriate existing and future "Design Aircraft". From **Table 3-22**, it can be surmised that RDC B-II (with over 2,000 operations in 2015) is appropriate for use as the existing RDC at CLM. However, by 2030, it is estimated that over 500 annual operations by aircraft approach category C and D aircraft will occur at the airport. Thus, even though it is beyond the normal five- to ten-year time period for consideration, RDC C-II may be considered appropriate for consideration and evaluation as the long-term future RDC at CLM.

Table 3-22. Summary of Operations Forecast By RDC, 2015-2035

RDC	REPRESENTATIVE AIRCRAFT	2015[1]	2020	2025	2030	2035
A-I	Cessna 172	12,300	12,678	12,920	13,380	13,870
A-II	Cessna Caravan	3,275	6,515	6,575	7,315	8,365
B-I	Beech King Air 100, Eclipse 500/550, Cessna Citation I, Cessna Mustang	4,369	4,645	5,014	5,175	5,291
B-II	Beech King Air 90, Beech Super King Air 200, Cessna Citation II/V/CJ2/CJ3, Dassault Falcon 50/900	3,758	3,995	4,161	4,425	4,767
C-I	Raytheon Beechjet 400, Bombardier Learjet 55	32	40	55	70	90
C-II	Dassault Falcon 2000, Gulfstream G200, BAe Hawker 800, Bombardier BD-100/Challenger 300	98	115	150	175	200
C-III	Boeing 737-700, Dassault Falcon 7X	1	10	12	16	20
D-I	Bombardier Learjet 35/45/60	110	125	140	160	175
D-II	Gulfstream GIV/G400	14	16	20	20	20
D-III	Gulfstream GV/G500, Boeing 737-800	51	61	71	81	91
Total[2]		**24,008**	**28,200**	**29,118**	**30,817**	**32,889**

Source: Reid Middleton, Inc. and Mead & Hunt.

1 Actual, as estimated by FBO and CLM personnel, November 2015.

2 Does not include helicopter operations, which have no RDC designation.

LOCAL & ITINERANT AIRCRAFT OPERATIONS

Aircraft operations forecasts can also be categorized into local and itinerant operations. The Air Traffic Control Handbook defines a local operation as any operation performed by an aircraft operating in the local traffic pattern or within sight of a tower, an aircraft known to be departing or arriving from a flight in the local practice area, or an aircraft executing practice instrument approaches at an airport. Existing local operations at CLM are estimated to account for approximately 41 percent of all aircraft operations. The local operations percentage is expected to remain fairly constant throughout the planning period. Based on this consideration, the existing and forecast local and itinerant operations are provided in **Table 3-23**.

Table 3-23. Summary of Local & Itinerant Operations Forecast, 2015-2035

YEAR	LOCAL	ITINERANT	TOTAL
2015[1]	11,120	15,938	27,058
2020	11,640	19,688	31,328
2025	12,119	20,287	32,406
2030	12,612	21,643	34,255
2035	13,119	23,332	36,451

Source: Reid Middleton, Inc. and Mead & Hunt.

1 Actual, as estimated by FBO personnel, November 2015.

PEAK PERIOD FORECAST

An additional element in assessing airport use and determining various capacity and demand considerations is to ascertain peak period activities. In lieu of actual air traffic logs or other reliable sources of information, FAA statistics and assumptions from airports with similar activity and operational characteristics have been applied to CLM to formulate peak period forecasts. Forecasts for CLM are based on the assumptions that 10 percent of annual operations occur in the peak month, a peak month consists of 31 days, and existing peak hour operations are 10 percent of the average day of the peak month. The peak period operational activities are provided in **Table 3-24**.

Table 3-24. Peak Period Aircraft Operations Forecast, 2015-2035

YEAR	ANNUAL	PEAK MONTH (AUGUST)	AVERAGE DAY OF PEAK MONTH	PEAK HOUR/ AVERAGE DAY RATIO	AVERAGE PEAK HOUR
2015	270,585[1]	2,706	87	10%	9
2020	31,328	3,133	101	10%	10
2025	32,406	3,241	105	10%	10
2030	34,255	3,425	110	10%	11
2035	36,451	3,645	118	10%	12

Source: *Reid Middleton, Inc. and Mead & Hunt.*

1 Actual, as estimated by FBO personnel, November 2015.

SUMMARY

A summary of the aviation forecasts prepared for this Master Plan Update is presented in **Table 3-24**. This information will be used as a background to develop the remaining portions of this study (i.e., to analyze facility requirements, to aid development of alternatives, and to guide the preparation of the plan and program for future airport facilities). In other words, the aviation activity forecasts are the foundation from which plans will be developed and implementation decision will be made.

Table 3-25. Summary of Aviation Activity, 2015-2035

	2015[1]	2020	2025	2030	2035
AIRCRAFT OPERATIONS					
Commercial Service	**---**	**3,224**	**3,224**	**3,952**	**4,992**
Single Engine	---	3,224	3,224	3,952	4,992
Air Taxi	**3,800**	**3,875**	**3,955**	**4,050**	**4,150**
Single Engine	3,500	3,550	3,600	3,650	3,700
Multi-Engine Piston	50	40	10	0	0
Multi-Engine Turboprop	75	75	90	100	115
Business Jet	125	150	175	200	225
Helicopter	50	60	80	100	110
Air Cargo	**1,158**	**1,160**	**1,160**	**1,160**	**1,160**
Single Engine	1,083	1,085	1,085	1,085	1,085
Multi-Engine Piston	50	50	50	50	50
Turboprop	25	25	25	25	25
General Aviation	**20,000**	**20,969**	**21,967**	**22,993**	**24,049**
Single Engine	17,500	18,180	18,803	19,406	20,081
Multi-Engine Piston	400	398	395	368	385
Multi-Engine Turboprop	600	692	769	920	1,034
Business Jet	500	629	791	966	1,106
Helicopter	1,000	1,069	1,208	1,334	1,443

	2015[1]	2020	2025	2030	2035
Military	**2,100**	**2,100**	**2,100**	**2,100**	**2,100**
Fixed Wing	100	100	100	100	100
Helicopter	2,000	2,000	2,000	2,000	2,000
Itinerant Operations	**15,938**	**19,688**	**20,287**	**21,643**	**23,332**
Local Operations	**11,120**	**11,640**	**12,119**	**12,612**	**13,119**
Design Aircraft (Beech Super King Air 200)	252	300	355	440	515
Total Operations	**27,058**	**31,328**	**32,406**	**34,255**	**36,451**
Passenger Enplanements	**---**	**9,411**	**11,131**	**13,884**	**18,167**
Air Cargo Freight (In Tons)	**392.7**	**400.6**	**408.7**	**416.9**	**425.3**
Based Aircraft	**70**	**74**	**78**	**82**	**86**
Single Engine	63	65	67	68	69
Multi-Engine Piston	1	1	0	0	0
Multi-Engine Turboprop	0	0	1	2	2
Business Jet	1	1	2	2	3
Other1	5	6	7	8	9
Helicopter	0	1	1	2	3

Source: Reid Middleton, Inc. and Mead & Hunt.

1 Actual, as estimated by FBO personnel, November 2015.

2 Includes light sport aircraft and ultralights.

FORECAST APPROVAL

According to language contained in Review and Approval of Aviation Forecasts, regional airports division offices or airports district offices are responsible for aviation forecast approvals at local airports. Local forecasts that are consistent with the FAA's TAF (i.e., the local forecast differs by less than 10 percent in the first five years, and differs by less than 15 percent in the ten-year forecast period) do not need to be coordinated with FAA headquarters (APP-400, APO-110). As noted on **Tables 3-25** and **3-26**, the Master Plan Update forecasts for total operations are not within the specified TAF thresholds for acceptance. The primary reasons for these discrepancies are outlined below.

The passenger enplanements forecast contained in the TAF relied on the last year of Kenmore Air's service at CLM, which had been experiencing declining enplanements before vacating the market. The enplanements forecast presented in this Master Plan Update are optimistic that SeaPort Airlines will reliably serve the market with a consistent schedule and will increasingly capture more and more of the potential customer base that exists within the two-county area.

The commercial service aircraft operations forecast contained in the TAF projects flat growth; it does not account for the operation of SeaPort Airlines at CLM. It is expected that an estimated 7,254 aircraft operations will be provided in the first year of service (2016), and operations will increase throughout the years to accommodate the expected increasing passenger demand.

Total operations contained in the TAF relied on the historically inaccurate general aviation aircraft operations, which are thought to be overinflated. As stated previously, it is believed that the estimated aircraft operations provided by CLM and FBO personnel are deemed to be much more accurate and reflective of actual airport activity. Therefore, the starting point of the total aircraft operations presented in this Master Plan Update is well below that contained in the TAF. And even though the TAF employs flat-line growth, the Master Plan Update forecasts do not increase at a sufficient rate to get within the 10 percent or 15 percent of the TAF forecasts.

Table 3-26. Summary of Master Plan Update & TAF Comparison

	YEAR	AIRPORT FORECAST	TAF	AF/TAF(% DIFFERENCE)
PASSENGER ENPLANEMENTS				
Base Year	2015	0	3,604	-100.0%
Base Year + 5 Years	2020	9,411	3,604	161.1%
Base Year + 10 Years	2025	11,131	3,604	208.9%
Base Year + 15 Years	2030	13,884	3,604	285.2%
COMMERCIAL OPERATIONS				
Base Year	2015	4,958	6,305	-21.4%
Base Year + 5 Years	2020	8,259	6,305	31.0%
Base Year + 10 Years	2025	8,339	6,305	32.3%
Base Year + 15 Years	2030	9,162	6,305	45.3%

	YEAR	AIRPORT FORECAST	TAF	AF/TAF(% DIFFERENCE)
TOTAL OPERATIONS				
Base Year	2015	27,058	56,575	-52.2%
Base Year + 5 Years	2020	31,328	56,575	-44.6%
Base Year + 10 Years	2025	32,406	56,575	-42.7%
Base Year + 15 Years	2030	34,255	56,575	-39.5%

Source: Reid Middleton, Inc. and Mead & Hunt.

Note: TAF data is based on the U.S. Government fiscal year basis (October through September).

Table 3-27. TAF Summary of Airport Planning Forecasts

	BASE YEAR (2015)	BASE YR. + 1 YR. (2016)	BASE YR. + 5 YRS. (2020)	BASE YR. +10 YRS (2025)	BASE YR. + 15 YRS. (2030)	BASE YR. TO + 1 (2016)	BASE YR. TO + 5 (2020)	BASE YR. TO + 10 (2025)	BASE YR. TO + 15 (2030)
ENPLANEMENTS									
Air Carrier	0	0	0	0					
Commuter	0	7,254	9,411	11,131	13,884				
TOTAL	**0**	**7,254**	**9,411**	**11,131**	**13,884**				
OPERATIONS									
Itinerant									
Air Carrier	0	0	0	0	0				
Commuter/ Air Taxi	4,958	5,618	8,259	8,339	9,162	13.3%	10.7%	5.3%	4.2%
Total Commercial Operations	4,958	5,618	8,259	8,339	9,162	13.3%	10.7%	5.3%	4.2%
General Aviation	10,455	10,545	10,904	11,423	11,956	0.9%	0.8%	0.9%	0.9%
Military	525	525	525	525	525	0.0%	0.0%	0.0%	0.0%
Local									
General Aviation	9,545	9,649	10,065	10,544	11,037	1.1%	1.1%	1.0%	1.0%
Military	1,575	1,575	1,575	1,575	1,575	0.0%	0.0%	0.0%	0.0%

	BASE YEAR (2015)	BASE YR. + 1 YR. (2016)	BASE YR. + 5 YRS. (2020)	BASE YR. +10 YRS (2025)	BASE YR. + 15 YRS. (2030)	BASE YR. TO + 1 (2016)	BASE YR. TO + 5 (2020)	BASE YR. TO + 10 (2025)	BASE YR. TO + 15 (2030)
TOTAL	**27,058**	**27,912**	**31,328**	**32,406**	**34,255**	**3.2%**	**3.0%**	**1.8%**	**1.6%**
Instrument Operations	---	---	---	---	---	---	---	---	---
Peak Hour Operations	9	9	10	10	11	3.2%	3.0%	1.8%	1.6%
Cargo/Mail (Tons)	449	451	458	467	477	0.4%	0.4%	0.4%	0.4%
Based Aircraft									
Single Engine	63	63	65	67	68	0.6%	0.6%	0.6%	0.5%
Multi-Engine Piston	1	1	1	0	0	0.6%	0.6%	-100.0%	-100.0%
Multi-Engine Turboprop	0	0	0	1	2	---	---	---	---
Business Jet	1	1	1	2	2	3.6%	3.4%	4.5%	4.9%
Other	5	6	7	8	10	20.0%	5.8%	4.9%	4.6%
TOTAL	70	71	74	78	82	2.0%	1.0%	1.1%	1.0%

Source: Reid Middleton, Inc. and Mead & Hunt.

CHAPTER 4
FACILITY REQUIREMENTS

INTRODUCTION

In efforts to quantify an airport's future facility needs, it is necessary to translate the forecasted aviation activity into specific physical requirements. Therefore, this chapter analyzes and presents the actual types and quantities of facilities to accommodate the demand safely and efficiently. For those components determined to be deficient, the type, size, or amount of facilities required to meet the demand is identified. Two broad analyses are included: those requirements related to airside facilities, and those requirements related to landside facilities.

This analysis uses the forecasts presented in the preceding chapter for establishing future development at CLM. This is not intended to dismiss the possibility that either accelerated growth or consistently higher or lower levels of activity may occur. Aviation activity levels should be monitored for consistency with the forecasts, and to improve sponsor awareness when operational trends change. Additionally, as described in the previous chapter, an airport's geometric design is based on the specified Runway Design Code (RDC) standards as specified in FAA AC 150/5300-13A. Although the RDC is based on the "Critical Aircraft" or "Design Aircraft" and is used for planning and design, it does not limit the aircraft that may be able to operate safely at an airport. In addition to the aircraft approach speed and wingspan components comprising the RDC introduced in the previous chapter, a third component is also present, and it is related to the lowest instrument approach visibility minimums. The instrument approach visibility minimums are expressed as Runway Visual Range (RVR) values in feet. **Table 4-1** provides the instrument approach visibility minimums and corresponding RVR value. For Runway 8/26, the lowest visibility minimum is ½ statute mile, so, the full RDC for it is expressed as B-II-2400. Runway 13/31 is a visual runway, so the full RDC for it is expressed as A-I-VIS.

Table 4-1. RVR Values

INSTRUMENT FLIGHT VISIBILITY CATEGORY (STATUTE MILE)	RVR (FEET)[1]
Visual	**VIS**
Not lower than 1 mile	5000
Lower than 1 mile but not lower than ¾ mile	4000
Lower than ¾ mile but not lower than ½ mile	2400
Lower than ½ mile not lower than ¼ mile	1600
Lower than ¼ mile	1200

1 RVR values are not exact equivalents

AIRSIDE REQUIREMENTS

Airside facilities are those airport components directly related to aircraft movement areas (i.e., approach areas, navigation aids, runways, and taxiways). The airside facility requirements analysis focuses on determining the necessary elements and the spatial relationship of the elements. The evaluation includes the delineation of airfield dimensional criteria, establishment of design parameters for the runways and taxiways systems, runway length and an identification of airfield instrumentation and lighting needs.

WEATHER AND WIND ANALYSIS

Climatological conditions specific to the location of an airport not only influence the layout of the airfield, but also affect the use of the runway system. Variations in the weather resulting in limited cloud ceilings and reduced visibility typically restrict the time an airport is available for use by aircraft, while changes in wind direction and velocity typically dictate runway usage. When landing and taking off, aircraft can operate on a runway properly and safely as long as the wind velocity perpendicular to the direction of travel (i.e., a crosswind) is not excessive. Wind conditions affect all aircraft to some extent, but the smaller the aircraft, generally the more it is affected by crosswinds. The wind coverage analysis translates the crosswind velocity and direction into a "crosswind component".

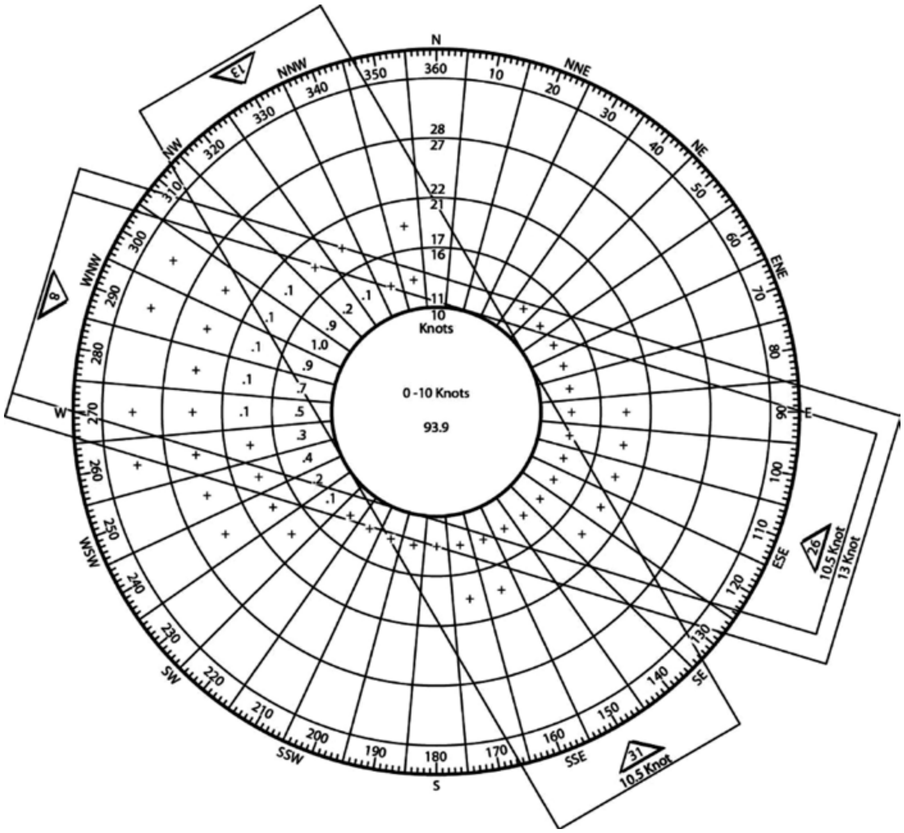
The determination of the appropriate crosswind component is dependent upon the RDC for the type of aircraft that utilize an airport on a regular basis. As previously identified, the RDC for Runway 8/26 is B-II-2400; A-I-VIS is the RDC for Runway 13/31. According to the FAA AC 150/5300-13A, for airports with a RDC designation of A-I and B-I, a crosswind component 10.5 knots is considered maximum. For RDC A-II and B-II airports, a crosswind component of 13 knots is considered maximum. For airports with an RDC designation of A-III, B-III, and C-I through D-III, a crosswind component of 16 knots is considered maximum. Finally, for RDC A-IV through D-VI airports, a crosswind component of 20 knots is considered maximum. Therefore, for Runway 8/26, a crosswind component of 13 knots will be utilized to analyze the adequacy of the runway orientation with the prevailing wind conditions, but because it is expected that small single engine and twin-engine aircraft will also operate on the runway, a 10.5-knot crosswind component will also be used. A 10.5-knot crosswind component is considered appropriate for Runway 13/31 to analyze the adequacy of the runway orientation with the prevailing wind conditions.

ALL WEATHER WIND CONDITIONS

To determine wind velocity and direction at CLM, accurate and timely wind data was obtained for the period between January 1, 2006 and December 31, 2015. Observations were taken at the airport (from data gathered by the National Oceanic and Atmospheric Administration, National Climatic Data Center). Using this data, an all weather wind rose was constructed and is presented in the **Exhibit 4-1**.

Table 4-2 quantifies the wind coverage provided by the individual runway ends and the combined runways during all weather conditions at CLM. The desirable wind coverage for a runway is 95 percent, which means that the runway should be oriented so that the maximum crosswind component is not exceeded more than 5 percent of the time. Runway 8/26 provides 99.95 percent wind coverage for the 13-knot crosswind component and 99.75 percent for the 10.5-knowt crosswind component. Runway 13/31 provides 97.79 percent wind coverage for 10.5-knot crosswind component. Combined, the runways provide 99.95 percent and 99.80 percent for the 13-knot and 10.5-knot crosswind components, respectively.

Exhibit 4-1. All Weather Wind Rose



Source: Reid Middleton, Inc. and Mead & Hunt utilizing the FAA Airport Design Tools, Wind Analysis. Wind data obtained from the National Oceanic and Atmospheric Administration, National Climate Data Center. Station 727885 William R Fairchild International Airport. Period of Record: 2006-2015.

Table 4-2. All Weather Wind Cover Analysis

RUNWAY DESIGNATION	10.5-KNOT CROSSWIND COMPONENT	13-KNOT CROSSWIND COMPONENT
Runway 8[1]	76.74%	76.67%
Runway 26[1]	95.31%	95.50%
Runway 8/26	99.75%	99.95%
Runway 13[1]	84.11%	---
Runway 31[1]	95.14%	---
Runway 13/31	97.79%	---
Combined	99.80%	99.95%

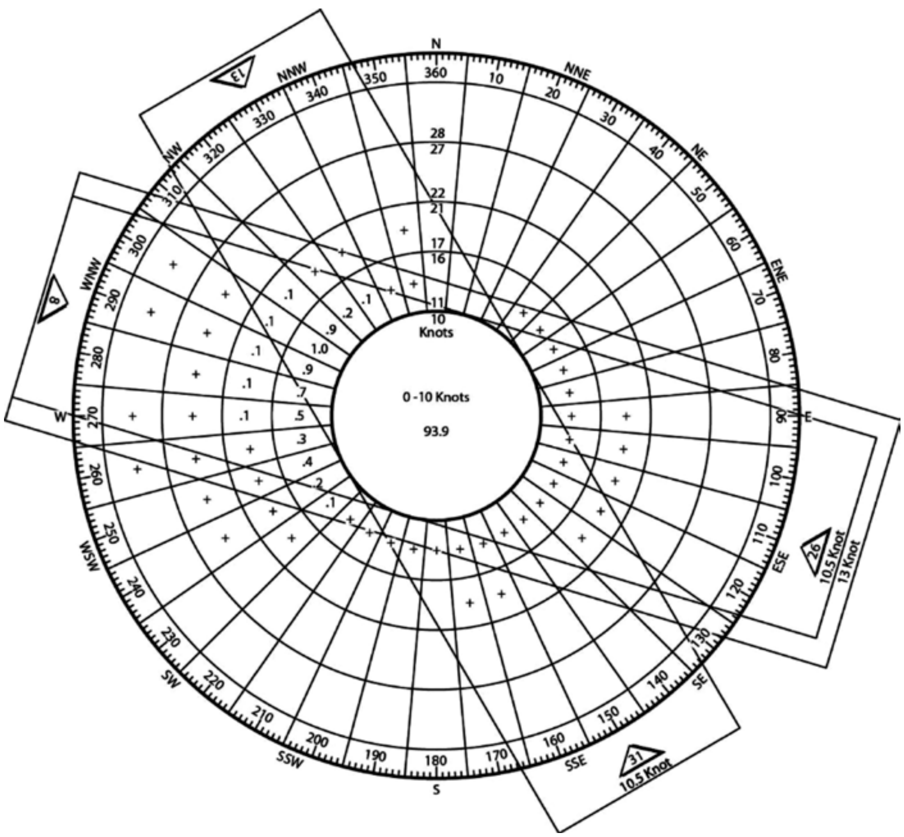
Source: Wind analysis tabulation provided Reid Middleton, Inc. and Mead & Hunt utilizing the FAA Airport Design Tools, Wind Analysis. Wind data obtained from the National Oceanic and Atmospheric Administration, National Climate Data Center. Station 727885 William R Fairchild International Airport. Period of Record: 2006-2015.

Note: 1 A 5-knot tailwind component was used for the individual runway end analysis.

IFR WEATHER WIND CONDITIONS

As provided in the Inventory chapter, CLM has three published instrument approach procedures. In an effort to analyze the effectiveness of these approaches, and to document the need for and placement of improved procedures, an Instrument Flight Rules (IFR) wind analysis has been conducted. IFR weather conditions exists when one or both of the following conditions exists: 1. When the ceiling is less than 1,000 feet but equal to or greater than 200 feet, and 2. And when visibility is less than three statute miles but equal to or greater than ½ statute mile. Using the wind data obtained from the National Climate Data Center, an IFR wind rose was constructed and is presented in **Exhibit 4-2**.

Exhibit 4-2. IFR Weather Wind Rose



Source: ***Reid Middleton, Inc. and Mead & Hunt utilizing the FAA Airport Design Tools, Wind Analysis. Wind data obtained from the National Oceanic and Atmospheric Administration, National Climate Data Center. Station 727885 William R Fairchild International Airport. Period of Record: 2006-2015.***

Table 4-3 quantifies the wind coverage provided by the individual runway ends and the combined runways during IFR weather conditions at CLM. From this analysis, it can be determined that CLM provides more than adequate wind coverage during IFR weather conditions for both the 10.5-knot and the 13-knot crosswind components. The all weather conditions indicates that Runway 8/26 alone provides greater than 95 percent wind coverage for both crosswind components. Runway 13/31 is not necessary to obtain the minimum IFR wind coverage because it is a visual only runway.

Table 4-3. IFR Weather Wind Cover Analysis

RUNWAY DESIGNATION	10.5-KNOT CROSSWIND COMPONENT	13-KNOT CROSSWIND COMPONENT
Runway 8[1]	81.45%	81.45%
Runway 26[1]	95.96%	95.98%
Runway 8/26	99.96%	99.99%
Runway 13[1]	88.28%	---
Runway 31[1]	96.75%	---
Runway 13/31	99.40%	---
Combined	99.97%	99.99%

Source: Wind analysis tabulation provided Reid Middleton, Inc. and Mead & Hunt utilizing the FAA Airport Design Tools, Wind Analysis. Wind data obtained from the National Oceanic and Atmospheric Administration, National Climate Data Center. Station 727885 William R Fairchild International Airport. Period of Record: 2006-2015.

Note: 1 A 5-knot tailwind component was used for the individual runway end analysis.

CONCLUSION – WIND & WEATHER ANALYSIS

From this analysis, it can be concluded that the existing runway configuration provides adequate wind coverage for both the 10.5- and 13-knot crosswind components and exceeds the 95 percent coverage recommended by the FAA. It also indicates that Runway 8/26 alone provides greater than 95 percent wind coverage for both crosswind components and Runway 13/31 is not necessary to obtain the minimum wind coverage. It is anticipated that the Port of Port Angeles will eventually elect to close Runway 13/31 in the future.

From an individual runway end analysis, Runway 26 provides the best IFR wind coverage (by more than 14 percent) compared to Runway 8.

AIRFIELD CAPACITY

The ability of an airport's airside facilities to accommodate both the existing and forecasted aircraft activity is known as airfield capacity. It is defined in the flowing terms:

- **Hourly Capacity** - *The maximum number of aircraft that can be accommodated under conditions of continuous demand during a one-hour period.*
- **Annual Service Volume (ASV)** - *The reasonable estimate of an airport's annual capacity (i.e., level of annual aircraft operations that will result in average annual aircraft delay of approximately one to four minutes.*

AIRFIELD CAPACITY FACTORS

Airfield capacity for long-range planning is determined by methodology contained in FAA AC 150/5060-5. Certain site-specific factors influence airfield capacity, and include aircraft mix, runway use, percent arrivals, touch-an-go operations, the location of exit taxiways, and local air traffic control rules and procedures.

Aircraft Mix: Aircraft mix is defined as the relative percentage of operations conducted by each of four classes of aircraft divided by type and size of the aircraft using an airport. Class A and B aircraft consist of small single engine and twin-engine (both propeller and jet) weighting 12,500 pounds or less. Class C aircraft are large jet and propeller aircraft weighing between 12,500 pounds and 300,000 pounds. Class D aircraft are jet and propeller aircraft weighing in excess of 300,000 pounds. Classes A and B are presentative of the general aviation fleet; Classes C and D are typical of those used by airlines and the military. At CLM, the fleet mix has been estimated as follows:

- **Existing fleet mix:** *Classes A and B at 95 percent, Class C at 5 percent.*
- **Future 2035 fleet mix:** *Classes A and B at 94 percent, Class C at 6 percent.*

Runway Use: The use configuration of the runway system is defined by the number, location, and orientation of the active runways and relates to the distribution and frequency of aircraft operations on those facilities. Both the prevailing winds and the existing runway system at CLM combine to dictate runway use patterns. It is estimated by FBO personnel and verified by CLM personnel that the runway utilization pattern is as follows:

- **Runway 8/26:** *Runway 8/26 is used an estimated 85 percent of the time, with Runway 8 used approximately 35 percent and Runway 26 used approximately 65 percent.*
- **Runway 13/31:** *Runway 13/31 is used approximately 15 percent of the time, with Runway 13 used an estimated 15 percent of the time and Runway 31 utilized an estimated 85 percent of the time.*

Percent Arrivals: The percentage of aircraft arrivals influence airfield capacity because aircraft on approach are travelling at a reduced speed and are typically given priority over departures. Thus, higher percentages of arrivals, especially during peak periods of activity, tend to reduce the ability of the airfield system to accommodate the demand. It is estimated by FBO personnel and verified by CLM personnel that arrivals equal departures at CLM.

Touch-and-Go Operations: Any aircraft maneuver in which the aircraft performs a normal landing touchdown followed by an immediate takeoff without stopping or taxiing clear of the runway is referred to as a touch-and-go. They are almost always associated with training and are counted as a local operation. As presented in the previous chapter, local operations comprise approximately 41 percent of the existing operations at CLM. By 2035, they are expected to decrease to an estimated 36 percent.

Exit Taxiways: Exit taxiways influence airfield capacity by providing aircraft the ability to exit the runway as quickly and safely as possible. The amount, spacing, and design of exit taxiways influence aircraft runway occupancy times and the capacity of the airfield system. CLM has an adequate exit system in place to minimize runway occupancy times and maximize airfield capacity.

Air Traffic Control Rules: The FAA specifies aircraft separation criteria and operational procedures for aircraft in the vicinity of airports, contingent upon the size, availability of radar, sequencing of operations, and noise abatement procedures that may be in effect at an airport. The impact of air traffic control on airfield capacity is most influenced by aircraft separation requirements dictated by the mix of aircraft using an airport. Presently, there are no special air traffic control rules in effect at CLM that significantly affect airfield capacity.

AIRFIELD CAPACITY METHODOLOGY

As specified in AC 150/5060-5, the determination of ASV and hourly capacity for long-range planning purposes involves several assumptions, which are: arrivals equal departures; touch-and-go operations are between 0 and 50 percent; a full-length parallel taxiway and adequate exit taxiways are available, and no taxiway crossing problems exist; there are no airspace limitations; at least one runway is equipped with an ILS and has the necessary air traffic control facilities and service to carry out operations in a radar environment; IFR weather conditions occur roughly 10 percent of the time; and, approximately 80 percent of the time the airport is operated with the runway use configuration that produces the greatest hourly capacity.

Using these assumptions and AC 150/5060-5 guidelines, the existing and future ASV for CLM has been calculated at approximately 270,000 operations, with a VFR hourly capacity of 150 operations and an IFR hourly capacity of 59 operations. It is recognized that CLM does not conform to all the assumptions, such as the lack of air traffic control facilities and services, built into the calculation, as stated above.

CONCLUSION – AIRFIELD CAPACITY

As can be seen, the estimated ASV of 270,000 operations is significantly higher than the 36,451 operations expected to occur in 2035. However, as stated above, the actual ASV and hourly capacities would be reduced from the calculated numbers, as CLM does not conform to all the assumptions built into the calculations. Additionally, FAA planning standards indicate that when 60 percent of the ASV is reached (in this case, 174,000 operations), an airport should begin planning ways to increase capacity. And when 80 percent of ASV is reached (approximately 232,000 operations), then construction of facilities to increase capacity should be initiated. It is not expected that CLM will experience capacity-related problems during the planning period.

AIRPORT DESIGN STANDARDS

An airport's design standards are based on the appropriate RDC for each runway. All existing and proposed airfield facilities must be constructed in accordance with FAA airport design standards as contained in Advisory Circular (AC) 150/5300-13, Change 1. The design standards have developed to assure that facilities can be operated in a safe and efficient manner and represent a minimum standard to be achieved.

RUNWAY 8/26

As presented earlier, the RDC for Runway 8/26 is B-II-2400. Applicable airport design standards for Runway 8/26 are presented in **Table 4-4**. As can be seen from the table, Runway 8/26 does not meet all the specified FAA design standards associated with RDC B-II-2400. The non-standard conditions are outlined below.

Table 4-4. Runway 8/26 Airport Design Standards

ITEM	EXISTING DIMENSION	B-II-2400
RUNWAY WIDTH	**150**	100
RUNWAY SAFETY AREA		
Width	300	300
Length Beyond Runway End		
Runway 8	**293**	600
Runway 26	600	600
Length Prior to Landing Threshold		
Runway 8	300	600
Runway 26	600	600
RUNWAY OBJECT FREE AREA		
Width	**651**	800
Length Beyond Runway End		
Runway 8	**293**	600
Runway 26	600	600
RUNWAY OBSTACLE FREE ZONE		
Width	400	400
Length		
Runway 8	2,600	[1]
Runway 26	200	[1]
PRECISION OBSTACLE FREE ZONE		
Width	800[2]	800
Length	200[2]	200

ITEM	EXISTING DIMENSION	B-II-2400
RUNWAY CENTERLINE TO:		
Parallel Taxiway A Between Taxiways B & E	**275**	300
Parallel Taxiway A Between Taxiways E & H	400	300
Aircraft Parking at Terminal Apron	**345**	400
Aircraft Parking at East GA Apron	425	400
Holding Position Line	250	250

Source: *FAA AC 150/5300-13A, Change 1, Airport Design.*

Notes: *1 The Runway Obstacle Free Zone length for this category would extend 200 feet beyond the last light unit of the Approach Lighting System (ALS).*

2 Dimensions applicable to Runway 8 only.

Existing dimensions delineated in **bold** *text reflect standards not met.*

First, the localizer antenna is located approximately 291 feet east of the Runway 26 pavement end, which is 309 feet deficient of the standard Runway Safety Area (RSA) length of 600 feet required for aircraft departures on Runway 8. The RSA is a defined surface centered on the runway centerline, prepared and suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from the runway. It must be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations; drained by grading or storm sewers to prevent water accumulation; capable under dry conditions of supporting rescue vehicles; and free of objects except those that must be in the RSA by function (e.g., runway edge lights). If objects higher than three inches must be located within the RSA, then to the extent practical, they must be constructed on frangible mounted structures of the lowest practical height with the frangible point no higher than three inches above grade. The FAA has determined that localizer antennas are not usually required to be located within the RSA and RSA standards cannot be modified or waived.

Second, the localizer antenna, as described above, also creates a 309-foot deficiency to the standard Runway Object Free Area (ROFA) length of 600 feet. Additionally, the localizer building is located within the ROFA width north of the runway approximately 251 feet, which is 149 feet deficient of the 400-foot standard from the runway centerline (800 feet total width). The ROFA is centered about the runway centerline and clearing standards require the clearing of above ground objects protruding above the nearest point of the RSA. It is acceptable for objects required for air navigation or aircraft ground maneuvering purposes (i.e., taxiing and holding) to be located within the ROFA.

Third, the centerline separation distance of Taxiway A is only 275 feet from the Runway 8/26 centerline where Taxiway A doglegs at the junction of Taxiway E, a deficiency of 25 feet.

Fourth, the terminal apron aircraft parking area is located a minimum distance of 345 feet from the Runway 8/26 centerline, a discrepancy of roughly 55 feet. **Exhibits 4-3** and **4-4** illustrate the design standard deficiencies associated with Runway 8/26.

Table 4-4 also presents one non-standard condition, the width of Runway 8/26 is 150 feet, which exceeds the airport design standard of 100 feet. FAA policies and guidelines indicate that funding for pavement reconstruction projects are generally limited to that required by the appropriate design standard. However, the FAA has determined that a near-term pavement rehabilitation project, generally consisting of a mill and overlay of the pavement surface, is eligible for Airport Improvement Program (AIP) funding for the entire 150-foot width (see FAA letter in Appendix Five). Should the Port of Port Angeles decide to retain the 150-foot width of the runway when pavement reconstruction is required, it must do so utilizing Port monies exclusively for the extra 50 feet.

RUNWAY 13/31

As presented earlier, Runway 13/31 has an applicable RDC of A-I-VIS. Additionally, for design standards analysis, the runway is designed and intended for small aircraft use exclusively (i.e., aircraft with maximum takeoff weights less than 12,500 pounds). The airport design standards applicable to Runway 13/31 are presented in **Table 4-5**.

Table 4-5. Runway 13/31 Airport Design Standards

ITEM	EXISTING DIMENSION	A-I-VIS[1]
RUNWAY WIDTH	**50**	60
RUNWAY SAFETY AREA		
Width	120	120
Length Beyond Runway End		
Runway 13	240	240
Runway 31	**218**	240
Length Prior to Landing Threshold		
Runway 13	**218**	240
Runway 31	240	240
RUNWAY OBJECT FREE AREA		
Width	250	250
Length Beyond Runway End		
Runway 13	240	240
Runway 31	**198**	240
RUNWAY OBSTACLE FREE ZONE		
Width	250	250
Length		
Runway 13	200	200
Runway 31	200	200
PRECISION OBSTACLE FREE ZONE		
Width	N/A	N/A
Length	N/A	N/A
RUNWAY CENTERLINE TO:		
Parallel Taxiway	230	150
Aircraft Parking	N/A	125
Holding Position Line	125	125

Source: *FAA AC 150/5300-13A, Change 1, Airport Design.*

Notes: *1 Airport Design Standards for Small Aircraft Only (i.e., aircraft with maximum takeoff weights less than 12,500 pounds).*

2 The Runway Obstacle Free Zone length for this category would extend 200 feet beyond the last light unit of the Approach Lighting System (ALS).

Existing dimensions delineated in **BOLD** *text reflect standards not met.*

Exhibit 4-3. Runway 26 Dimensional Non-Standard Conditions

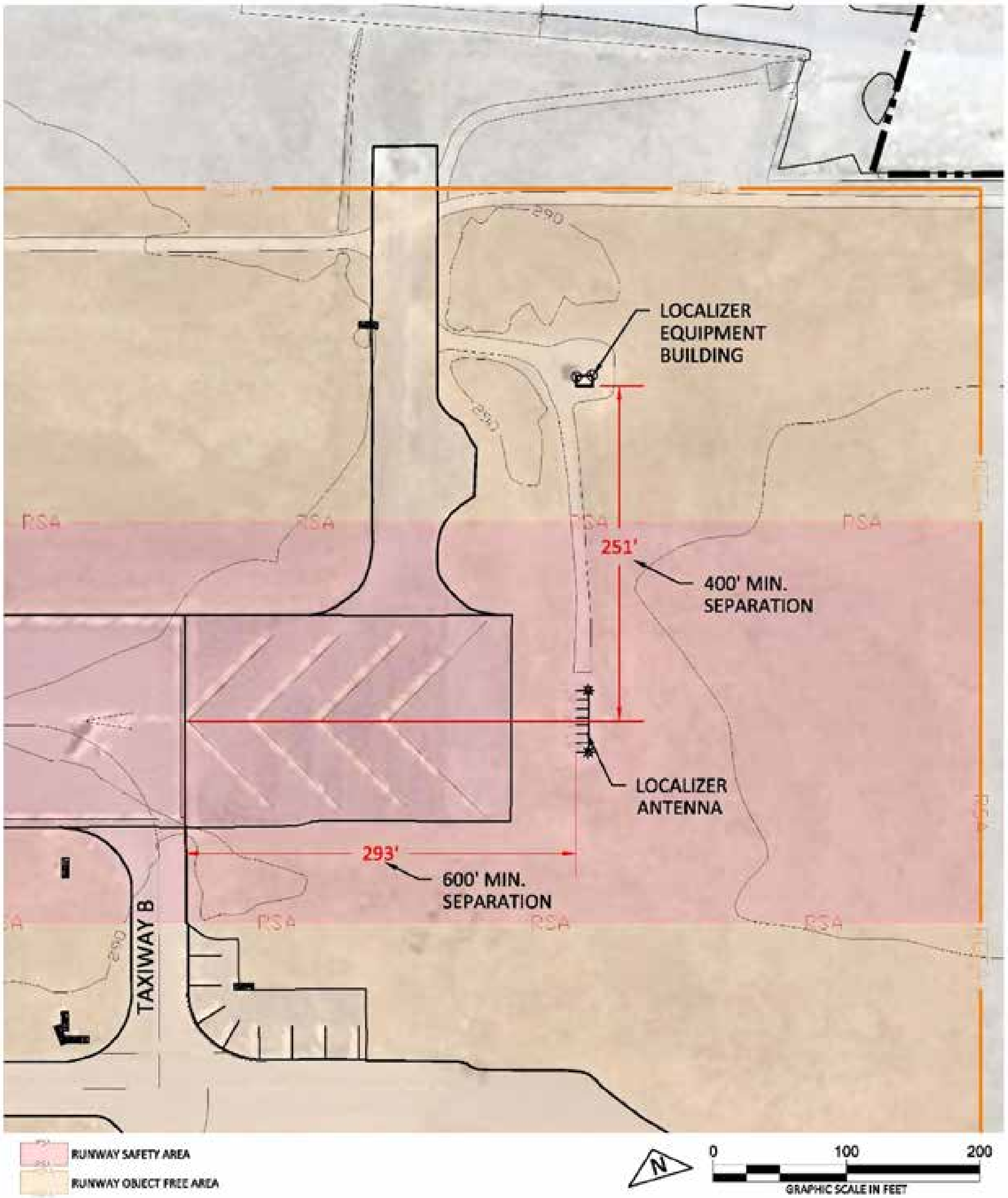
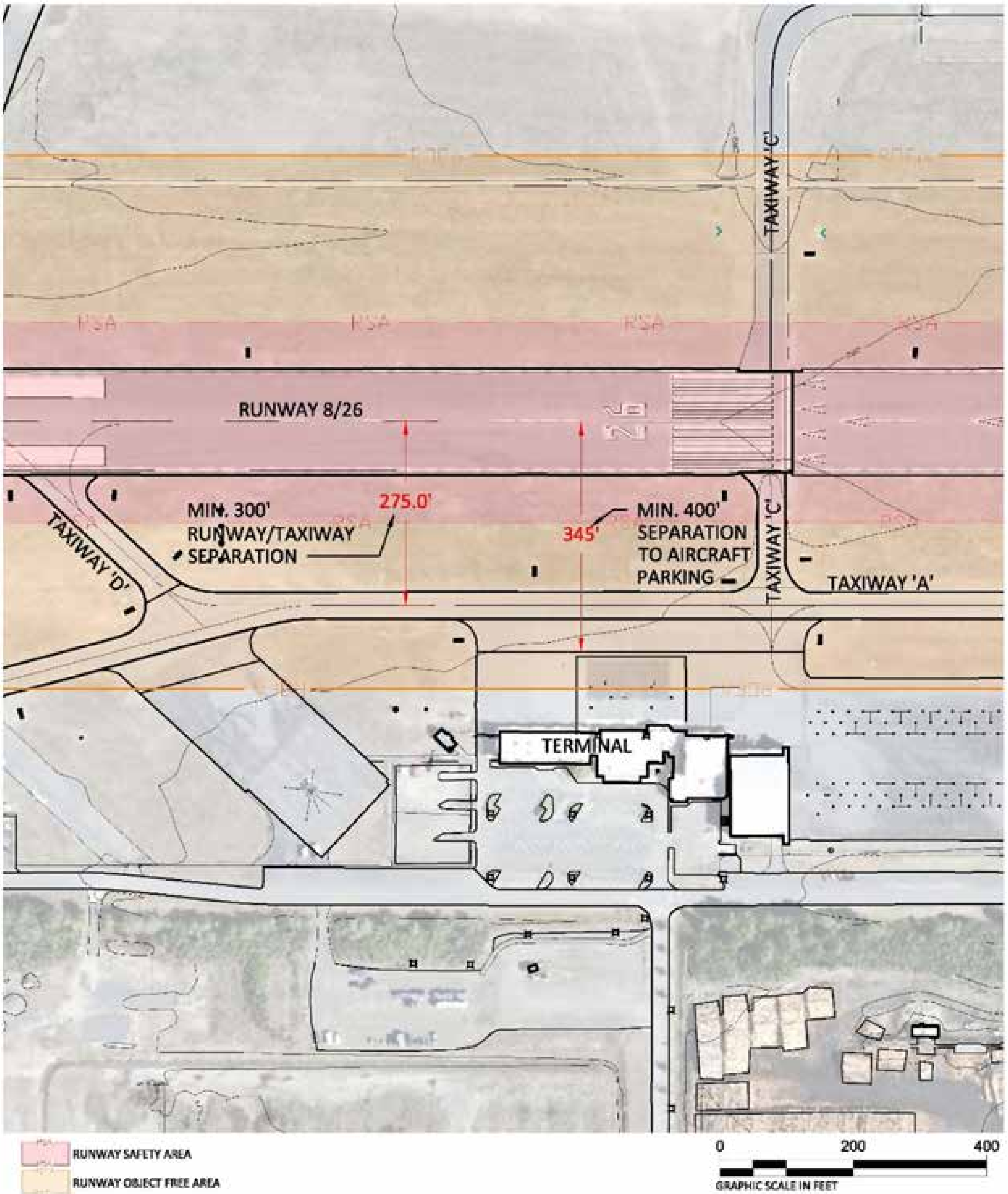


Exhibit 4-4. Taxiway A and Terminal Apron Dimensional Non-Standard Conditions

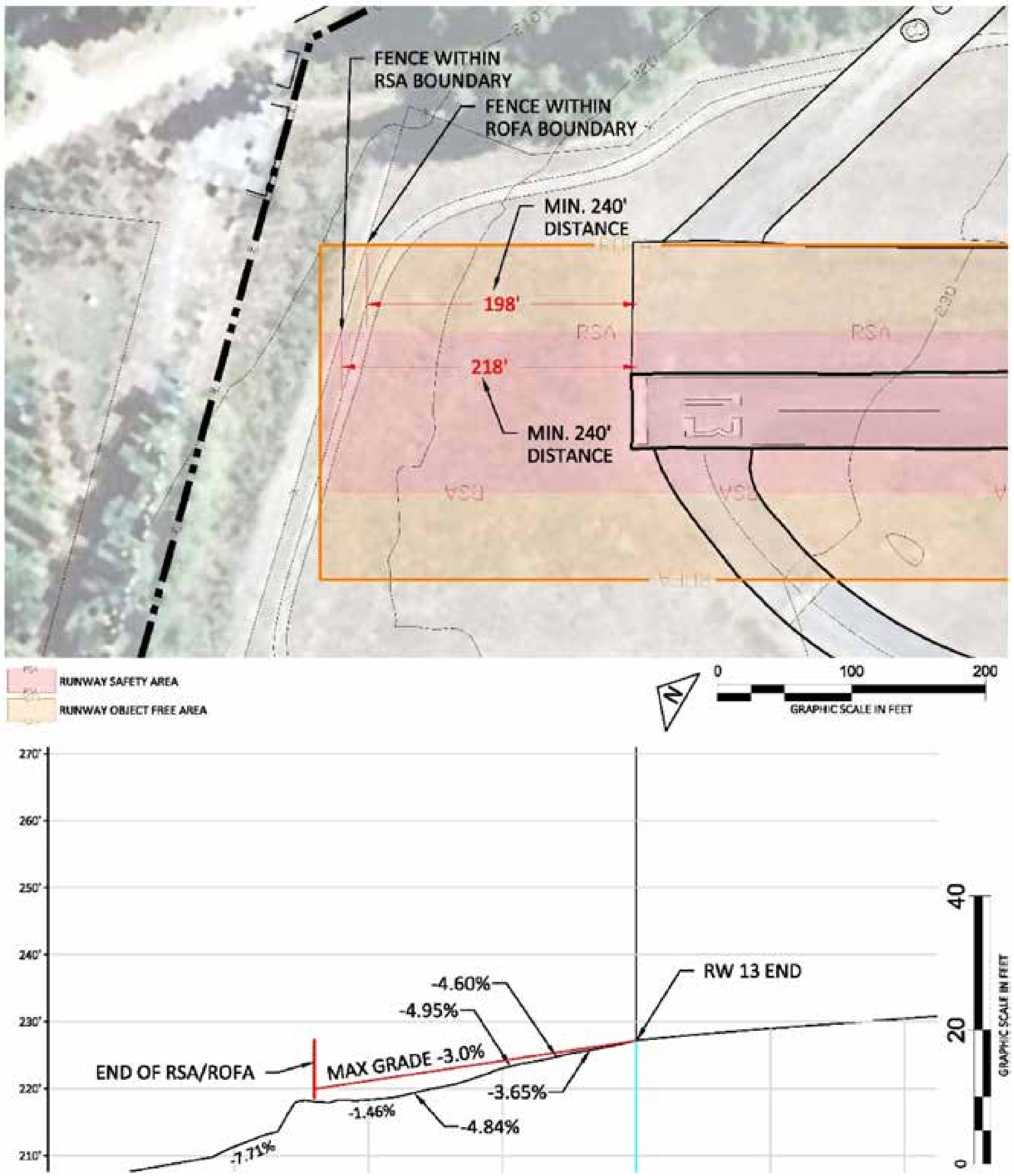


Runway 13/31 meets most airport design standards with two exceptions. **First**, the runway width is currently marked at 50 feet, which is 10 feet deficient of the 60-foot design standard.

Second, the Runway 13 departure end RSA length is limited to 218 feet by the location of the airport fence located northwest of the Runway 13 end, a deficiency of 22 feet compared to the standard length of 240 feet.

Additionally, the maximum standard RSA gradient of 3.0 percent beyond runway ends is exceeded in this area (existing grade of nearly 5.0 percent within the RSA). **Exhibit 4-5** graphically presents the deficiencies associated with the Runway 13 approach end.

Exhibit 4-5. Runway 13 Dimensional Non-Standard Conditions



Third, the Runway 13 ROFA length is also limited to 198 feet by the airport fence located northwest of the Runway 13 end, a deficiency of approximately 42 feet compared to the standard length of 240 feet.

CONCLUSION – AIRPORT DESIGN STANDARDS

In consideration of the existing aircraft fleet and instrument approach minimums, Runway 8/26 should continue to be planned and protected to accommodate dimensional standards associated with RDC B-II-2400. For as long as the Port desires to keep Runway 13/31 operational without FAA funding, it should continue to be planned and protected to accommodate RDC A-I-VIS. Alternatives that alleviate the identified design deficiencies will be examined and presented in the next chapter.

RUNWAY LENGTH

Generally, for design purposes, the determination of appropriate runway length recommendations at general aviation airports is premised upon a combination of factors, which include:

- **Airport Elevation**
- **Mean maximum daily temperature of the hottest month**
- **Runway gradient**
- **Family grouping of critical aircraft for runway length purpose**

The runway length operational requirements for aircraft are greatly affected by elevation, temperature, and runway gradient. The calculation for runway length requirement at CLM is based on an elevation of 291 feet Above Mean Sea Level (AMSL), 69.1° Fahrenheit Mean Normal Maximum Temperature (MNMT) of the hottest month, and a maximum difference in runway elevation at the centerline of 17.6 feet.

RUNWAY LENGTH ANALYSIS

Runway length determination involves the family grouping of critical design aircraft consisting of those aircraft types deemed the most demanding aircraft within the general aviation fleet that operate or are projected to operate regularly at an airport. CLM accommodates all classes of aircraft, but the fleet is dominated by small aircraft with maximum takeoff weight (MTOW) of less than 12,500 pounds. The previous chapter identified the Beech Super King Air 200 as the Design Aircraft at CLM, which is in the aircraft family grouping with approach speeds of 50 knots or more and having 10 or more passenger seats. Other aircraft within this category include the Beech King Air 90 and 100, Beech Super King Air 300, the Beech Queen Air, and the Cessna 441 Conquest. **Table 4-6** presents the recommended runway length based on this family grouping. It is derived from FAA AC 150/5325-4B, Runway Length Requirements for Airport Design, which provides standards and guidelines recommended strictly for use in the design of civil airports and include airplane performance data curves and tables for use in airport planning and runway length analysis. **Exhibit 4-6** provides the runway length curve (green arrows) derived from AC 150/5325-4B used to determine the appropriate runway length for this family grouping of aircraft.

Table 4-6. Runway 8/26 Runway Length Recommendations, In Feet

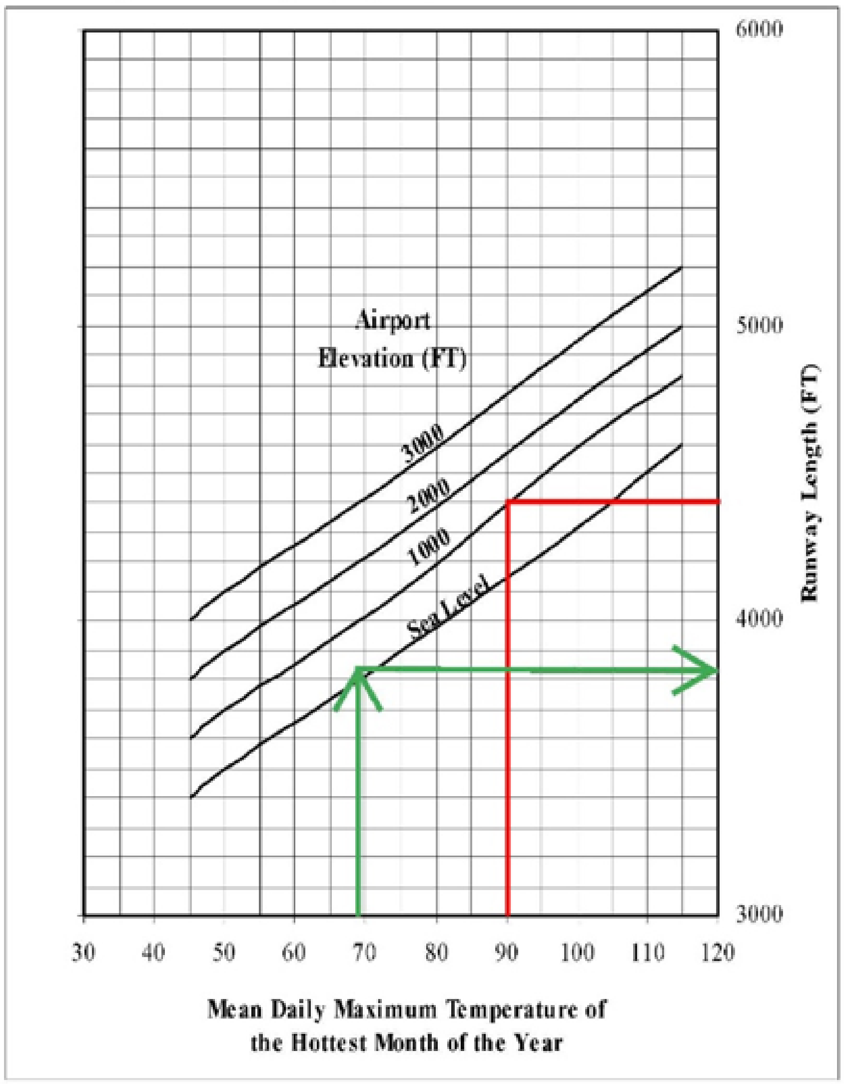
	RUNWAY LENGTH (DRY CONDITIONS)	TOTAL (ADJUSTMENT)
Existing Runway 8/26 Length = 6,347		
Small Airplanes Having 10 or More Passenger Seats	3,850	3,850

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

CLM is used by larger, more demanding business jets in the family grouping of aircraft weighing greater than 12,500 pounds MTOW. However, the existing utilization of these aircraft types does not meet the FAA defined "regular use threshold" of a minimum 500 non touch-and-go itinerant operations contained in FAA AC 150/5000-17, Critical Aircraft and Regular Use Determination. In recognition of potential changes in critical aircraft design criteria and the associated impacts on the airport's facilities, additional runway length analysis by "non-regular use" aircraft is included in Appendix Six.

Exhibit 4-6. Runway Length Curve

Small Airplanes Having 10 or More Passenger Seats
(Excludes Pilot and Co-pilot)

Representative Airplanes	Runway Length Curves
Raytheon B80 Queen Air **Raytheon** E90 King Air **Raytheon** B99 Airliner **Raytheon** A100 King Air (Raytheon formerly Beech Aircraft) **Britten-Norman** Mark III-1 Trilander **Mitsubishi** MU-2L **Swearigen** Merlin III-A **Swearigen** Merlin IV-A **Swearigen** Metro II	**Example:** Temperature (mean day max hot month) 90° F (32° C) Airport Elevation (msl) 1,000 feet (328 m) Recommended Runway Length 4,400 feet (1,341 m) **Note:** For airport elevations above 3,000 feet (915 m), use the 100 percent of fleet grouping in figure 2-1.  **(Degrees F)**

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

CONCLUSION – RUNWAY LENGTH

As it is at most airports, the determination of appropriate runway length at CLM is a complex consideration. As determined earlier, the all-weather wind conditions favor the use of Runway 26 by nearly 19 percent compared to Runway 8 in consideration of the 13-knot crosswind component. The IFR wind conditions favor Runway 26 by more than 14 percent in consideration of the 13-knot crosswind component. Most aircraft approaching CLM do so from the east. Except when meteorological conditions dictate that aircraft utilize the ILS approach to Runway 8, it is more economical and sustainable for most aircraft operators to use Runway 26 for landing. Thus, it is prudent that Runway 26 provide adequate runway landing length for users of CLM, especially the operators of turbine-powered large transport category aircraft.

The analysis presented in **Table 4-6** demonstrates that the overall Runway 8/26 length of 6,347 feet exceeds the 3,850 feet required by the Design Aircraft. Using this criterion, the FAA has determined that a runway length of 3,850 feet is the maximum length currently eligible for AIP funded pavement reconstruction projects. However, similar to the runway width determination, the FAA has determined that the near-term pavement rehabilitation project (i.e., mill and overlay of the pavement surface) is eligible for AIP funding for a runway length of 5,000 feet (see FAA letter in Appendix Five). This determination is based on demonstrated aircraft operational need, CLM listing in the State of Washington Emergency Plan, and the Port's recent clearing of trees in Lincoln Park that removed obstructions to the Runway 26 displaced threshold. Should the Port decide to maintain a runway length greater than 5,000 feet for the pavement rehabilitation project, it must do so utilizing Port monies exclusively for any additional runway length.

Since the Port and the City of Port Angeles strongly desire to accommodate emergency medical flights conducted by business jet aircraft (i.e., Lear 31s) and the existing business jets in the family grouping of aircraft weighing greater than 12,500 pounds MTOW that frequent the airport, it is recommended that the alternatives examination process conducted in the next chapter evaluate an alternative that decreases the runway length to 5,000 feet. The Port also desires to maintain the existing runway length of 6,347 feet, so it is recommended that an alternative be analyzed in the next chapter that retains the status quo, with the understanding the any pavement rehabilitation or reconstruction projects for this runway length will use Port monies exclusively for the additional runway length.

RUNWAY LOAD BEARING CAPACITY

The runway pavement strength at CLM was described previously in the Inventory chapter. Runway 8/26 has a published gross weight bearing capacity of 55,000 pounds single wheel, 66,000 pounds dual wheel, 115,000 pounds dual tandem. Though not published yet, Runway 8/26 has a weight bearing capacity of 155,000 pounds for tandem singles (2S) wheel main landing gear configuration. Runway 13/31 has a published gross weight bearing capacity of 30,000 pounds single wheel main landing gear configuration.

RUNWAY 8/26

Existing Runway 8/26 pavement surfaces appear to be adequate to support the most frequent use aircraft in the B-II runway design group, including the Cessna Caravan and the Beech Super King Air 200 which is the critical design aircraft. The runway also appears adequate to support regular use by larger, more demanding B-II category aircraft such as the Cessna Citation II and the Dassault Falcon 900. On a less frequent basis there are operational uses by aircraft in the C-II and C-III design group such as the Gulfstream G-IV/G400 and the Gulfstream G-V/G500. The G-IV aircraft can weigh 72,000 pounds, with dual main wheel configuration, and the G-V aircraft can have a maximum weight of 89,000 pounds. These larger, less frequent use aircraft can also be accommodated on Runway 8/26 without undue harm to the pavements. If the operational counts for this class of aircraft grow beyond a few dozen per year, it is recommended that further evaluation of pavement load bearing capacity be conducted.

As part of the planned response to a Cascadia Subduction zone event, the runway also appears suitable to support limited use by C-IV design group C-130 operations without adversely affecting the pavement. Actual pavement conditions may vary and be more susceptible to damage, but there appears to be excess pavement thickness beyond the required C-130 thickness to provide some additional protection as well. The Calculated Pavement Classification Number (PCN) of Runway 8 PCN of 77 and Runway 26 PCN of 63, also indicates the pavement is capable to support the C-130 Aircraft Classification Number (ACN) of 30.2. The C-130 cumulative damage factor is less than 1, indicating the pavement should be capable to support the aircraft. The California Bearing Ratio (CBR) value utilized for analysis was assumed from recent CBR test data for a nearby apron development. Runway specific CBR test was not performed.

It is recommended that the Runway 8/26 strength code be modified from 2S-83, to 2S-155, with the notation that this is for occasional operations. It is also recommended that the airport perform runway pavement surface inspections during operational drills with C-130 aircraft to determine actual viability of pavement condition to support C-130 aircraft.

RUNWAY 13/31

The existing Runway 13/31 load bearing capacity appears sufficient to support design group A-I (Small) aircraft including all single engine aircraft. The pavement condition is deteriorating and will eventually fail with continued use and lack of maintenance. Due to the primary runway providing adequate cross wind coverage, the FAA is no longer providing maintenance or repair funding for Runway 13/31. It is recommended that the Port close Runway 13/31 when it is no longer suitable for use due to pavement condition deterioration.

Runway 13/31 is not rated for use for landing and departure by C-130 aircraft, but the runway may support some limited C-130 taxiing and parking operations. Findings indicate that Runway 13-31 could handle an isolated taxiing or parking operation at maximum landing weight (155,000 pounds), and could possibly support more operations with an aircraft gross weight limitation at 100,000 pounds. Runway 13/31 may support some C-130 activity, however, it is more susceptible to damage than Runway 8/26 due to its thinner runway cross section and reduced PCI rating. The Calculated PCN for Runway 13/31 of 23 is less than the ACN of the C-130 of 30.2. Despite this, the C-130 cumulative damage factor is still less than 1 indicating the pavement should be able to support an isolated aircraft taxiing or parking operations. The CBR value utilized for this analysis was assumed from recent CBR test data for a nearby apron development. Runway specific CBR testing was not performed.

Due to the potential use of Runway 13/31 for C-130 aircraft parking during a disaster response event, it is recommended that the Port perform runway pavement surface inspections to determine actual viability of pavement condition to support C-130 aircraft. If pavement appears to be suitable upon visual inspection, the Port should identify, target, and confine usage to those areas that appear to be in best condition. It is recommended that C-130 weight and operations be limited as much as possible to sustain pavement. Utilizing steel plates in parking locations could provide additional pavement protection for aircraft anticipated to be parked for longer durations.

CONCLUSION – RUNWAY LOAD BEARING CAPACITY

Runways 8/26 and 13/31 currently have pavement load bearing capacity to sufficiently support existing use by the current runway design group aircraft and existing fleet mix aircraft types. The Runway 8/26 pavement, with regular maintenance and rehabilitation should meet the demands for operations by forecast design group and fleet mix aircraft into the foreseeable future. The Runway 13/31 pavement is deteriorating due to age and lack of maintenance and the Port may choose to close the runway when the pavement conditions are no longer suitable for takeoffs and landings.

RUNWAY PROTECTION ZONES

The function of RPZs is to enhance the protection of people and property on the ground beyond the runway ends. This is achieved through airport control of the RPZ areas, and control is preferably exercised through fee simple ownership by the airport within the RPZs. It is desirable to clear all above ground objects from within RPZs; where this is impractical, airport owners, at a minimum, should maintain the RPZ clear of all facilities supporting incompatible activities.

In FAA Memorandum Interim Guidance on Land Uses Within a Runway Protection Zone, dated September 27, 2012, the FAA Office of Airports (ARP) outlined interim policy on land uses within RPZs until a comprehensive guidance document for existing and proposed land uses within RPZs is published. The interim guidance requires ARP Regional Office (RO) and Airport District Office (ADO) staff to consult with National Airport Planning and Environmental Division (APP-400) when defined land uses would enter the limits of the RPZ as a result of the following actions:

- *Airfield improvements (e.g., runway extensions or shifts).*
- *Change in design aircraft increasing the RPZ dimensions.*
- *New or revised instrument approach procedures increasing the RPZ dimensions.*
- *Local development proposals in the RPZ.*
- *Land uses defined in the memorandum that require consultation include:*
- *Buildings and structures (e.g. residences, schools, churches, hospitals, or other medical care facilities, commercial/industrial buildings).*
- *Recreation land sues (e.g., golf courses, sports fields, amusement parks, other places of public assembly).*
- *Transportation facilities (e.g., rail facilities, public roads and highways, vehicular parking facilities).*
- *Fuel storage facilities (above and below ground).*
- *Hazardous material storage facilities (above and below ground).*
- *Wastewater treatment facilities.*
- *Above ground utility infrastructure (e.g., electrical substations), including any type of solar panel installation.*

RO and ADO staffs are further required to work with airport sponsors to identify, analyze, and document a full range of detailed alternatives that avoid introducing non-compatible land use within an RPZ, minimize the impact of the land use in the RPZ, and mitigate the risks to people and property on the ground.

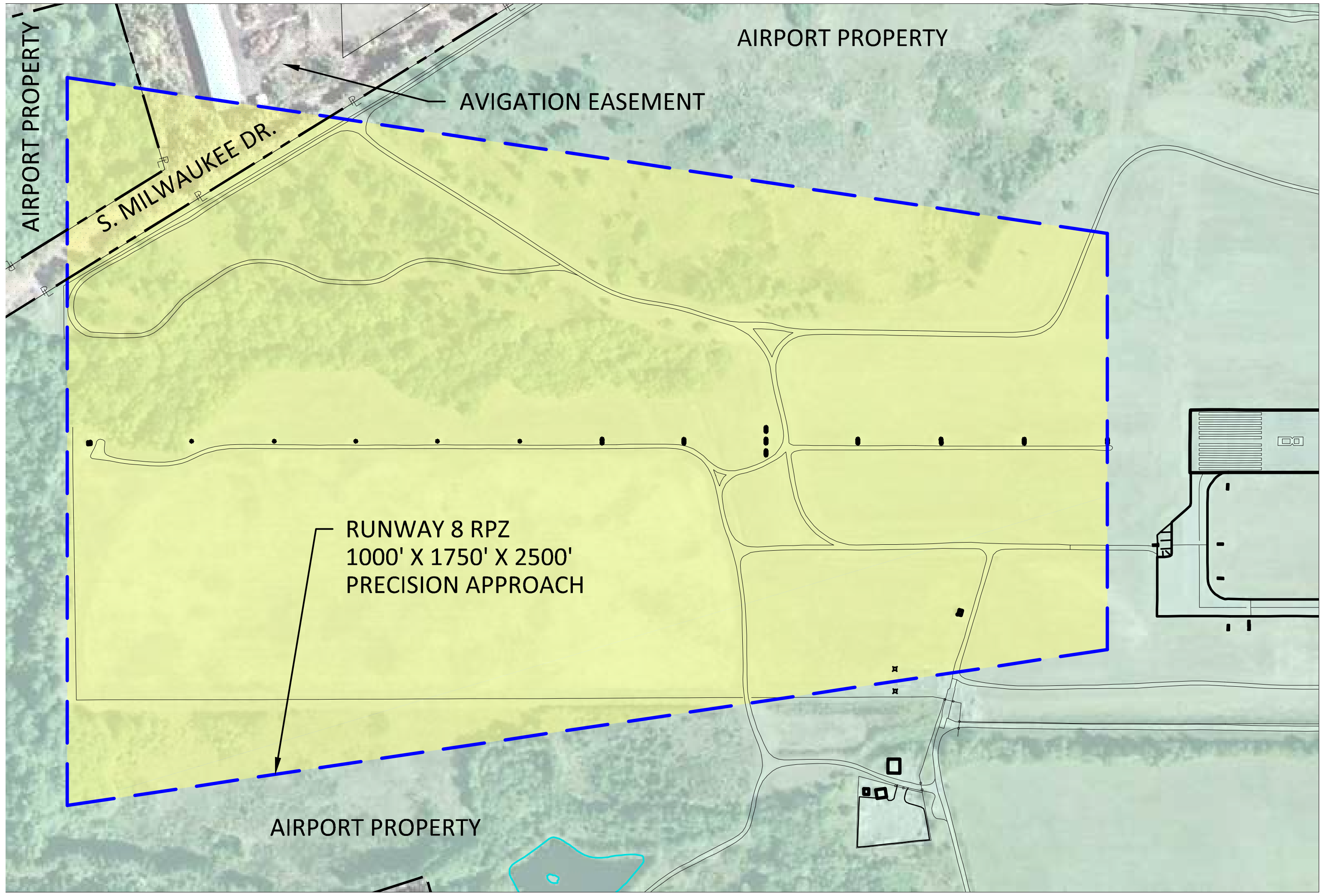
In the top half of **Table 4-7**, the existing RPZ dimensions at CLM are presented based on function (i.e., Approach or Departure RPZ), Aircraft Approach Category (AAC), and the lowest IAP visibility minimums to each runway end. The bottom half of **Table 4-7** presents the FAA's dimensional requirements associated with various aircraft sizes, AACs, and visibility minimums. Currently, the existing RPZs meet the dimensional standards based on the existing visibility minimums and the appropriate AAC. Because Runway 26 has the 1,354-foot displaced threshold for landings, and aircraft utilizing Runway 8 for takeoffs can use the pavement beyond the displaced threshold, there are separate Approach and Departure RPZs at the Runway 26 end. The Runway 26 Departure RPZ (located at the Runway 8 end) begins at the same location as the Runway 8 Approach RPZ but is smaller in size and fully enclosed by the Runway 8 Approach RPZ.

Table 4-7. Runway Protection Zone Dimensions, In Feet

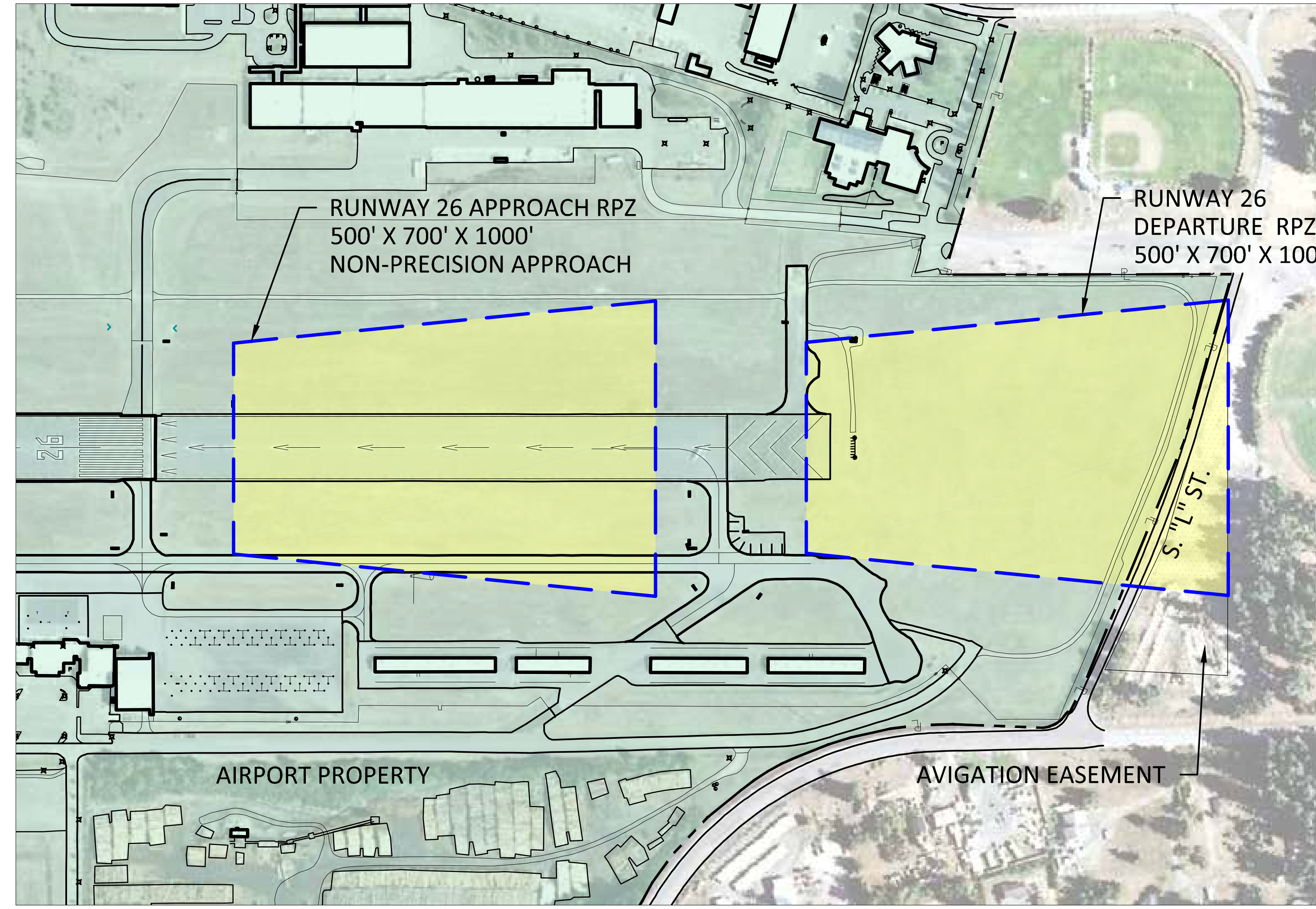
RUNWAY PROTECTION ZONE	INNER WIDTH	LENGTH	OUTER WIDTH	AIRPORT CONTROLS ENTIRE LAND AREA
EXISTING RPZ DIMENSIONS				
Runway 8 Approach (Lower than ¾-mile instrument approach, all aircraft)	1,000	2,500	1,750	Yes (Fee Simple and Easement)
Runway 8 Departure (Large aircraft, AACs A & B)	500	1,000	700	No
Runway 26 Approach (Not lower than one statute mile instrument approach, AACs A & B)	500	1,000	700	Yes (Fee Simple)
Runway 26 Departure (Large aircraft, AACs A & B)	500	1,000	700	Yes (Fee Simple)
Runway 13 (Visual approach, small aircraft only)	250	1,000	450	No
Runway 31 (Visual approach, small aircraft only)	250	1,000	450	Yes (Fee Simple)
FAA STANDARD APPROACH RPZ DIMENSIONS FOR VARIOUS VISIBILITY MINIMUMS				
Visual and not lower than one statute mile, small aircraft only	250	1,000	450	
Visual and not lower than one statute mile, AACs A & B	500	1,000	700	
Visual and not lower than one statute mile, AACs C & D	500	1,700	1,010	
Not lower than ¾-mile, all aircraft	1,000	1,700	1,510	
Lower than ¾-mile, all aircraft	1,000	2,500	1,750	
FAA STANDARD DEPARTURE RPZ DIMENSIONS FOR VARIOUS AIRCRAFT SIZES & AACS				
Small aircraft only, AACs A & B	250	1,000	450	
Large aircraft, AACs A & B	500	1,000	700	
Large aircraft, AACs C, D, & E	500	1,700	1,010	

Source: FAA AC 150/5300-13A, Change 1, Airport Design.

As illustrated in **Exhibit 4-7**, CLM does not own the entire properties within the existing RPZs. There is small piece of the Runway 8 Approach RPZ that is located beyond airport property in the far northern portion of this RPZ. CLM does exercise control over future development in this area through an avigation easement. Most of the Runway 13 RPZ extends beyond airport property, and the properties beyond airport property are not controlled through an avigation easement. Finally, the very end of the Runway 8 Departure RPZ extends beyond airport property into Lincoln Park.



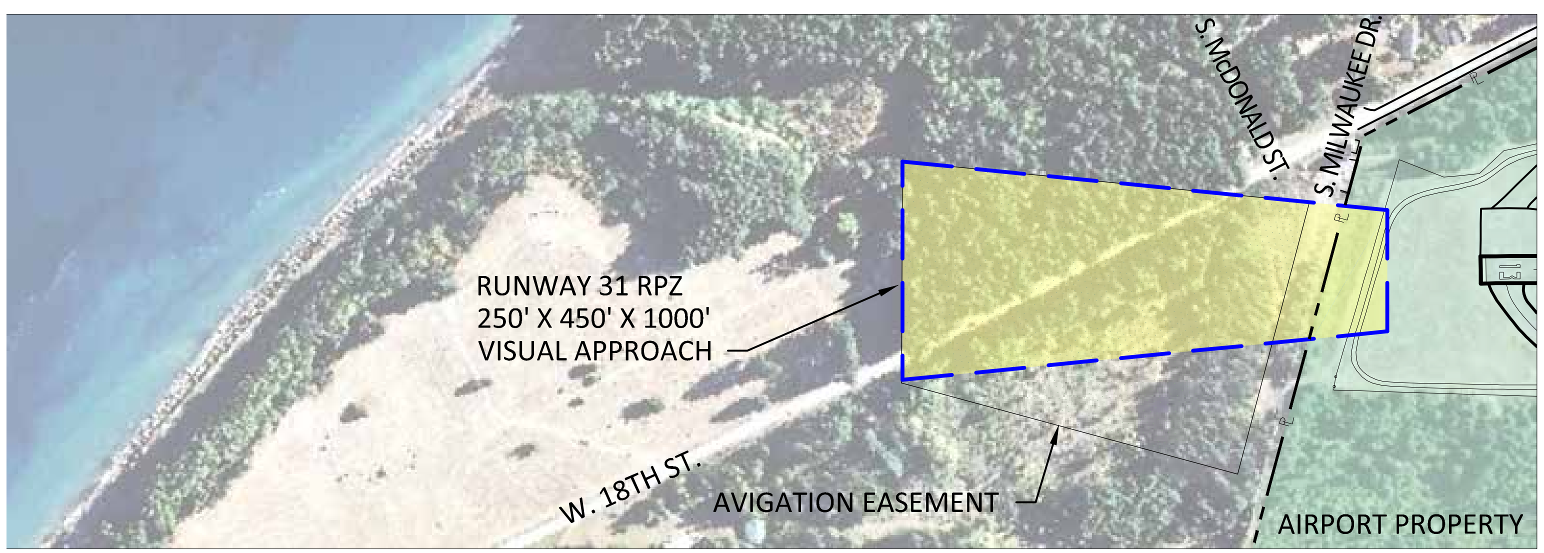
RUNWAY 8



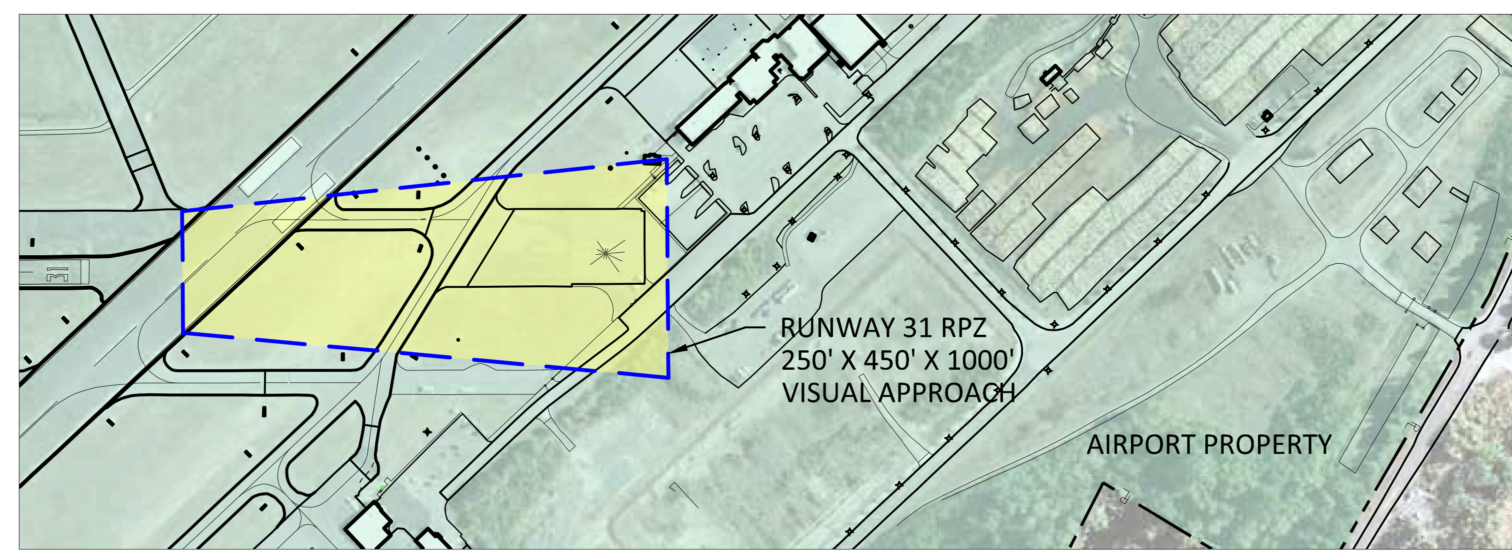
RUNWAY 26

N

0 400 800
GRAPHIC SCALE IN FEET



RUNWAY 13



RUNWAY 31

N

0 400 800
GRAPHIC SCALE IN FEET

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Exhibit 4-7. Runway Protection Zones

CONCLUSION – RUNWAY PROTECTION ZONES

The existing RPZs meet the dimensional standards based on the existing visibility minimums and AACs applicable to each runway end. However, the Runway 13, Runway 8 Approach, and Runway 8 Departure RPZs extend beyond airport-controlled property into non-conforming land uses (i.e. West 18th Street within the Runway 13 RPZ and South L Street and Lincoln Park within the Runway 8 Departure RPZ). The portions of the RPZs extending beyond existing airport-owned or airport-controlled property should be programmed for acquisition (either fee simple or avigation easement) to keep additional non-conforming land uses from developing in the future. The Runway 31 Approach RPZ extends to the southeast beyond Runway 8/26, Taxiway A, and portions of the Terminal and a new GA Ramp area. There is an on-airport land use conflict within the Runway 31 Approach RPZ. There is a new GA apron located west of the terminal building. The use of the ramp to park aircraft conflicts with landing operations to Runway 31. On this ramp the aircraft tail height is limited to 15 feet to stay below the Runway 31 approach surface. Since FAA funding is not anticipated to be available for Runway 13/31 during the time period of this Master Plan Update, the Port is expecting to close Runway 13/31 when the pavement conditions are no longer suitable for aircraft takeoffs and landings. At that point, the conflicting land use within the RPZs will be mitigated for those areas. Any work performed on the runway will be completed to FAA standards.

In conjunction with the examination of alternatives that decrease the Runway 8/26 length, the alternatives evaluation will include the effects of RPZ location based on threshold locations.

RUNWAY END SITING

Criteria contained in AC 150/5300-13A provide guidance for the proper siting of runway ends and thresholds. The criteria are in the form of evaluation surfaces that are typically trapezoidal shaped and extend away from the runway along the centerline at a specific slope, expressed in horizontal feet by vertical feet (e.g., a 20:1 slope rises one unit vertically for every 20 units horizontally). Like RPZs, the specific size, slope, and starting point of the surfaces depend on the visibility minimums and aircraft type associated with the runway end.

THRESHOLD SITING ANALYSIS

Thresholds are located to provide proper clearance over obstacles for landing aircraft on approach to a runway end. When an object beyond an airport owner's ability to remove, relocate, or lower obstructs the airspace required for aircraft to land at the beginning of the runway for takeoff, the landing threshold may require a location other than the end of pavement (i.e., a displaced threshold, like that currently occurring at Runway 26). Much like the RPZ requirements, **Table 4-8** presents the existing dimensions for CLM in the top half of the table. The bottom half of the table presents the FAA's required dimensions for various aircraft sizes, approach speeds, AACs, and the lowest IAP visibility minimums to each runway end.

Table 4-8. Threshold Siting Surfaces, In Feet

THRESHOLD SITING SURFACE	DISTANCE FROM RW END	INNER WIDTH	LENGTH	OUTER WIDTH	SLOPE	EXISTING OBSTRUCTIONS
EXISTING DIMENSIONS						
Runway 8 (IAP with visibility minimums <3/4 statute mile, day or night)	200	800	10,000	3,800	34:1	Yes
Runway 26 (AAC A & B only, instrument night operations)	200	400	10,000	3,800	20:1	Yes
Runway 13 (Small aircraft only with approach speeds < 50 knots, visual approach)	0	250	5,000	700	20:1	Yes
Runway 31	0	250	5,000	700	20:1	No
FAA'S STANDARD DIMENSIONS FOR VARIOUS AIRCRAFT SIZES, APPROACH SPEEDS, AACS						
Small aircraft only with approach speeds < 50 knots, visual approach	0	120	3,000	300	15:1	
Small aircraft only with approach speeds > 50 knots, visual approach	0	250	5,000	700	20:1	
Large aircraft, visual approach, or instrument minimums ≥ one statute mile, day only	0	400	10,000	1,000	20:1	

THRESHOLD SITING SURFACE	DISTANCE FROM RW END	INNER WIDTH	LENGTH	OUTER WIDTH	SLOPE	EXISTING OBSTRUCTIONS
AAC A & B only, instrument night operations	200	400	10,000	3,800	20:1	
AAC > B, instrument night operations	200	800	10,000	3,800	20:1	
Instrument approach with visibility minimums < one statute mile but ≥ ¾ statute mile, day or night	200	800	10,000	3,800	20:1	
Instrument approach with visibility minimums < ¾ statute mile or precision approach, day or night	200	800	10,000	3,800	34:1	

Source: FAA AC 150/5300-13A, Change 1, Airport Design.

Exhibits 4-8 and **4-9** provide a graphic depiction of the existing threshold siting surfaces for Runways 8/26 and 13/31, respectively. Runway 8 has at least one tree located on airport property that is an obstruction to the threshold siting surface and Runway 26 has multiple trees located in Lincoln Park that are obstructions to the threshold siting surface for both the displaced threshold and the end of pavement. There are many penetrations to the Runway 13 threshold siting surface.

GLIDE PATH QUALIFICATION SURFACE ANALYSIS

The Glide Path Qualification Surface (GQS) is an imaginary surface used to evaluate precision approaches and approaches providing vertical guidance. When objects exceed the height of the GQS that cannot be mitigated, then approaches with vertical guidance cannot be authorized. The existing GQS criteria for CLM are presented in **Table 4-9**. Runway 8 is the only runway currently provided with an approach with vertical guidance, therefore, it is the only runway with a GQS analysis. This surface is illustrated on **Exhibit 4-8** and indicates there are no objects that penetrate the surface.

Table 4-9. Glide Path Qualification Surface, In Feet

GLIDE PATH QUALIFICATION SURFACE	DISTANCE FROM RW END	INNER WIDTH	LENGTH	OUTER WIDTH	SLOPE	EXISTING OBSTRUCTIONS
Existing Dimensions						
Runway 8	0	350	10,000	1,520	30:1	No
Standard Dimensions						
Instrument approach with positive vertical guidance (GQS)	0	Runway width + 200	10,000	1,520	30:1	

Source: FAA AC 150/5300-13A, Change 1, Airport Design.

DEPARTURE RUNWAY END ANALYSIS

Departure ends of runways normally mark the end of the full-strength runway pavement available and suitable for departures. Departure surfaces, when clear of obstacles, allow pilots to follow standard departure procedures. If obstacles penetrate the departure surface, then the obstacles must be evaluated through the Obstruction Evaluation/Airport Airspace Analysis (OE/AAA) process. After the OE/AAA process, departure procedure amendments such as non-standard climb rates, non-standard (higher) departure minimums, or a reduction in the length of Takeoff Distance Available (TODA) may be required. The size, shape, slope, and criteria for CLM are presented in **Table 4-10** and graphically presented in **Exhibits 4-8** and **4-9**.

Table 4-10. Departure Runway Surfaces, In Feet

DEPARTURE SURFACE	DISTANCE FROM RW END	INNER WIDTH	LENGTH	OUTER WIDTH	SLOPE	EXISTING OBSTRUCTIONS
EXISTING DIMENSIONS						
Runway 8	0	1,000	10,200	6,466	40:1	Yes
Runway 26	0	1,000	10,200	6,466	40:1	Yes
Runway 13	0	1,000	10,200	6,466	40:1	Yes
Runway 31	0	1,000	10,200	6,466	40:1	Yes
STANDARD DIMENSIONS						
Departure Surface	0	1,000	10,200	6,466	40:1	

Source: FAA AC 150/5300-13A, Change 1, Airport Design.

CONCLUSION – RUNWAY END SITING

This analysis indicates that Runway 26 has penetrations (i.e., trees located in Lincoln Park) to both the displaced threshold and end of pavement siting surface. As stated in the Inventory chapter, Runway 8 has nonstandard takeoff minimums of 300 feet AGL and one-mile visibility minimums, which is reflective of the multiple object penetrations to the departure surface illustrated east of the Runway 26 threshold. Runway 13 has a nonstandard climb rate 454 feet per nautical mile to 1,100 feet AMSL, which is reflective of the rising terrain south of the airport. Runways 26 and 31 do not have nonstandard takeoff minimums or climb rates, but there are many penetrations to the departure surface north of the Runway 13 threshold and there does appear to be one tree, located on airport property, penetrate the departure surface west of the Runway 8 threshold. The alternatives analysis will incorporate the threshold siting details presented in this section that ensure runway ends are sited to achieve sufficient clearance of objects.

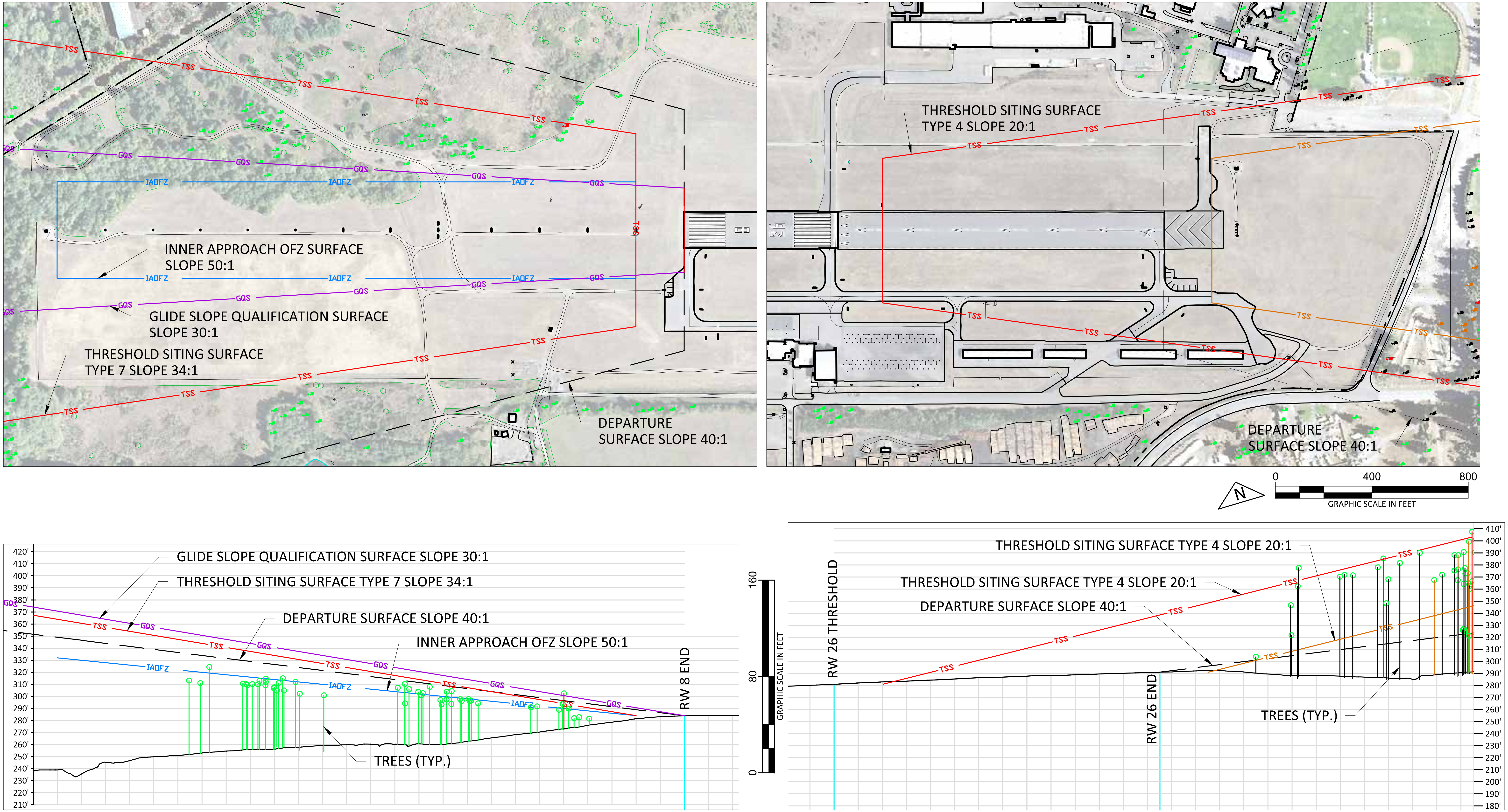

Exhibit 4-8. Runway 8/26 Threshold Siting Surfaces

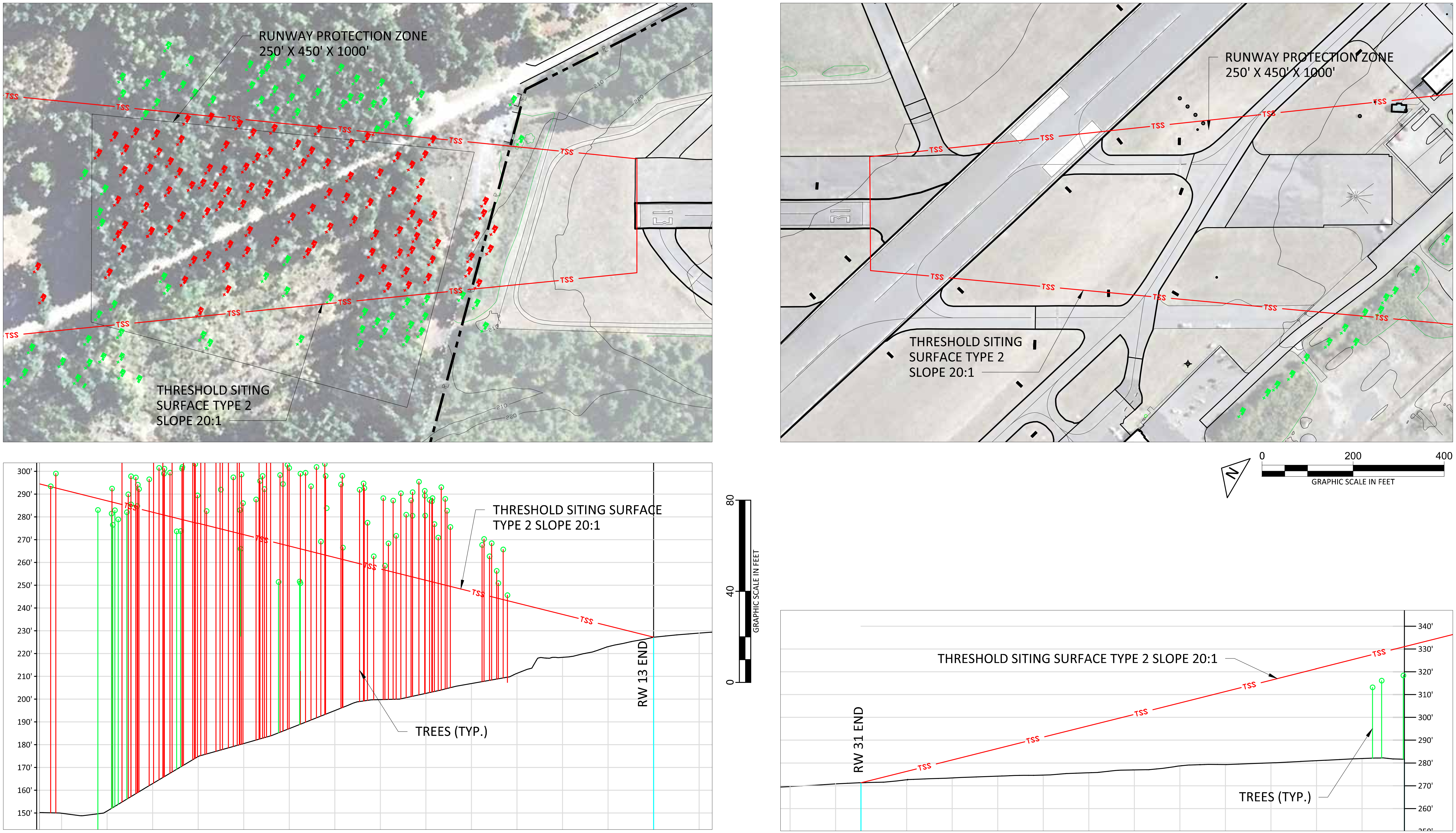

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Exhibit 4-9. Runway 13/31 Threshold Siting Surfaces

INSTRUMENTATION & AIRSPACE ANALYSIS

Runways provide maximum utility when they can be used in less than ideal weather conditions. For runway requirement, weather conditions translate to ceiling and visibility minimums in terms of the distance to see and identify prominent unlighted objects by day and prominent lighted objects by night. In order to land during periods of limited visibility, pilots must be able to visually acquire the runway or associated lighting at a specified height above (ceiling minimums) and distance from (visibility minimum) the runway.

INSTRUMENT APPROACH PROCEDURES

Instrument Approach Procedure (IAP) capabilities and associated equipment were detailed in the Inventory chapter. As noted, CLM has three published IAPs, an ILS precision approach to Runway 8 (with ceiling and visibility minimums of 200 feet AGL and ½ statute mile), a Localizer Performance with Vertical Guidance (LPV) approach to Runway 8 (with ceiling and visibility minimums of 300 feet AGL and ½ statute mile), and a non-precision RNAV approach to Runway 26 (with ceiling and visibility minimums as low as 500 feet and one statute mile).

It is expected that more and more general aviation aircraft will be furnished with sophisticated GPS equipment in the future, and that CLM will continue to experience increased use by such aircraft. Based on the existing meteorological conditions and wind analysis conducted earlier in this chapter, Runway 26 provides the best wind coverage (by more than 14 percent) compared to Runway 8 during IFR weather conditions. Since most aircraft approach CLM from the east, the majority would prefer to land on Runway 26 rather than Runway 8, which would reduce fuel consumption, equipment wear, and flight times. However, it is not anticipated that an improved IAP is warranted to Runway 26 at this time, so no alternatives will be evaluated in the next chapter.

FAR PART 77 ANALYSIS

Safe and efficient landing operations at an airport require that certain areas on and near the airport are clear of objects or restricted to objects with certain function, composition, and/or height. Obstruction clearing standards and criteria are established to create a safer environment for aircraft operation on or near the airport. Any existing or proposed object, whether man-made or of natural growth that penetrates an obstruction clearance surface is classified as an "obstruction" and is presumed to be a hazard to air navigation. These obstructions are subject to FAA aeronautical study, after which the FAA issues a determination stating if the obstruction is in fact considered a hazard.

The criteria contain in Federal Aviation Regulations (FAR), Part 77, Safe, Efficient Use, and Preservation of Navigable Airspace, apply to existing and proposed man-made objects and/or objects of natural growth and terrain (i.e. obstructions). These guidelines define the critical areas in the vicinity of airports that should be kept free of obstructions. Secondary areas may contain obstruction if they are determined to be non-hazardous by an aeronautical study and/or if they are marked and lighted as specified in the aeronautical study determination. Airfield navigation aids, as well as lighting and visual aids, by nature of their location, may constitute obstructions. However, these objects do not violate FAR Part 77 requirements, as they are essential to airport operations.

PRIMARY SURFACE. The primary surface is a surface longitudinally centered on the runway. It extends 200 feet beyond each end of the runway and the width varies based on the existing instrument approach visibility minimums of the runway. At CLM, the Runway 8/26 primary surface is 1,000 feet wide (500 feet from the centerline); the Runway 13/31 primary surface is 250 feet wide (125 feet from the centerline).

TRANSITIONAL SURFACE. The transitional surface is a surface that extends upward and outward at right angles to the runway centerline, and the extended runway centerline, at the edges of the primary surface, having a slope of 7:1. At CLM, the terminal building, two cargo company hangars, and T-hangars east of the terminal building penetrate the existing transitional surfaces.

APPROACH SURFACE. The approach surface is longitudinally centered on the extended runway centerline and extends outward and upward from each end of the primary surface at a specified slope. An approach surface is applied to each end of the runway based on the type of approach available or planned for that runway end. The inner width of the approach surface is the same as the primary surface and expands uniformly. The Runway 8 approach surface consists of a 10,000-foot long segment at a 50:1 slope, then a 40,000-foot long segment at a 40:1 slope, uniformly expanded to an ultimate width of 16,000 feet. The Runway 26 approach surface is 10,000 feet in length at a slope of 34:1 uniformly expanding to a width of 3,500 feet. Unlike the threshold siting surfaces, the approach surfaces are not based on displaced thresholds, but on the physical end of pavement. The approach surfaces associated with Runways 13 and 31 are 5,000 feet in length at a slope of 20:1 expanding to a width of 1,250 feet. There are multiple trees within all existing CLM approach surfaces.

CONCLUSION – INSTRUMENTATION & AIRSPACE

It is not anticipated that an improved IAP to Runway 26 is warranted at this time. Recently, the Port of Port Angeles and the City of Port Angeles entered into a 15-year interlocal agreement that removed trees and maintains the right to further remove trees considered obstructions to the Runway 26 displaced threshold.

RUNWAY MARKING, LIGHTING, & SIGNAGE

Runway 8 is provided with standard precision markings; Runway 26 is provided with standard non-precision markings. Runway 8/26 is equipped with holding position lines at all taxiway intersections conforming to standards for precision IAPs provided in AC 150/5300-13A, Change 1 and AC 150/5340-1L, Standards for Airport Markings. Runway 13/31 is provided with standard visual markings, although the Airport's 5010 Form indicates they are faded and in poor condition. This runway is equipped with holding position lines conforming to visual runway requirements.

Runway 8/26 is equipped with MIRL. According to AC 150/5300-13A, MIRL is adequate for a precision IAP. However, should a precision IAP with Runway Visual Range (RVR)-based minimums be desired, then High Intensity Runway Lights (HIRL) would be required. Runway 8 is equipped with VASI providing visual vertical guidance and a MALSR approach light system. Runway 26 is equipped with Runway End Identifier Lights (REIL) and PAPI providing visual vertical guidance.

According to guidance contained in AC 150/5300-13A, Change 1, a full Approach Light System (i.e., a MALSR) is recommended, but not required for IAPs with visibility minimums not less than ¾ statute mile, but is required for IAPS with visibility minimums less than ¾ statute mile. Unless the ALS is a requirement to achieve the lower visibility minimums based on credit for lighting, they are not normally eligible for Airport Improvement Program (AIP) funding.

Runway 8/26 is equipped with exit taxiway direction signs located on the south side of the runway and distance remaining signs located on the north side of the runway. Runway 13/31 is not equipped with any signage.

CONCLUSION – MARKING, LIGHTING & SIGNAGE

The existing marking, lighting, and signage facilities at CLM are adequate for the existing airfield conditions and IAPs. The examination of alternatives improving the Runway 26 IAP will include an analysis of any required ALS improvements. Should any airfield conditions change or improvements be made, it is recommended that the existing level of marking and signage provided be maintained in the future.

TAXIWAY SYSTEM

Taxiways provide defined movement corridors for aircraft between the various functional landside areas on an airport and the runway system. Some taxiways are necessary simply to provide access between aircraft parking aprons and runways, whereas others become necessary simply to provide more efficient and safer use of the airfield. Parallel taxiways eliminate the use of runways for taxiing, thus increasing capacity and protecting the runway under low visibility conditions. Taxiway turns and intersections are designed for safe and efficient taxiing by aircraft while minimizing excess pavement.

TAXIWAY DESIGN METHODOLOGY

Taxiways are designed for "cockpit over centerline" taxiing with pavement being of sufficient width to allow a certain amount of wander. Potential runway incursions should be kept to a minimum by proper taxiway design, choosing simplicity over complexity wherever possible. AC 150/5300-13A provides basic taxiway design concepts and methodologies are outlined in the following narrative.

INCREASED PILOT AWARENESS. Taxiway intersections should be kept simple by utilizing the "three-node concept", which means that a pilot is presented with no more than three choices at each intersection – ideally, left, right, and straight ahead. Intersection angles ideally should be 90° wherever possible, but standard angles of 30°, 45°, 60°, 120°, 135°, and 150° are acceptable.

LIMIT RUNWAY CROSSING. Opportunities for human error can be reduced by limiting the need for runway crossings, especially crossings within the middle third of runways defined as high energy intersections. Limiting runway crossings to the outer thirds of the runway keeps clear the portion of the runway where pilots can least maneuver to avoid collisions. Taxiways D and E can function as crossover taxiways and are in the middle third of Runway 8/26 (i.e., considered high energy taxiway crossings).

INCREASE VISIBILITY. Right angle intersections, both between taxiways and between taxiways and runways, provide the best visibility to the left and right for a pilot. A right angle turn at the end of the parallel taxiway is a clear indication of approaching a runway. Acute angled exit taxiways provide greater runway efficiency but should not be used for runway entrance or crossing points. Taxiways D, E, and J are not at right angles to Runway 8/26 and should be programmed for correction in the future.

INDIRECT ACCESS. Taxiways should not lead directly from an apron to a runway without requiring a turn. This design only leads to confusion when a pilot typically expects to encounter a parallel taxiway. Taxiway C leads directly from the terminal aircraft parking apron to the Runway 26 displaced threshold.

TAXIWAY DIMENSIONAL CRITERIA

Taxiway and taxilane clearance requirements are the required distances between a taxiway/taxilane centerline and other objects, which are based upon the required wingtip clearance, a function of the wingspan, and therefore are determined by the ADG as it relates to the design aircraft. Taxiway and taxilane pavement design standards are related to the Taxiway Design Group (TDG), which is based on the overall Main Gear Width (MGW) and the Cockpit to Main Gear (CMG) distance of the design aircraft. The aircraft fleet using CLM indicate that ADG II and TDG 2 are appropriate for the design of the taxiway system serving Runway 8/26; ADG I and TDG 1 are appropriate for the design of taxiways serving Runway 13/31.

Applying the appropriate TDG and ADG design standards to the existing taxiway conditions results in the deficiencies presented in **Table 4-11**. Currently, the 20-foot width of Taxiway K does not meet TDG 1 standard of 25 feet. Taxilanes on the East GA Apron do not provide adequate distance between the centerlines and aircraft tie down spaces. A minimum of 39.5 feet should be provided to meet the ADG I standard Taxilane Object Free Area width. The taxilane on the north edge of the apron is provided approximately 32 feet; the taxilane providing access between the rows of tiedowns is afforded approximately 36 feet. Existing taxiways having widths of 40 or 50 feet exceed the TDG 2 standard of 35 feet. As with the excessive runway width, FAA policies and guidelines indicate that funding for pavement reconstruction projects are generally limited to that required the appropriate design standard. If the Port of Port Angeles decides to retain the extra taxiway widths when pavement reconstruction is required, it must do so utilizing Port monies exclusively for the extra widths.

Table 4-11. Taxiway Design Standards, In Feet

DESIGN STANDARD	EXISTING DIMENSION	DESIGN STANDARD DIMENSION	
Design Standard Based on ADG		ADG I	ADG II
Taxiway Safety Area for Taxiways Serving Runway 13/31	49	49	N.A.
Taxiway Safety Area for Taxiways Serving Runway 8/26	79	N.A.	79
Taxiway Object Free Area for Taxiways Serving Runway 13/31	>89	89	N.A.
Taxiway Object Free Area for Taxiways Serving Runway 8/26	>131	N.A.	131
Parallel Taxiway A Centerline to East GA Apron North Taxilane Centerline	125	N.A.	105
Parallel Taxiway A to West GA Apron North Taxilane Centerline	132	N.A.	105
East GA Apron Taxilane Centerline to Parallel Taxilane Centerline	103	64	97
West GA Apron Taxilane Centerline to Parallel Taxilane Centerline	125	64	97
East GA Apron North Taxilane Centerline to Fixed or Movable Object	**32**	39.5	N.A.
East GA Apron South Taxilane Centerline to Fixed or Movable Object	**36**	39.5	N.A.
Design Standard Based on TDG		TDG 1	TDG 2
Taxiway K Width	**20**	25	N.A.
Taxiways A, B, C, D, F, G, and H Widths	40	N.A.	35
Taxiways E and J Widths	50	N.A.	35

Source: FAA AC 150/5300-13A, Change 1, Airport Design.
Note: N.A. Not Applicable to standard dimension.

TAXIWAY LOAD BEARING CAPACITY

Similar to the primary runway, the existing Taxiway A pavement load bearing capacity appears sufficient to support the more demanding and frequent use aircraft at the airport, including the Cessna Caravan, Beech Super King Air 350, Cessna Citation II, and Dassault Falcon 900. The pavement load bearing capacity also appears sufficient to accommodate occasional operations by larger aircraft in RDCs C-II and C-III such as the Gulfstream G-IV/G400 and the Gulfstream G-V/G500.

As part of the on-going disaster response plan contingencies, the Taxiway A load bearing capacity was evaluated for use by C-130 aircraft. Taxiway A is not currently rated for use by C-130 aircraft but may support some limited C-130 taxi activity. Findings indicate that Taxiway A can accommodate an isolated taxiing operation at maximum landing weight (155,000 pounds) and could possibly support additional taxiing activity with an aircraft gross weight limitation of 100,000 pounds. The taxiway may sustain some C-130 activity, however it is more susceptible to damage than Runway 8/26 due to a thinner pavement section. The Calculated Pavement Classification Number (PCN) of 17 is less than the Aircraft Classification Number (30.2) of the C-130, and the cumulative damage factor is equal to 1 indicating the pavement is right at the threshold of being able to support C-130 aircraft. The California Bearing Ratio (CBR) value utilized for analysis was assumed from recent CBR test data for a nearby apron development. Taxiway specific CBR test was not performed.

It is recommended that the Port perform taxiway pavement surface inspection to determine actual viability of pavement condition to support C-130 aircraft. If pavement appears to be suitable upon visual inspection, identify areas that appear to be in best condition and target and confine usage to those areas. A limit on the C-130 maximum weight and operational levels (to the extent practical) will prolong and help sustain pavement conditions. For more details see the Pavement Strength Summary spreadsheet in the Attachments.

It is recommended that Taxiway A retain the 40-foot width to continue to accommodate the occasional use by the larger design group aircraft.

TAXIWAY LIGHTING & SIGNAGE

Currently, all the taxiways serving Runway 8/26 (i.e., Taxiways A, B, C, D, E, F, G, H) are equipped with Low Intensity Taxiway Lights (LITL) and proper intersection, boundary, location, and direction signage. Taxiway J, north of Runway 8/26, is not equipped with LITL, but is equipped with an intersection sign at Runway 8/26. Taxiways serving Runway 13/31 are not equipped with lighting or signs.

CONCLUSION – TAXIWAY SYSTEM

Correcting the previously identified Taxiway A centerline separation distance deficiency, the Taxiways D and E having non-perpendicular angles with Runway 8/26 and are high energy crossings at the Runway 26 touchdown point, as well as the other confusing geometry deficiencies will be evaluated through the alternatives development contained in the next chapter. The intersection of Runways 8/26 and 13/31 also presents the potential for runway incursions and will be evaluated during alternatives development.

In the interest of safety and efficiency, existing taxiway lighting and signage should be maintained and revised with any future airfield changes. Taxiway A and the associated Runway 8/26 taxiway connectors currently have pavement load bearing capacity to accommodate usage by current design group aircraft and existing fleet mix. The Taxiway A pavement, with regular maintenance and rehabilitation should meet the demands for operations by forecast design group and fleet mix aircraft into the foreseeable future.

Although the FAA Pavement strength survey form (5320-1) indicates the load bearing capacity of Taxiway A system is rated similar to Runway 8/26, the pavement section thickness may indicate the taxiway is not as strong as Runway 8/26. Taxiway A and the connectors load bearing capacity may be slightly less than Runway 8/26. Pavement load bearing capacity strength should be increased to match Runway 8/26 as part of future pavement rehabilitation projects.

As stated previously, since no FAA funding is available for Runway 13/31, the Port may elect to close the runway and associated taxiways. Therefore, the Port will continue to maintain the taxiways in their existing condition and no changes are envisioned at this time. **Exhibit 4-10** provides a graphic illustration of the identified taxiway and taxilane system deficiencies.

LANDSIDE REQUIREMENTS

Landside facilities are those airport facilities that support the airside facilities but are not actually a part of the aircraft operating surfaces. These consist of facilities such as terminal buildings, hangars, aprons, access roads, and support facilities. Following an analysis of these facilities, current deficiencies can be noted in terms of accommodating both existing and future aviation needs at the airport.

TERMINAL AREA REQUIREMENTS

The Terminal Area requirements analysis will focus on validating the recommendations from the 2011 Master Plan in relation to the forecast activity prepared for this study. The 2011 Master Plan considered all development within the terminal area to be an obstruction based on the FAR Part 77 Transitional Surfaces. It was recommended that the facilities ultimately be relocated to the south. As identified earlier in this chapter, the terminal area aircraft parking apron area does not meet the design standards for aircraft parking distance from the Runway 8/26 centerline. Therefore, the Terminal Area requirements analysis presented here will continue to use the assumption that all terminal facilities will ultimately be relocated.

PASSENGER TERMINAL BUILDING REQUIREMENTS

The existing passenger terminal building consists of 5,000 square feet devoted to servicing commercial airline passengers. It contains space for one airline (ticket counter and office space), a restaurant/concessions area, restrooms, passenger waiting area, and baggage processing facilities. It does not contain Transportation Security Administration (TSA) facilities for passenger security screening.

The 2011 Master Plan recommended a total of 11,977 square feet of future terminal building to accommodate 40,590 annual passengers (both enplaning and deplaning) by the year 2027. This is an average of 0.3 square feet per annual passenger. While the space calculations developed for the 2011 Master Plan were based on assumptions that no longer seem valid (e.g., eventual airline service by aircraft carrying up to 60 passengers), some are still valid for space allocation purposes (e.g., eventual service provided by two airlines and one queuing lane for TSA passenger security screening). Additionally, many of the components of the space allocation computations are not based on passengers (e.g., airport management, maintenance, and Customs and Immigration space) and would therefore remain the same regardless of the passenger totals.

Compared to the estimated 36,334 total annual passengers forecast for this Master Plan Update, it is reasonable to assume that the terminal building need only be approximately 94 percent of the size recommended in the 2011 Master Plan, or roughly 11,280 square feet.

TERMINAL APRON REQUIREMENTS

The existing terminal apron consists of 37,000 square feet and includes room for two Cessna Caravan-sized aircraft or one DeHavilland Dash 8-sized aircraft. It also includes sufficient space for fueling positions, taxilanes, ground servicing of aircraft, and storage of the ground service equipment. Additionally, one aircraft parking position is set apart for Customs and Immigration service that will accommodate corporate business jets as big as a Gulfstream G-V.

The 2011 Master Plan recommended a minimum area equal to the current terminal apron (i.e., 37,000 square feet) be allocated for ultimate development. This recommendation seems valid given the assumptions used in the passenger enplanements and commercial aircraft operations forecast of this Master Plan Update.

The pavement section for the terminal apron is similar in construction and condition to Taxiway A and its load bearing capabilities with a PCN rating of 17

To the west of the Terminal Apron is an area of abandoned pavement that was previously associated with Runway 13/31. It is constructed of concrete and would be suitable for overflow parking of larger aircraft. Due to the potential use of the former runway surface being used for parking of C-130 aircraft during a disaster response event, it is recommended that the Port perform surface inspections to determine actual viability of ramp concrete condition to support C-130 aircraft. It is recommended that C-130 parking be conducted utilizing steel plates to provide additional protection. A ramp area specific CBR test was not performed.

Between the existing terminal ramp and the west GA ramp a new apron has been constructed to accommodate larger transient corporate aircraft. The new apron reduces operational conflicts between dissimilar aircraft types, and provides easier access to vehicle parking for those larger aircraft users.

AUTOMOBILE PARKING REQUIREMENTS

The existing passenger terminal automobile parking facilities consists of an 85-space paved and marked lot directly in front of the terminal, with both short- and long-term parking provided. Additional parking is provided in unmarked gravel lots to the west and south of the paved parking area.

The automobile parking facility requirements recommended in the 2011 Master Plan indicated that 83 spaces would be required by 2027, which would accommodate 20,295 annual enplanements. This amount seems high and should be adjusted by accounting for fewer forecasted passengers, which equals roughly 74 total automobile parking spaces required by 2035.

AIR CARGO FACILITY REQUIREMENTS

The existing air cargo facilities at CLM consist of one hangar (approximately 10,800 square feet in size) used by Fed Ex and two Cessna Caravan-sized aircraft parking spaces on the terminal apron. The 2011 Master Plan projected air cargo tonnage (both enplaned and deplaned) to increase at an average annual growth rate of 3.7 percent, which equated to an approximate 3,035 tons being processed at CLM by the year 2027. The air cargo tonnage forecasts to occur at CLM in this Master Plan Update indicated an average annual growth rate of 0.4 percent, with total tonnage by 2035 equaling 425 tons.

Air cargo facility requirements derived in the 2011 Master Plan indicated that approximately 2,038 square feet of warehouse processing space would be required by 2027, as well as apron space requirements for two peak hour aircraft. Because the amount of air cargo tonnage expected to pass through CLM has been decreased in this Master Plan Update, the amount of warehouse processing space has also been reduced. Using the same ratio identified in the 2011 Master Plan indicates that approximately 750 square feet of warehouse processing space will be required by 2035. Two peak hour aircraft apron spaces are still recommended, which equates to 6,500 square feet.

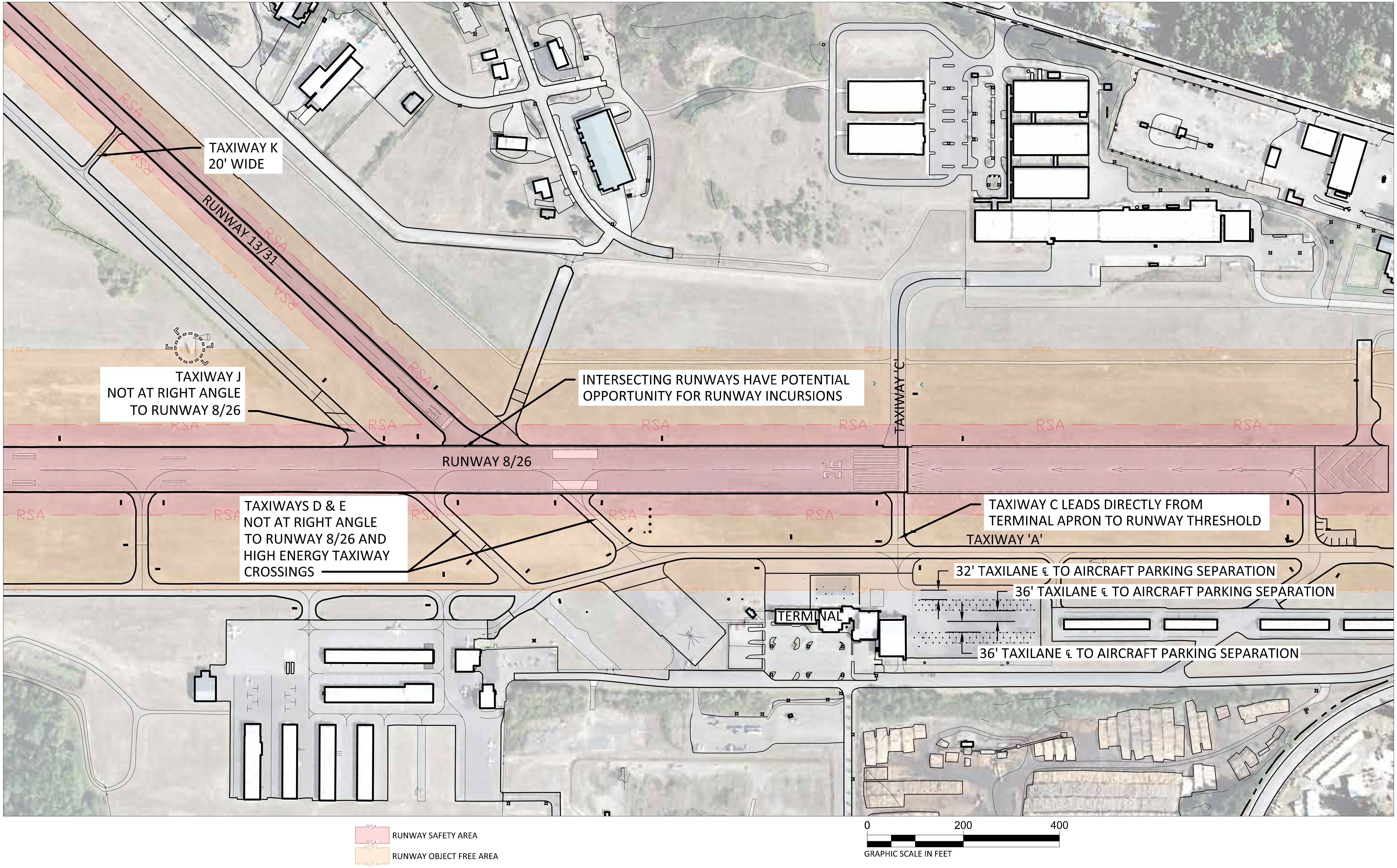
CONCLUSION – TERMINAL AREA REQUIREMENTS

Based on the preceding terminal area facility analysis presented here, it is recommended that the 2011 Master Plan recommendations be tempered somewhat, and space allocation be adjusted to reflect the commercial service forecasts presented earlier in this Master Plan Update. **Table 4-12** presents the recommended terminal area requirements throughout the planning period.

Table 4-12. Terminal Area Requirements, 2015-2035

BUILDING TYPE	2015[1]	2020	2025	2030	2035
Terminal Building (sf)	5,000	8,425	8,990	9,885	11,280
Enplaning (sf)		540	640	800	1,045
Security (sf)		1,160	1,160	1,160	1,160
Gate Area (sf)		745	890	1,100	1,440
Deplaning (sf)		250	290	365	480
Other (sf)		1,530	1,810	2,260	2,955
Miscellaneous (sf)		4,200	4,200	4,200	4,200
Terminal Apron (sf)	37,000	37,000	37,000	37,000	37,000
Automobile Parking					
Spaces	85	40	46	57	74
Area (sf)	38,850	6,740	7,970	9,940	13,000
Air Cargo					
Warehouse (sf)	10,800	700	715	730	750
Apron (sf)	6,500	6,500	6,500	6,500	6,500

Source: Reid Middleton, Inc. and Mead & Hunt analysis
Note: 1 Actual.



PORT OF PORT ANGELES WASHINGTON

Exhibit 4-10. Identified Taxiway System Deficiencies

AIRCRAFT STORAGE REQUIREMENTS

The majority of aircraft based at CLM are primarily stored in T-hangars located south of Runway 8/26, with a few stored on the apron and in private group hangars.

HANGAR STORAGE REQUIREMENTS/BASED AIRCRAFT

During the planning period, based aircraft are projected to increase from 70 to 86 aircraft. Currently, there are 86 spaces available for rent in the various T-hangars at CLM. On the surface, it would seem that no additional hangar spaces would be required. However, 7 of the 16 future based aircraft are anticipated to be either helicopter, turboprop, or business jet aircraft, indicating additional hangar spaces are needed that accommodate the larger, more expensive aircraft that are not normally stored in T-hangar spaces. This trend of increasing general aviation aircraft size will also play a role in defining future development needs. It should be noted that the 2011 Master Plan indicated that the four Port-owned T-hangars located east of the terminal building (providing 32 of the 86 existing spaces) are designated for removal based on their existing location and height constitutes obstructions to the Runway 8/26 FAR Part 77 Transitional Surface.

TIEDOWN STORAGE REQUIREMENTS/BASED AIRCRAFT

Based aircraft tiedowns are normally provided for those aircraft that do not require hangar storage or do not desire to pay the cost of hangar space. Given the weather conditions that prevail at CLM, the characteristics of current storage patterns, and an abundance of existing hangar storage spaces, most based aircraft are anticipated to be stored in hangars. CLM personnel estimate that approximately three based aircraft are currently stored long-term on the apron. Space calculations for these areas are typically based on 360 square yards of apron for each aircraft tiedown, which allows for aircraft parking and circulation between rows of parked aircraft. The space allocation assumes pilots have a certain degree of familiarity with the parking layout and represents the minimum that should be provided.

TIEDOWN STORAGE REQUIREMENTS/TRANSIENT AIRCRAFT

Transient aircraft storage is normally provided in the form of dedicated apron with either tiedown spaces for longer-term storage or wheel chocks for short-term storage. In calculating the transient aircraft apron storage requirements, an area of 400 square yards per transient aircraft is used. This rule-of-thumb guideline allows for aircraft parking and circulation between rows of parked aircraft, accommodates aircraft that tend to be larger than based aircraft, and provides additional maneuvering spaces for users who are not familiar with the apron layout and circulation patterns.

Currently, there are a total of 66 tiedown spaces on 18,600 square yards of apron. There is no designation between based aircraft and transient aircraft aprons. In consideration of the future apron tiedown modifications that may be required in this planning effort, several apron design and planning guidelines are presented as follows:

- *Aprons and associated taxilanes should be designed based on a specific Design Aircraft and/or the combination of aircraft that will use the facility. Transient aprons should be designed for easy access by aircraft under power. Aprons designed to accommodate jet aircraft should consider the effects of jet blast and allow sufficient space for safe maneuvering.*
- *The primary design consideration is to provide adequate wingtip clearance for the aircraft positions and the associated taxilanes. Parked aircraft must remain clear of ROFAs and TOFAs, and no part of the parked aircraft should penetrate the runway approach and departure surfaces and Runway Obstacle Free Zones.*

- *The layout of aprons should be grouped according to the aircraft wingspans. This allows the taxilane OFA width to be optimized for the aircraft using the area. It is also a good practice to separate corporate jets from lighter propeller aircraft to minimize the effects of jet blast and prop wash.*
- *Recommended surface gradients have been developed to ease aircraft towing and taxiing while promoting positive drainage. The maximum allowable grade in any direction is 2.0 percent for AACs A and B and 1.0 percent for AACs C and higher.*

CONCLUSION – AIRCRAFT STORAGE REQUIREMENTS

Based on the preceding analysis, the focus of future aircraft storage needs will be group hangars and replacement T-hangar spaces for the four Port-owned T-hangars located in the east GA area identified for removal. **Table 4-13** summarizes the space needs for aircraft storage throughout the planning period.

Table 4-13. Aircraft Storage Requirements, 2015-2035

AIRCRAFT STORAGE TYPE	2015[1]	2020	2025	2030	2035
BASED AIRCRAFT APRON					
Number of Tiedowns		3	4	4	5
Square Yards		1,080	1,440	1,440	1,800
TRANSIENT APRON					
Number of Tiedowns		17	18	19	21
Square Yards		6,800	7,200	7,600	8,400
TOTAL APRON					
Total Number of Tiedowns	66[2]	20	22	23	26
Total Square Yards	18,600[2]	7,880	8,640	9,040	10,200
Open T-Shade Spaces	14	8	9	9	10
Closed T-hangar Spaces	72	64	66	68	70
Group Hangars	3	3	4	5	6

Source: Reid Middleton, Inc. and Mead & Hunt analysis using FAA AC 150/5300-13A, Change 1, Airport Design, and actual airport conditions.

Note: 1 Actual.

2 The existing aprons and tiedowns are not designated by based aircraft and transient aircraft areas.

SUPPORT FACILITY REQUIREMENTS

Airport support facilities typically consist of such facilities as fuel storage and dispensing systems, Airport Traffic Control Towers (ATCT), on- and off-airport fire protection facilities, airport maintenance facilities, and airport administrative facilities. The only quantifiable support facilities applicable to CLM is the fuel storage facility.

FUEL STORAGE FACILITY

According to CLM fuel records supplied by Rite Bros. Aviation, there has been an average of 20,944 gallons of AVGAS and 58,875 gallons of Jet A fuels sold per year between 2010 and 2015. Based on aircraft operations and fuel sales records, there were 1.2 gallons of AVGAS sold per piston-powered aircraft operation and 6.3 gallons of Jet A fuel sold per turbine-powered aircraft operation. Typically, as operations increase, fuel storage requirements can be expected to increase proportionately. National and local trends indicate that the size of the general aviation aircraft fleet is slightly increasing, as more aircraft are used for business purposes and less for pleasure and leisure purposes. Therefore, it is expected that the ratio of gallons sold per operation will increase as well, and an estimate of future fuel storage needs can be calculated as a two-week supply during the peak month of operations. **Table 4-14** provides an estimate of the future fuel storage requirements at CLM through 2035. It appears that the existing fuel storage capacity is more than adequate to accommodate the expected demand during the planning period.

Table 4-14. Fuel Storage Requirements, 2015-2035

FUEL TYPE	2015[1]	2020	2025	2030	2035
AVGAS					
Average Day of Peak Month Operations	51	53	55	57	59
Two Weeks of Operations	719	745	770	793	821
Gallons Per Operation	1.2	1.2	1.3	1.3	1.4
Fuel Storage (gallons)	12,0002	894	1,001	1,031	1,149
JET A					
Average Day of Peak Month Operations	36	50	50	54	59
Two Weeks of Operations	503	693	694	754	825
Gallons Per Operation	6.3	6.3	6.5	6.8	7.0
Fuel Storage (gallons)	12,0003	4,366	4,510	5,126	5,777

FUEL TYPE	2015[1]	2020	2025	2030	2035

Source: Reid Middleton, Inc. and Mead & Hunt analysis.

Notes: 1 Actual base year estimates.

2 Existing AVGAS fuel storage capacity, consisting of one 12,000-gallon above-ground storage tank.

3 Existing Jet A fuel storage capacity, consisting of one 12,000-gallon above-ground storage tank.

AUTOMOBILE ACCESS & PARKING

Existing automobile access to CLM is provided by Airport Road with a connection to West Edgewood Drive/ South Lauridsen Boulevard. In addition to the terminal building automobile parking described above, there are two gravel parking lots located west and south of the existing terminal building parking lot. Additionally, a parking lot serves the FBO hangars in the west GA area and another is located adjacent the maintenance and cargo hangars.

The future development of automobile access and parking lots serving general aviation facilities will be dependent on the amount and type of landside development, as well as the most effect routing of roadways. Large FBO facilities with multiple employees and visitors require more parking spaces than individual aircraft storage hangars. What can be determined is that as additional hangars are provided and the existing Port owned T-hangars in the east GA area are relocated, additional parking will be required. Additionally, as TSA general aviation security requirements are further refined and regulations enacted, access to the airfield will become increasingly more limited, especially at airports providing commercial air service.

EMERGENCY OPERATIONS CENTER

As stated in the Inventory chapter, the State of Washington Military Department Emergency Management Division (EMD) has designated CLM as a Tier Two response facility following a Cascadia Subduction Zone event. Additionally, the 2011 Master Plan identified that Clallam County Emergency Services expressed a need for a centralized Emergency Operations Center (EOC) that would be available 24 hours per day, 7 days a week. Facilities for the EOC would include a communications center, office space for a staff of five, a briefing room for 20 people, a response command center, a conference room, and equipment storage.

SUMMARY OF REQUIREMENTS

The result from the analysis contained in this chapter provide the basis for understanding what facility improvements at CLM might help in the effort to accommodate future demands safely and efficiently. A summary of the requirements is presented in **Table 4-15**.

Table 4-15. Summary of Facility Requirements, 2015-2035

FACILITY	2015[1]	2020	2025	2030	2035
RUNWAY SYSTEM					
Runway 8/26 Width	150’	Exceeds RDC B-II standard of 100’ (Extra width maintained by Port of Port Angeles exclusively). Recommend maintaining 150’ for occasional Group III operations.			
Runway 26 Landing Length	4,993’	4,993’ (Minimum)			
Runway 8 Landing Length	6.347’	5,000’ (Minimum)			
Runway 13/31 Width	50’	50’	Same	Close	Close
RSA Length					
Runway 26	291’	600	Same	Same	Same
Runway 13	218’	218’	Same	Close	Close
ROFA Width	651’	800’	Same	Same	Same
ROFA Length					
Runway 26	291’	600’	Same	Same	Same
Runway 13	198’	198’	Same	Close	Close
Parallel Taxiway A Separation Distance from Runway 8/26 Between Taxiways B and E	275’	400’ (Exceeds B-II-2400 standard of 300’). Recommend providing and maintaining 400’ by Port of Port Angeles exclusively for occasional Group III operations.			
Runway 8/26 Load Bearing Capacity	55,000 lb SW	Same	Same	Same	Same
66,000 lb DW	30,000 lb SW	30,000 lb SW	Same	Close	Close

FACILITY	2015[1]	2020	2025	2030	2035
115,000 lb DTW					
Runway 8	1000′ x 2500′ x 1750′	Same	Same	Same	Same
Runway 26	500′ x 1000′ x 700′	Same	Same	Same	Same
Runway 13	250′ x 1000′ x 450′	Same	Same	Close	Close
Runway 31	250′ x 1000′ x 450′	Same	Same	Close	Close
Threshold Siting					
Runway 26	Obstructions	Remove Obstructions	Same	Same	Same
Runway 8	No Obstructions	Same	Same	Same	Same
Runway 13	Obstructions	Obstructions	Same	Close	Close
Runway 31	No Obstructions	No Obstructions	Same	Close	Close
Runway 8/26 Markings	Prec. – RW 8	Same	Same	Same	Same
Non-Prec. – RW 26	Same	Same	Same	Same	Close
Runway 13/31 Markings	Visual	Visual	Same	Close	Close
Instrument Approach Procedures	ILS – RW 8	Same	Same	Same	Same
LPV – RW 8					
Acute-Angled Taxiways	TWs D, E, & J	Same	Same	Close J	Reconstruct D & E
Taxiway K Width	20′	20′	Same	Close	Close
Taxiways A, B, C, D, E, F, G, H, and J Width	40′, 50′	Exceeds TDG 2 standard of 35′(Extra width maintained by Port of Port Angeles exclusively). Recommend maintaining existing widths for occasional Group III operations.			
Taxiway Load Bearing Capacity	55,000 lb SW 66,000 lb DW 115,000 lb DTW	Increase to match Rwy 8/26	Increase to match Rwy 8/26	Increase to match Rwy 8/26	Increase to match Rwy 8/26
PASSENGER TERMINAL BUILDING	5,000 sf	8,425 sf	8,990 sf	9,885 sf	11,280 sf
SUPPORT FACILITIES					
Group Hangars	3	3	4	5	6
EMERGENCY OPERATIONS CENTER	None	Construct	Same	Same	Same

Source: *Reid Middleton, Inc. and Mead & Hunt.*

CHAPTER 5
ALTERNATIVES

INTRODUCTION

The purpose of this chapter is to present development alternatives and recommendation for CLM in terms of both the concept and reasoning, with a focus on the comprehensive nature of the elements involved. A description of the various factors, influences, concepts, and issues that will form the basis for the ultimate plan and program is provided. The conclusion of this chapter is the selection and presentation of the Conceptual Development Plan for CLM.

DEVELOPMENT ASSUMPTIONS & GOALS

The preparation of the CLM future development plan begins with establishing several basic assumptions and goals, the purpose of which is to direct and guide the evaluation process and establish continuity. They allow for several short- and long-term categorical considerations relating to facility needs, including safety, capital improvements, land use compatibility, financial and economic conditions, noise, public interest and investment, and community recognition and awareness.

DEVELOPMENT ASSUMPTIONS

The development assumptions presented here include a commitment for continued airport development, which supports the economic development needs of the community and region.

Assumption One: CLM will continue to be developed and operated in a manner that is consistent with local ordinances and codes, federal and state statutes, federal grant assurances, and FAA regulations.

Assumption Two: Runway 8/26 will be maintained to FAA defined RDC B-II-2400 design standards.

Assumption Three: Based on recent FAA Reauthorization legislation, when evaluating airport master plans, the FAA shall take into account the role the airport plays with respect to medical emergencies and evacuation, and the role the airport plays in emergency or disaster preparedness in the community served by the airport, the Port desires to maintain Runway 8/26 to a minimum length of 5,000 feet, as well as retain, to the extent financially practical, the entire length of 6,347 feet.

Assumption Four: Retain, but do not evaluate improvements to the Runway 26 IAP.

Assumptions Five: The Port of Port Angeles will eventually elect to close Runway 13/31 but is committed to keeping the runway functional as long as financially feasible. Any work performed on the runway will be completed to FAA standards, but no FAA funds are anticipated to be used on the runway during the time period of this Master Plan Update.

Assumption Six: To the maximum extent possible, CLM will be designed to enhance the compatibility of the operation of the airport with the surrounding environs.

Assumption Seven: The Terminal Area and East GA Apron redevelopment plan from the 2011 Master Plan will be incorporated as is and alternatives will not be evaluated.

DEVELOPMENT GOALS & OBJECTIVES

The following goals and objectives take into account several categorical considerations relating to the short- and long-term needs of CLM, including safety, capital improvements, land use compatibility, financial and economic conditions, public interest and investment, and community recognition and awareness. While all are project oriented some obviously represent more tangible activities than others. However, all are deemed important and appropriate to the future of CLM.

- *Plan the airport to accommodate the forecast aircraft fleet safely and efficiently.*
- *Program facilities to be constructed when actual demand is realized, not based on forecast demand.*
- *Enhance the self-sustaining capability of the airport and ensure the financial feasibility of all future development.*
- *Encourage the protection of existing public and private investment in land and facilities and advocate the resolution of any potential land use conflicts, both on and off airport property.*
- *Plan and prepare airport facilities that meet the State of Washington Military Department EMD Tier Two response facility criteria as well as other local, regional, and national emergency response agencies, to the extent practical and feasible.*
- *Plan and develop airport facilities to be environmentally compatible with the community and minimize or mitigate environmental impacts to the extent practical and feasible.*
- *Maintain compatibility with existing surrounding land uses and zoning ordinances and work with land use jurisdictions to ensure reasonable land use and zoning changes.*
- *Provide effective direction for future airport development through the preparation of a rational plan and adherence to the adopted development program.*

AIRSIDE DEVELOPMENT CONCEPTS, ALTERNATIVES, & RECOMMENDATIONS

Because all other airport functions revolve around the basic runway/taxiway layout and configuration, airside development alternatives must first be examined and evaluated carefully. This airside alternatives analysis has been prepared to provide the Port of Port Angeles with a comprehensive outline of the key components of each alternative to assist with the identification of a preferred long-term development plan for CLM. It is important to note that most of the alternatives components are not necessarily exclusive to an individual alternative. Each alternative concept is a collection of features, many of which are common elements from alternative to alternative.

Each of the proposed alternatives was evaluated to determine the relative levels of environmental impact to each of the environmental conditions categories described in Chapter 2. The purpose of this evaluation is to identity an anticipated range of impacts associated with each alternative so that these impacts can be considered in terms of environmental documentation, permit requirements, and potential mitigation costs associated with each alternative. Further analysis may be required to determine if a threshold of significance has been exceeded for any specific resource category.

The environmental elements evaluated for the Master Plan Update include:

- **Noise**
- **Section 4(f) Parks and Recreation Areas**
- **Section 4(f) Historic and Archeologic Properties**
- **Critical Areas**
- **Wetlands**
- **Threatened and Endangered Species**

Additionally, the proposed alternatives do not appear to have potential impacts to the following environmental elements, as identified in the baseline of environmental conditions presented in Chapter 2. However, as conditions change over time, further investigations may be warranted in the preparation of National Environmental Protection Act (NEPA) documents for future projects.

- **Air Quality.** *The airport is currently within an area designated as "in attainment" for all criteria pollutants under the National Ambient Air Quality Standards (NAAQS) and none of the alternatives are anticipated to result in substantively different assessments related to air quality.*
- **Coastal Resources.** *None of the alternatives will impact a coastal barrier resource or the coastal environment.*
- **Farmlands.** *No existing prime farmlands were identified in proximity to the airport.*
- **Floodplains.** *While there are mapped 100-year flood zones (Zone A) on the airport, none of the alternatives will have an impact on this resource.*
- **Hazardous Materials, Solid Waste, and Pollution Prevention.** *There are no known hazardous or contaminated sites identified near the airport, nor is it anticipated that any of the alternatives will produce or generate an appreciably different quantity of hazardous or solid waste over and above what is currently produced on the airport.*
- **Natural Resources.** *The alternatives do not appear to have the potential to cause demand to exceed available or future supplies of natural resources or energy.*
- **Socioeconomics, Environmental Justice, and Children's Environmental Health and Safety Risks.** *The alternatives do not appear to have the potential to significantly impact the existing social or economic conditions of the communities near the airport, pose a disproportionately high and adverse impact to an existing environmental justice population (i.e., low income or minorities), or lead to a disproportionate increased risk to the health and safety of children.*
- **Visual Effects.** *There would be no significant changes to the existing light systems at CLM, nor would the existing visual character of the area near the airport experience any appreciable change resulting from the implementation of any alternative.*

AIRSIDE ALTERNATIVE ONE

Alternative One involves retaining the existing Runway 26 1,354-foot displaced threshold, removing trees within the Runway 26 threshold siting surface, resolving the Runway Safety Area (RSA) and Runway Object Free Area (ROFA) deficiencies, reducing the Runway 8/26 width to 100 feet, and realigning Taxiway A. This alternative is illustrated in **Exhibit 5-1**.

Runway Dimensions: This alternative retains the existing conditions, providing a runway length of 6,347 feet for takeoffs using Runways 8 and 26 and landings to Runway 8. The landing distance provided to Runway 26 remains at 4,993 feet due to the displaced threshold. Initially, the existing runway width of 150 feet is maintained through the short-term pavement rehabilitation (i.e., mill and overlay of pavement surface) project eligible for FAA's Airport Improvement Program (AIP) funding. Ultimately, this alternative reduces the runway width to 100 feet, in concert with RDC B-II-2400 design standards.

The Port of Port Angeles understands that in order to maintain a runway length exceeding AIP funding eligibility requirements when pavement rehabilitation is required, it might be required to do so with Port or other funds exclusively (i.e., it is not AIP eligible under current FAA funding policies). Additionally, when pavement reconstruction is required, Port or other funds might be required for any runway length exceeding AIP funding eligibility requirements at the time of project implementation.

Runway Protection Zones: No changes to the existing RPZs are required with this alternative. The existing conditions remain the same, so the incompatible land uses currently within the RPZs would not require consultation and approval from the National Airport Planning and Environmental Division (APP-400).

However, since there are existing incompatible land uses located within the Runway 8 Departure RPZ (South L Street and a part of Lincoln Park), it is the FAA's desire that airport sponsors demonstrate a pathway to complying with the standards for compatible RPZ land uses as outlined in FAA Memorandum Interim Guidance on Land Uses Within a Runway Protection Zone. Therefore, this alternative proposes the purchase of a portion of Lincoln Park and either the relocation or closure of South L Street outside the Runway 8 Departure RPZ. Existing park facilities impacted include the bicycle motocross track and vehicle parking, with the potential impact on ballfields.

Threshold Siting: This alternative assures proper threshold siting through the eventual removal of all trees located within the approach area to the Runway 26 displaced threshold that penetrate or come close to penetrating the Threshold Siting Surface. The Port of Port Angeles has an interlocal agreement with the City of Port Angeles for the maintenance of the approach path to Runway 26 that identifies and removes obstruction trees annually or as needed.

Taxiway System: This alternative rectifies the Taxiway A non-standard centerline separation by relocating Taxiway A to 400 feet from the Runway 8/26 centerline between Taxiways B and E. This will eliminate the current dogleg in Taxiway A and provide aircraft the less complicated ability to transit the entire length of the taxiway without making maneuvers. The Port of Port Angeles understands that to implement the relocation by 100 feet more than the 300-foot RDC B-II-2400 design standard, it might be required to do so with Port or other funds exclusively. However, initially the short-term pavement rehabilitation project of milling and overlaying the existing taxiway surfaces are fundable under current FAA AIP policies. This alternative also corrects the acute angle of Taxiways D and E by eliminating both taxiways and constructing one right angled taxiway at the current intersection of Runway 8/26 and Taxiway D.

Design Standards: This alternative rectifies the non-standard RSA and ROFA conditions by relocating the localizer antenna and localizer equipment building approximately 307 feet to the east, beyond the 600-foot RSA and ROFA length design standards. Currently, the navigational equipment does meet FAA's Air Traffic Organization (ATO) siting standards. Further, ATO is only charged with relocating its equipment outside RSAs at FAR Part 139 certificated commercial service airports. Therefore, this alternative proposes that the Port fund the entire relocation costs and enter into an agreement for future reimbursement from the ATO when funding options allow.

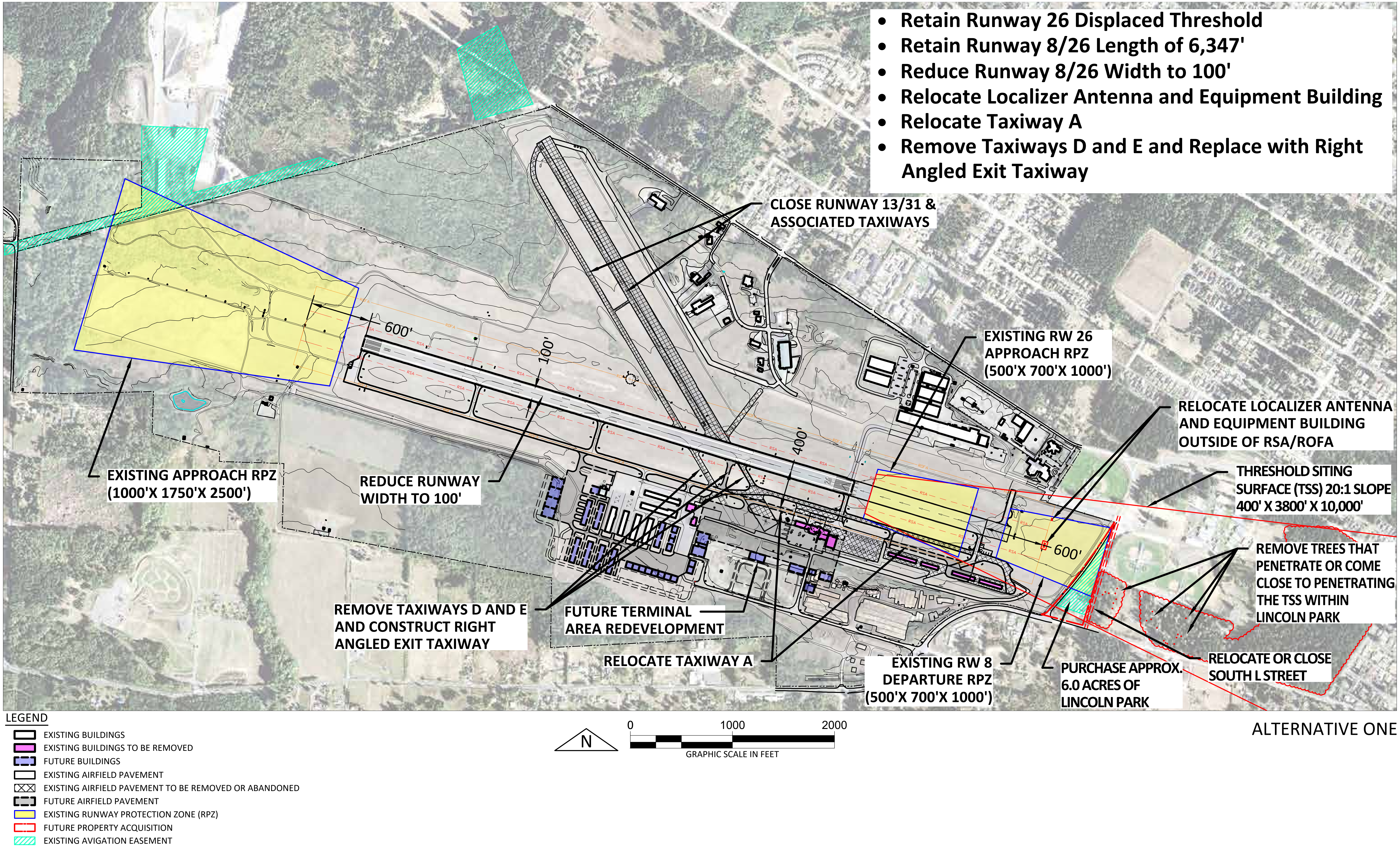


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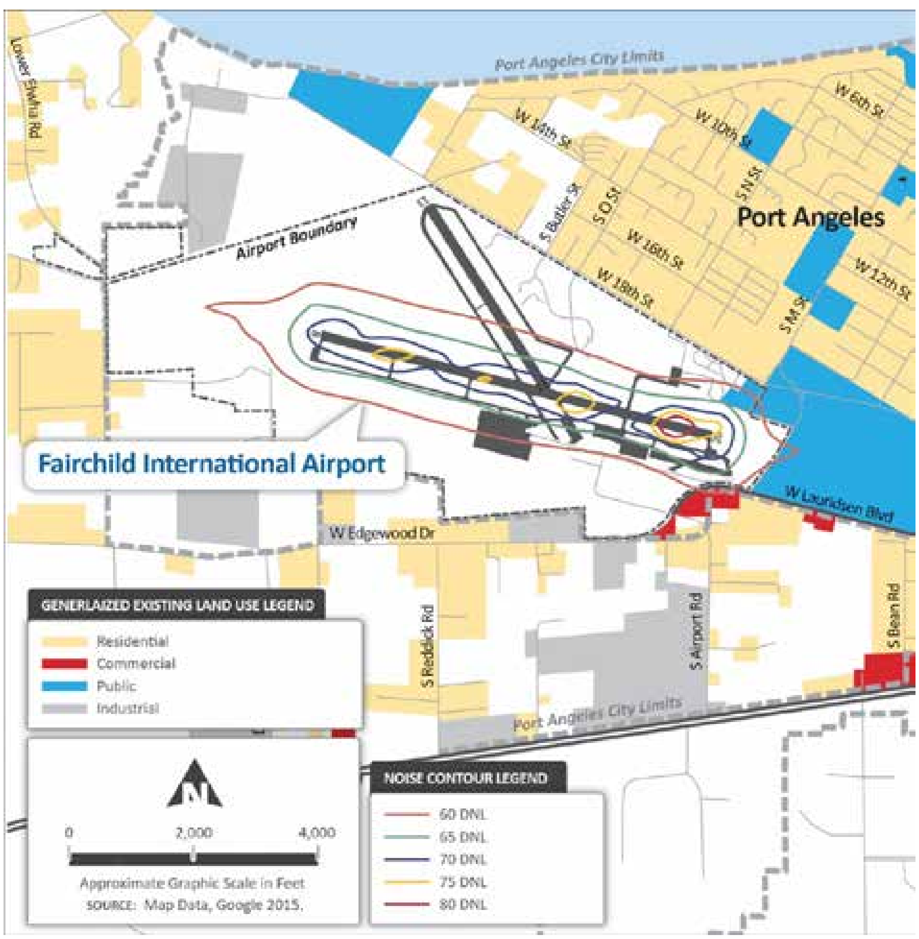
Exhibit 5-1. Alternative One

Property Acquisition: Alternative One would eventually require the purchase of approximately 6 to 7 acres of property within Lincoln Park for the removal of RPZ incompatible land uses.

Environmental Impacts: The acquisition of Lincoln Park property, the redevelopment of park facilities, and the eventual removal of all trees that penetrate or come close to penetrating the threshold siting surface to the Runway 26 displaced threshold have the potential to impact environmental resources.

Noise: The future (year 2035) potential noise impacts associated with Alternative One are provided on **Exhibit 5-2**. FAA defines significant noise impacts as an increase by day-night average sound level (DNL) 1.5 decibel (dB) or more for a noise sensitive area that is exposed to noise at or above the 65 DNL noise exposure level, or that will be exposed at or above the 65 DNL level due to a DNL 1.5 dB or greater increase. As presented, the future (2035) 65 DNL noise contour remains entirely on airport property. The future 60 DNL noise contour extends beyond airport property to the east into commercial areas south of West Lauridsen Boulevard, into Lincoln Park east of the relocated South L Street, and into Volunteer Field west of South L Street and south of West 18th Street. Since there are no noise sensitive areas contained within the 65 DNL noise contour, no noise sensitive areas will experience a DNL 1.5 dB increase within the 65 DNL noise contour. Additionally, the potential Section 4(f) properties located within Lincoln Park are not contained within the 60 DNL noise contour, so these resources will not be exposed to at or greater than the 65 DNL level due to a DNL 1.5 dB or greater increase. Therefore, no significant noise impacts are anticipated if this alternative is implemented.

Exhibit 5-2. Alternative One Future (2035) Noise Contours With Existing Land Use



Section 4(f) Parks and Recreation Areas: The planned improvements for this alternative would result in physical disturbance of park land through the eventual removal of all trees within Lincoln Park that penetrate or come close to penetrating the threshold siting surface to the Runway 26 displaced threshold and the purchase and redevelopment of 6 to 7 acres of park land for RPZ land use compatibility. The acquisition of park property would have a direct impact on the bicycle motocross facility, vehicle parking, and potentially the ballfields. The majority of tree removal would occur in areas in or near active recreational uses (i.e., dog park) and near the park entrance. There would-be short-term displacement of park users during tree removal activities and the removal of mature fir and cedar tree stands could change the character of these areas for park users.

The redevelopment of park facilities would require close coordination between the Port of Port Angeles, the City of Port Angeles, and the public to ensure that park facilities deemed important for citizen's use continue to be provided and that the character of the park is not changed substantially. A Section 4(f) analysis is likely to be required due to the anticipated impacts to the park from Alternative One. As stated earlier, the Port of Port Angeles has an interlocal agreement with the City of Port Angeles for the maintenance of the approach path to Runway 26 that identifies and removes obstruction trees annually or as needed.

Section 4(f) Historic, Architectural, Archeological, and Cultural Properties: Chapter 2 identified that Lincoln Park and the Clallam County Fairgrounds contain numerous associated buildings, structures, and landscape features that are over 50 years old. These areas may be affected by "constructive use" of the park due to obstruction removal and property acquisition, but no eligible structures are anticipated to be directly affected by the airside improvements. Constructive use impacts occur when a project does not physically use or take a property, but the associated impacts are so severe that the activities, features, or attributes that qualify the property for protection under Section 4(f) are substantially impaired. Substantial impairment occurs only when the protected activities, features, or attributes of the Section 4(f) property that contribute to its significance or enjoyment are substantially diminished. This means that the value of the Section 4(f) property, in terms of the its prior significance and enjoyment, is substantially reduced or lost.

Close coordination between the Port of Port Angeles and the City of Port Angeles would be required to ensure that no eligible structures, buildings, or landscape features are substantially impacted through redevelopment of park facilities that require replacement when park property is acquired. As the lead agency, FAA would also be required to consult with the Washington State Department of Archaeology and Historic Preservation and Native American Tribes pursuant to Section 106 of the National Historic Preservation Act and Executive Order 13175 Consultation and Coordination with Indian Tribal Governments. All ground disturbing activities associated with the planned Alternative One airside improvements (i.e., the relocation of the localizer antenna, localizer equipment building, and Taxiway A, and the construction of the right angled taxiway replacing Taxiways D and E) are located on current airport property within areas that have experienced past ground disturbance and have a low potential for encountering archeological objects.

Critical Areas: None of the improvements associated with Alternative One are anticipated to affect known aquatic habitat conservation areas (streams), frequently flooded areas, geologic hazard areas, or areas designated as locally unique features by the City of Port Angeles. Areas of the central portion of the airport, including that portion of the airport crossed by Runway 8/26 are identified within a designated aquifer recharge area. However, none of the planned airside improvements associated with this alternative are anticipated to substantially change existing conditions in these areas that would result in additional potential impact to groundwater.

Wetlands: None of the improvements associated with this alternative will affect known wetlands. Wetlands are present within Lincoln Park, but they are beyond the proposed property acquisition and areas planned for initial tree removal. It is possible that the removal of obstruction trees (as permitted in the interlocal agreement) could require tree removal from wetlands or buffers, but this potential impact is common to all alternatives.

Threatened and Endangered Species: There is a low probability that the existing listed threatened or endangered species are present within areas impacted by this alternative. Alternative One is not anticipated to result in indirect effects to listed species.

Advantages/Disadvantages: The primary advantages provided by this alternative include:

- *Improves safety through proper design standards associated with the relocation of the localizer antenna, the localizer equipment building, and Taxiway A.*
- *Removes obstructions to provide proper siting of the Runway 26 threshold.*
- *Reduces long-term runway pavement maintenance costs for the Port of Port Angeles.*

The primary disadvantages provided by this alternative include:

- *Requires relocation of South L Street.*
- *Direct impacts to Lincoln Park facilities.*
- *Requires the Port to fund the entire localizer antenna relocation costs and enter into an agreement for future reimbursement from the ATO when funding options allow.*

Development Costs: Major cost items associated with Alternative One include:

- *Eventual removal of all trees located within the approach area to Runway 26 that penetrate or come close to penetrating the threshold siting surface, all within Lincoln Park.*
- *Purchase of approximately 6 to 7 acres of Lincoln Park and redevelopment of park facilities for RPZ land use compatibility.*
- *Relocation or closure of South L Street.*
- *Relocation of Taxiway A to 400 feet from the centerline of Runway 8/26 between Taxiways B and E.*
- *Relocation of the localizer antenna and the localizer equipment building.*
- *Removal of Taxiways D and E and construction of right angled taxiway.*
- *Relocation of all runway lights in conjunction with runway width reduction.*
- *Removal of excess runway pavement, or*
- *Saw cuts in excess pavement for runway light relocation and on-going maintenance of excess pavement to minimize deterioration and limit Foreign Object Debris (FOD) formation.*
- *Relocation of Runway 26 PAPI and Runway 8 VASI in conjunction with runway width reduction.*

AIRSIDE ALTERNATIVE ONE (A)

Alternative One (A) is identical to Alternative One, except for implementing declared distances to reduce the runway lengths available for takeoffs on Runway 8 by 255 feet and maintaining the runway width of 150 feet. This alternative is illustrated in **Exhibit 5-3**.

Runway Dimensions: Same conditions as Alternative One except that this alternative implements declared distances to reduce the runway length available for Runway 8 takeoffs. Declared distances can be used for, among others, the mitigation of unacceptable incompatible land uses in RPZs and to cost effectively preserve usable runway length. As detailed in the RPZ section that follows, the use of declared distances in this alternative provides for the Runway 8 departure RPZ to be located entirely on airport property and not extend into South

L Street and Lincoln Park (i.e., incompatible land uses within RPZs). Declared distances represent the maximum runway length an airport owner declares available and suitable for meeting takeoff, rejected takeoff, and landing distance performance requirements for turbine-powered aircraft. The declared distances are:

- **Takeoff Runway Available (TORA).** *The runway length declared available and suitable for the ground run of an aircraft taking off.*
- **Takeoff Distance Available (TODA).** *The TORA plus the length of any remaining runway or clearway beyond the far end of the TORA.*
- **Accelerate Stop Distance Available (ASDA).** *The runway plus stopway length declared available and suitable for the acceleration and deceleration of an aircraft aborting a takeoff.*
- **Landing Distance Available (LDA).** *The runway length declared available and suitable for landing an aircraft.*

The runway lengths provided using Alternative One (A) declared distances are summarized in **Table 5-1**.

Table 5-1. Alternative One(A) Declared Distances Runway Lengths

DECLARED DISTANCES	RUNWAY 8	RUNWAY 26
Takeoff Runway Available (TORA)	6,092’	6,347’
Takeoff Distance Available (TODA)	6,092’	6,347’
Accelerate Stop Distance Available (ASDA)	6,347’	6,347’
Landing Distance Available (LDA)	6,347’	4,993’

The FAA’s Northwest Mountain Regional Office must review and approve the use of new declared distances. FAA’s AC 150/5300-13A allows for declared distances to mitigate incompatible land uses within RPZs but limits their use to purposes where it is impractical to meet airport design standards.

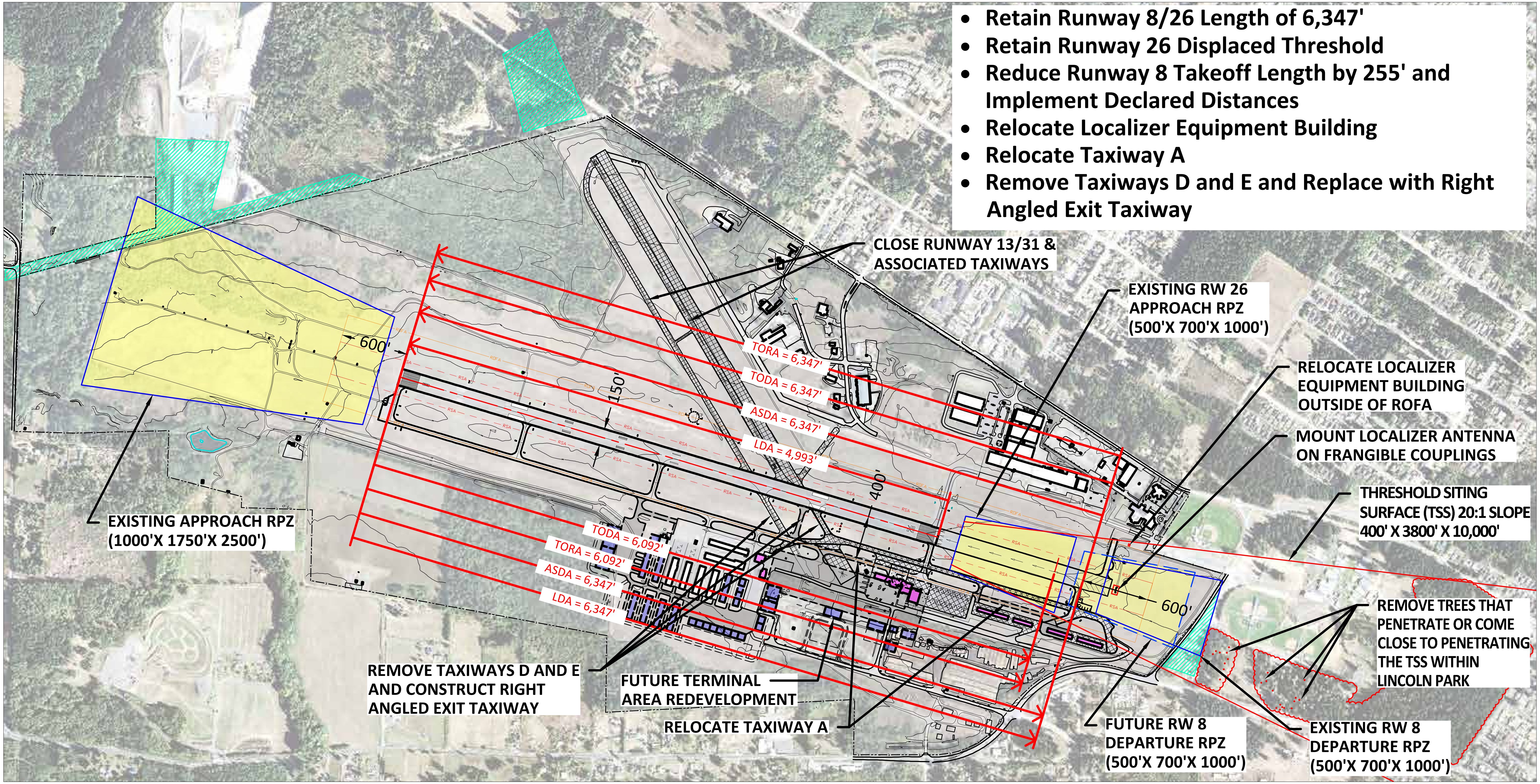
The Port of Port Angeles understands to maintain the runway length exceeding AIP funding eligibility requirements when pavement rehabilitation (i.e., mill and overlay of pavement surface) is required, it might be required to do so with Port or other funds exclusively (i.e., it is not AIP eligible under current FAA funding policies). Initial short-term pavement rehabilitation of the existing runway width of 150 feet is eligible for AIP funding. However, when pavement reconstruction is required, Port or other funds might be required for any runway length and width exceeding the AIP funding eligibility requirements at the time of project implementation.

Runway Protection Zones: In conjunction with the use of declared distances, the Runway 8 Departure RPZ is relocated entirely on airport property, thus eliminating the existing incompatible RPZ land uses of South L Street and portions of Lincoln Park. It would not require consultation and approval from the National Airport Planning and Environmental Division (APP-400) would be required. However, as stated previously, the FAA’s Northwest Mountain Regional Office must review and approve the use of declared distances to mitigate the unacceptable incompatible RPZ land uses.

Threshold Siting: Same conditions as Alternative One.

Taxiway System: Same conditions as Alternative One.

Design Standards: Alternative One (A) proposes that the non-standard RSA be resolved by mounting the localizer antenna on frangible couplings. This option is not normally available for localizer antennas because they are not considered a fixed-by-function navigational aid (i.e., their location within the RSA is not required for proper functioning). However, because of the uncertain time frame and funding availability from the ATO regarding



LEGEND

- EXISTING BUILDINGS
- EXISTING BUILDINGS TO BE REMOVED
- FUTURE BUILDINGS
- EXISTING AIRFIELD PAVEMENT
- EXISTING AIRFIELD PAVEMENT TO BE REMOVED OR ABANDONED
- FUTURE AIRFIELD PAVEMENT
- EXISTING RUNWAY PROTECTION ZONE (RPZ)
- EXISTING RUNWAY PROTECTION ZONE (RPZ) TO BE RELOCATED
- FUTURE RUNWAY PROTECTION ZONE (RPZ)
- EXISTING AVIGATION EASEMENTS

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ALTERNATIVE ONE (A)

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Exhibit 5-3. Alternative One (A)

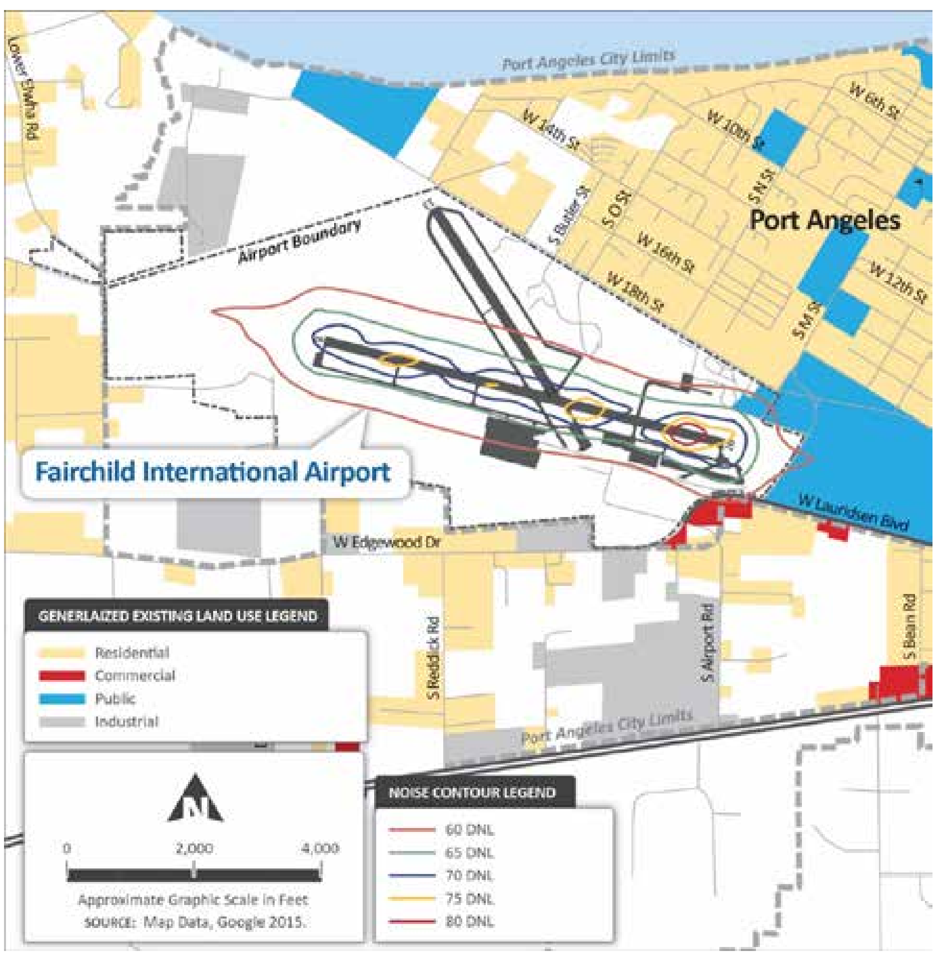
relocation of the localizer antenna at non-Part 139 commercial service airports, the FAA would make an allowance for mounting the antenna on frangible couplings until such time that relocation cost becomes a more viable option. The equipment building would still have to be relocated beyond the 800-foot wide ROFA dimensional standard width (i.e., 400 feet from the runway centerline.

Property Acquisition: No additional property acquisition is required to implement this alternative.

Environmental Impacts: This alternative has similar potential environmental impacts as Alternative One. Potential differences are discussed below.

Noise: The potential noise impacts associated with this alternative are presented in **Exhibit 5-4**, which are nearly identical to Alternative One. The noise contours extend beyond airport property to the east into commercial areas south of West Lauridsen Boulevard, into Lincoln Park east of South L Street, and into Volunteer Field west of South L Street and south of West 18th Street. Since there are no noise sensitive areas contained within the 65 DNL noise contour, no noise sensitive areas will experience a DNL 1.5 dB increase within the 65 DNL noise contour. Additionally, the potential Section 4(f) properties located within Lincoln Park are not contained within the 60 DNL noise contour, so these resources will not be exposed to at or greater than the 65 DNL level due to a DNL 1.5 dB or greater increase. Therefore, no significant noise impacts are anticipated if Alternative One (A) is selected as the future development plan.

Exhibit 5-4. Alternative One (A) Future (2035) Noise Contours with Existing Land Use



Section 4(f) Parks and Recreation Areas: The planned improvements associated with Alternative One (A) would result in physical disturbance of park land through the eventual removal of all trees within Lincoln Park that penetrate or come close to penetrating the threshold siting surface to the Runway 26 displaced threshold. The majority of tree removal would occur in areas in or near active recreational uses (i.e., dog park) and near the park entrance. There would-be short-term displacement of park users during tree removal activities and the removal of mature fir and cedar tree stands could change the character of these areas for park users. A Section 4(f) analysis is likely to be required due to the anticipated impacts to the park from Alternative One (A). As stated earlier, the Port of Port Angeles has an interlocal agreement with the City of Port Angeles for the maintenance of the approach path to Runway 26 that identifies and removes obstruction trees annually or as needed.

Section 4(f) Historic, Architectural, Archeological, and Cultural Properties: No Lincoln Park property acquisition is required, and no park buildings or structures are physically impacted. The airside improvements requiring ground disturbance are identical to Alternative One except that the localizer antenna is not relocated in this alternative, thus resulting in an even lower potential for encountering archeological objects. As the lead agency, FAA would also be required to consult with the Washington State Department of Archaeology and Historic Preservation and Native American Tribes pursuant to Section 106 of the National Historic Preservation Act and Executive Order 13175 Consultation and Coordination with Indian Tribal Governments.

Critical Areas: None of the improvements associated with Alternative One (A) are anticipated to affect known aquatic habitat conservation areas (streams), frequently flooded areas, geologic hazard areas, or areas designated as locally unique features by the City of Port Angeles. Areas of the central portion of the airport, including that portion of the airport crossed by Runway 8/26 are identified within a designated aquifer recharge area. However, none of the planned airside improvements associated with this alternative are anticipated to substantially change existing conditions in these areas that would result in additional potential impact to groundwater.

Wetlands: None of the improvements associated with Alternative One (A) will affect known wetlands. It is possible that the removal of obstruction trees (as permitted in the interlocal agreement) could require tree removal from wetlands or buffers, but this potential impact is common to all alternatives.

Threatened and Endangered Species: There is a low probability that the existing listed threatened or endangered species are present within areas impacted by this alternative. Therefore, Alternative One (A) is not anticipated to result in indirect effects to listed species.

Advantages/Disadvantages: The primary advantages provided by this alternative include:

- *Improves safety through proper design standards associated with the relocation of the localizer equipment building and Taxiway A.*
- *Improves safety through the mounting of the localizer antenna on frangible couplings.*
- *Removes obstructions to provide proper siting of the Runway 26 threshold.*
- *Provides extra margin of safety for aircraft operating during crosswind conditions with additional runway width.*
- *No direct impact to Lincoln Park facilities.*

The primary disadvantages provided by this alternative include:

- *Reduces runway length available for Runway 8 takeoffs.*
- *Increases long-term pavement maintenance costs for the Port of Port Angeles.*

Development Costs: Major cost items associated with Alternative One (A) include:

- *Eventual removal of all trees located within the approach area to Runway 26 that penetrate or come close to penetrating the threshold siting surface, all within Lincoln Park.*

- *Relocation of Taxiway A to 400 feet from the centerline of Runway 8/26 between Taxiways B and E.*
- *Relocation of the localizer equipment building.*
- *Mounting the localizer antenna on frangible couplings.*
- *Removal of Taxiways D and E and construction of right angled taxiway.*

AIRSIDE ALTERNATIVE TWO

Alternative Two involves reducing the entire Runway 8/26 length to 4,993 feet, corresponding to the existing Runway 26 displaced threshold location, removing trees within the Runway 26 threshold siting surface, maintaining the runway width of 150 feet, and realigning Taxiway A. This alternative is illustrated in **Exhibit 5-5**.

Runway Dimensions: This alternative provides a runway length of 4,993 feet and retains the existing width of 150 feet. Initial short-term pavement rehabilitation of the runway length and width of 4,993 feet and 150 feet, respectively, is eligible for AIP funding. However, when pavement reconstruction is required, Port or other funds might be required for any runway length and width exceeding AIP funding eligibility requirements at the time of project implementation.

Runway Protection Zones: In conjunction with the reduction of the runway length to 4,993 feet, the Runway 8 Departure RPZ is relocated to coincide with the Runway 26 Approach RPZ, positioned entirely on airport property. Therefore, this eliminates the existing incompatible RPZ land uses of South L Street and portions of Lincoln Park and no consultation and approval from the National Airport Planning and Environmental Division (APP-400) would be required.

Threshold Siting: Same conditions as previous alternatives.

Taxiway System: Same conditions as previous alternatives.

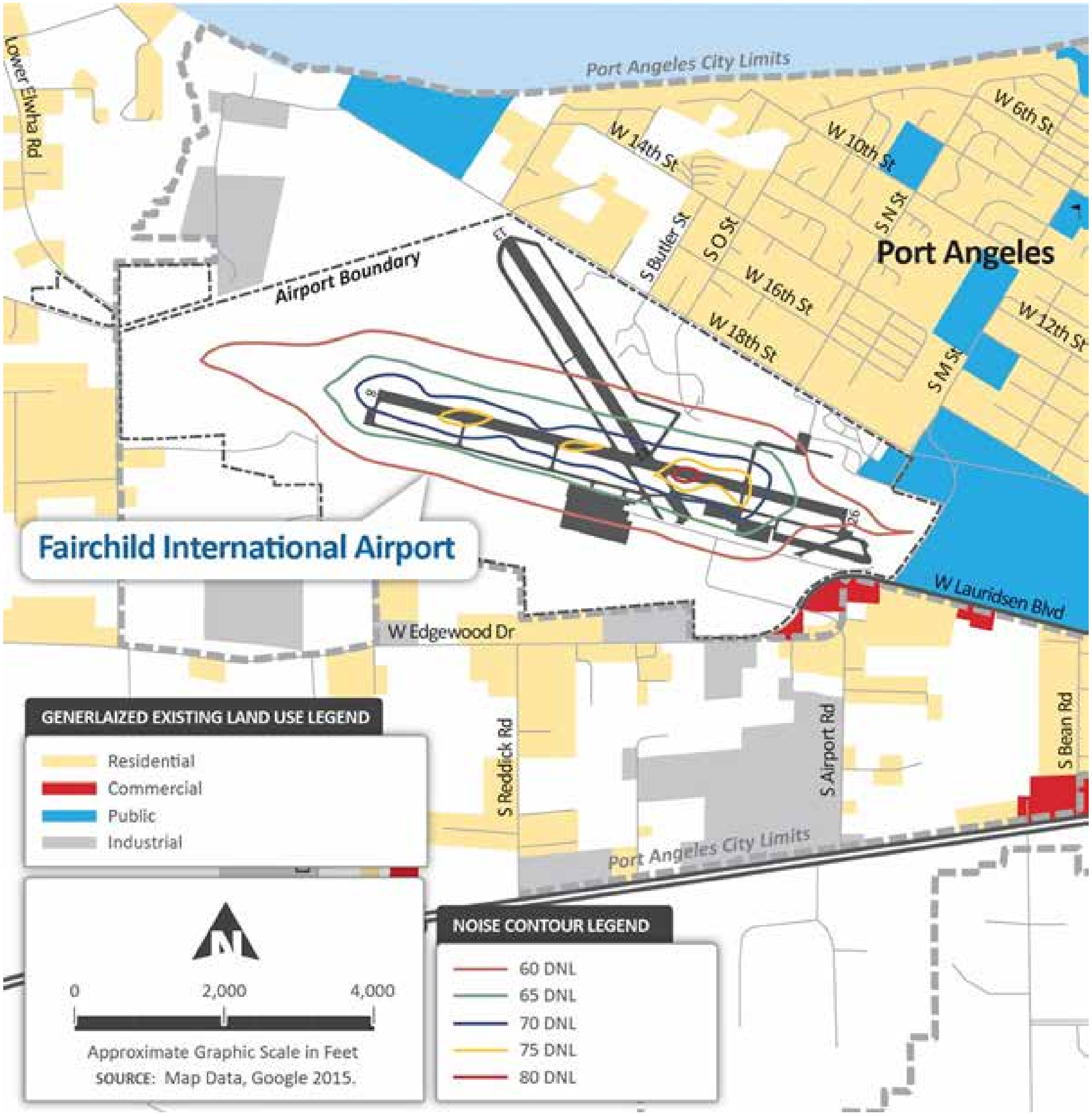
Design Standards: Alternative Two rectifies the non-standard RSA and ROFA conditions by reducing the runway length to 4,993 feet, which provides the standard RSA and ROFA length of 600 feet without the need to relocate the localizer antenna and localizer equipment building.

Property Acquisition: No additional property acquisition is required to implement this alternative.

Environmental Impacts: This alternative has similar potential environmental impacts as Alternative One (A). Potential differences are discussed below.

Noise: The potential noise impacts associated with Alternative Two are provided in **Exhibit 5-6**. Unlike the previous two alternatives, the Alternative Two noise contours remain entirely on airport property. With the decreased takeoff runway lengths available both to the east and west, the noise contours are essentially shifted to the west. Since there are no noise sensitive areas contained within the 65 or 60 DNL noise contour, no noise sensitive areas will experience a DNL 1.5 dB increase within the 65 DNL noise contour. Therefore, no significant noise impacts are anticipated with the implementation of this alternative.

Exhibit 5-6. Alternative Two Future (2035) Noise Contours with Existing Land Use



Section 4(f) Parks and Recreation Areas: The planned improvements associated with Alternative Two would result in physical disturbance of park land through the eventual removal of all trees within Lincoln Park that penetrate or come close to penetrating the threshold siting surface to the Runway 26 displaced threshold. The majority of tree removal would occur in areas in or near active recreational uses (i.e., dog park) and near the park entrance. There would-be short-term displacement of park users during tree removal activities and the removal of mature fir and cedar tree stands could change the character of these areas for park users. A Section 4(f) analysis is likely to be required due to the anticipated impacts to the park from Alternative Two. As stated earlier, the Port of Port Angeles has an interlocal agreement with the City of Port Angeles for the maintenance of the approach path to Runway 26 that identifies and removes obstruction trees annually or as needed.

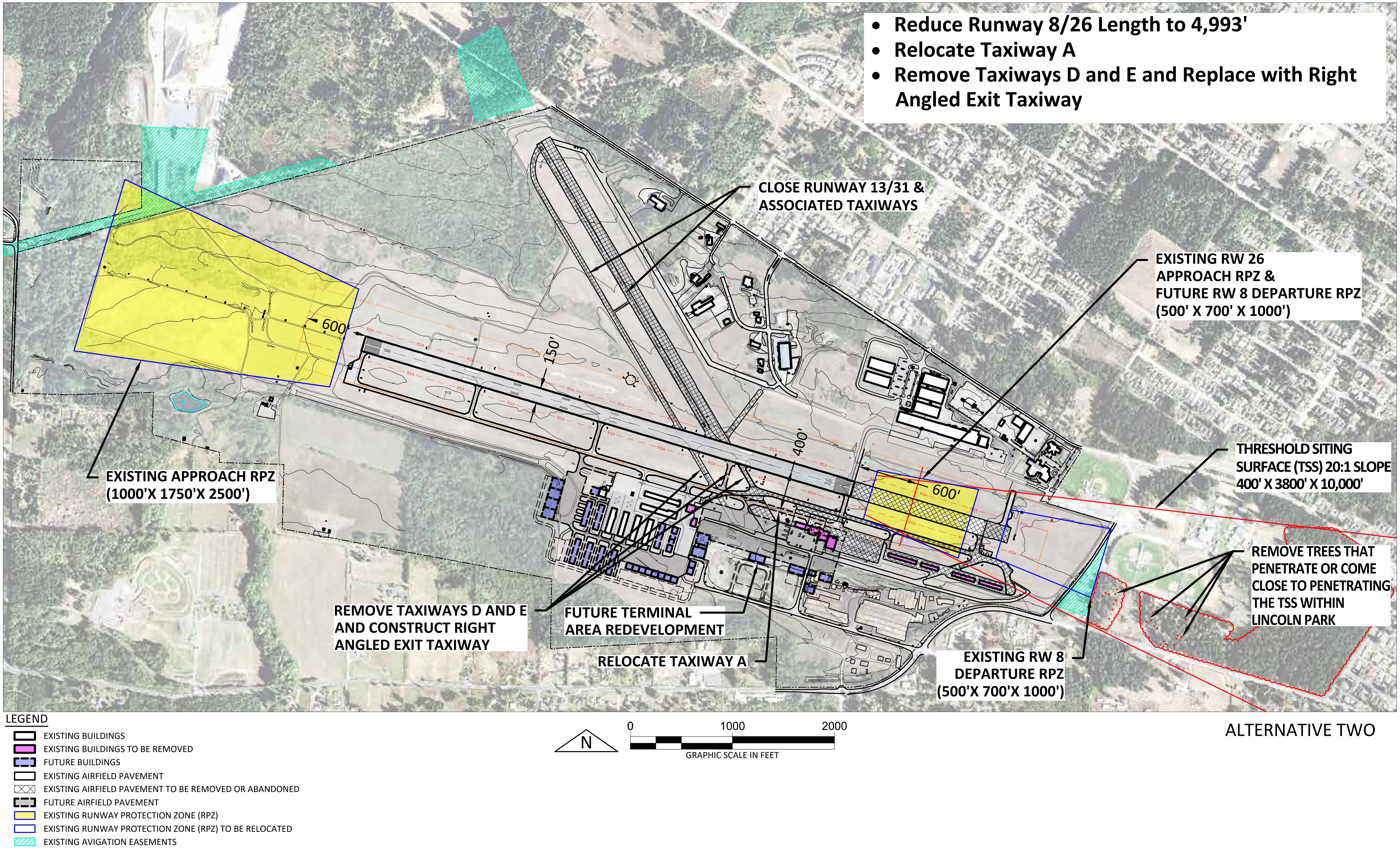


Exhibit 5-5. Alternative Two

Section 4(f) Historic, Architectural, Archeological, and Cultural Properties: No Lincoln Park property acquisition is required, and no park buildings or structures are physically impacted. The airside improvements requiring ground disturbance are identical to the previous alternatives, but with even less disturbance since the localizer antenna and localizer equipment building are not required to be relocated. As the lead agency, FAA would also be required to consult with the Washington State Department of Archaeology and Historic Preservation and Native American Tribes pursuant to Section 106 of the National Historic Preservation Act and Executive Order 13175 Consultation and Coordination with Indian Tribal Governments.

Critical Areas: None of the improvements associated with Alternative Two are anticipated to affect known aquatic habitat conservation areas (streams), frequently flooded areas, geologic hazard areas, or areas designated as locally unique features by the City of Port Angeles. Areas of the central portion of the airport, including that portion of the airport crossed by Runway 8/26 are identified within a designated aquifer recharge area. However, none of the planned airside improvements associated with this alternative are anticipated to substantially change existing conditions in these areas that would result in additional potential impact to groundwater.

Wetlands: None of the improvements associated with Alternative Two will affect known wetlands. It is possible that the removal of obstruction trees (as permitted in the interlocal agreement) could require tree removal from wetlands or buffers, but this potential impact is common to all alternatives.

Threatened and Endangered Species: There is a low probability that the existing listed threatened or endangered species are present within areas impacted by this alternative. Therefore, Alternative Two is not anticipated to result in indirect effects to listed species.

Advantages/Disadvantages: The primary advantages provided by this alternative include:

- *Improves safety through proper design standards associated with the reduction of the runway length, thus providing the standard RSA and ROFA lengths beyond the Runway 26 end.*
- *Removes obstructions to provide proper siting of the Runway 26 threshold.*
- *Reduces long-term pavement maintenance costs for the Port of Port Angeles.*
- *Provides extra margin of safety for aircraft operating during crosswind conditions with additional runway width.*
- *No direct impact to Lincoln Park facilities.*

The primary disadvantage provided by this alternative includes:

- *Reduces runway length to 4,993 feet.*

Development Costs: Major cost items associated with Alternative Two include:

- *Eventual removal of all trees located within the approach area to Runway 26 that penetrate or come close to penetrating the threshold siting surface, all within Lincoln Park.*
- *Relocation of Taxiway A to 400 feet from the centerline of Runway 8/26 between Taxiways C and E.*
- *Removal of Taxiways D and E and construction of right angled taxiway.*

AIRSIDE ALTERNATIVES SUMMARY

A summary of the various components of each alternative is provided in **Table 5-2** as an aid for directly comparing the alternatives, the improvements provided, the advantages and disadvantages, and the level of effort required for implementation.

Table 5-2. Summary of Airside Alternatives Analysis

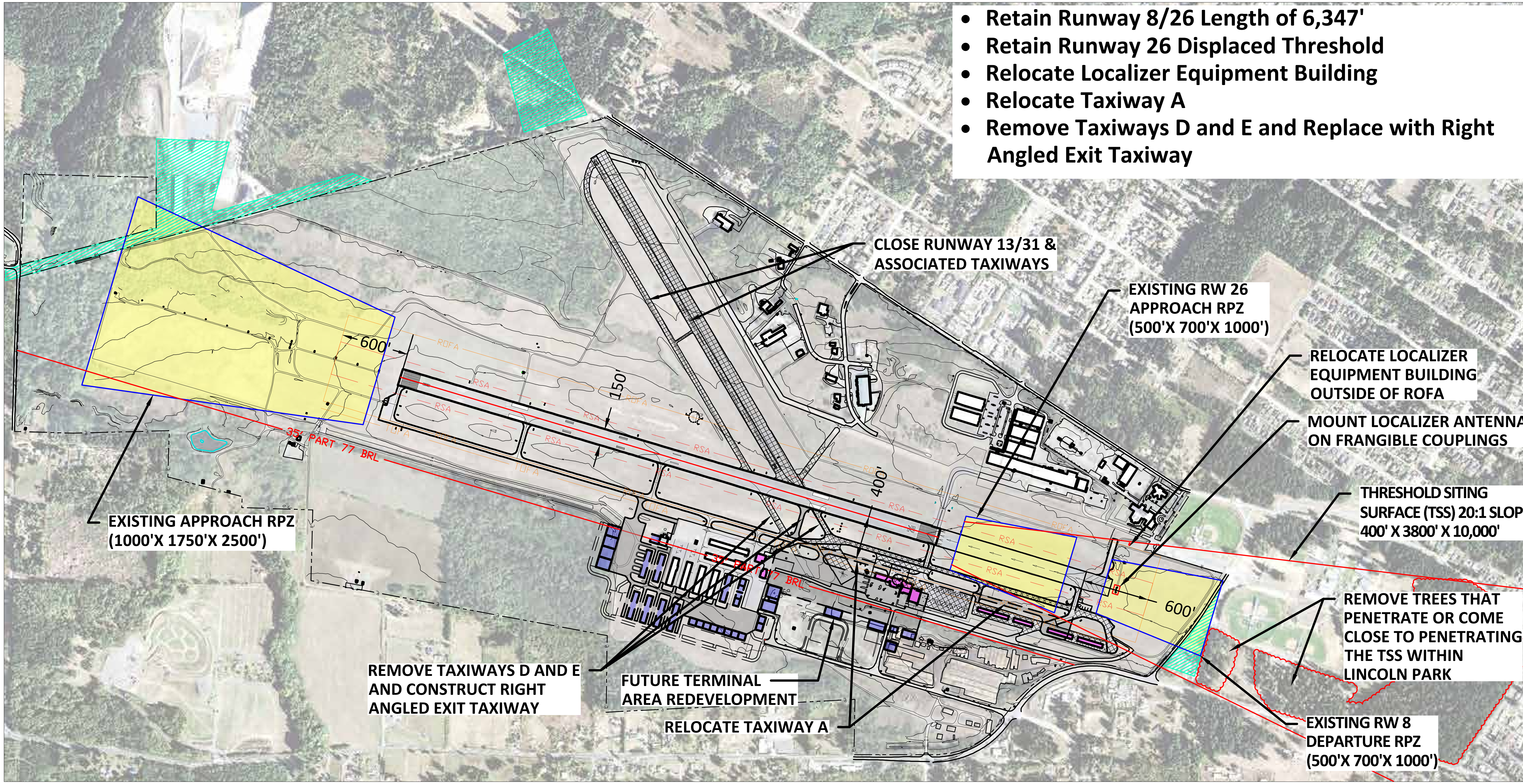
ITEM	ALTERNATIVE ONE	ALTERNATIVE ONE (A)	ALTERNATIVE TWO
Runway 8 Declared Distance Lengths			
TORA	6,347′	6,092′	4,993′
TODA	6,347′	6,092′	4,993′
ASDA	6,347′	6,347′	4,993′
LDA	6,347′	6,347′	4,993′
Runway 26 Declared Distance Lengths			
TORA	6,347′	6,347′	4,993′
TODA	6,347′	6,347′	4,993′
ASDA	6,347′	6,347′	4,993′
LDA	4,993′	4,993′	4,993′
Runway 8/26 Width	100′	150′	150′
Tree Removal in Lincoln Park	Yes	Yes	Yes
Correction of Taxiway A Separation Deficiency	Yes	Yes	Yes
Requires Relocation of Localizer Antenna & Equipment Building to Meet Design Standards	Yes	No	No
Property Acquisition (Approx. Acreage)	6-7	None	None
Noise Impacts Within DNL 65 Noise Contour	No	No	No

PREFERRED DEVELOPMENT PLAN DETERMINATION

The proposed alternatives for CLM are intended to present to the Port of Port Angeles with a variety of options for future facility expansion and improvement. Following the careful assessment of the alternatives and using input and comments provided by airport staff, Port staff, airport users, interested citizens, the Master Plan Update Study Advisory Committee, and the FAA, the Port has selected the recommended improvements for future airport development and is presented in **Exhibit 5-7**. This plan will be confirmed and presented in the next chapter to represent the ultimate 20-year airport configuration.

Preferred Airside Development Determination

The Port of Port Angeles has determined that most of the elements presented in Alternative One are to be used as the preferred alternative for the future airside development at CLM. The elements from Alternative One involve retaining the existing Runway 8/26 length of 6,347 feet, retaining the existing 1,354-foot displaced threshold, relocating the localizer equipment building outside the RSA and ROFA, and realigning Taxiway A.



LEGEND
- EXISTING BUILDINGS
- EXISTING BUILDINGS TO BE REMOVED
- FUTURE BUILDINGS
- EXISTING AIRFIELD PAVEMENT
- EXISTING AIRFIELD PAVEMENT TO BE REMOVED OR ABANDONED
- FUTURE AIRFIELD PAVEMENT
- EXISTING RUNWAY PROTECTION ZONE (RPZ)
- EXISTING AVIGATION EASEMENTS

N

0 1000 2000
GRAPHIC SCALE IN FEET

Conceptual Development Plan

Exhibit 5-7. Conceptual Airside Development Plan

Elements form Alternative One not retained for use as the preferred alternative for future airside development include the purchase and redevelopment of a portion of Lincoln Park and the relocation or closure of South L Street. While the FAA AC 150/5300-13A states: "…Where practical, airport owners should own the property under the runway approach and departure areas to at least the limits of the RPZ. It is desirable to clear the entire RPZ of all above-ground objects. Where this is impractical, airport owners, as a minimum, should maintain the RPZ clear of all facilities supporting incompatible activities." However, FAA Memorandum, Interim Guidance on Land Uses within a Runway Protection Zone, dated 9/27/2012, acknowledges that "RPZ land use compatibility also is often complicated by ownership considerations. Airport owner control over the RPZ land is emphasized to achieve the desired protection of people and property on the ground. Although the FAA recognizes that in certain situations the airport sponsor may not fully control land within the RPZ, the FAA expects airport sponsors to take all possible measures to protect against and remove or mitigate incompatible land uses."

Land use decisions are a matter of local policy and the FAA has no legal authority to make, determine, or regulate local land use decisions. Therefore, the Port of Port Angeles and the City of Port Angeles have determined that it is in their best interests to not close or relocate South L Street since it is an important north/south connector road between West 16th Street and West Lauridsen Boulevard. Additionally, both the Port and the City have determined that the impacts associated with purchasing and redeveloping a portion of Lincoln Park are also not in their best interest from a local land use decision standpoint.

The Port has determined that retaining the runway width of 150 feet and mounting the localizer antenna on frangible couplings from Alternative One (A) are also to be incorporated into the preferred alternative for future airside development.

As stated previously, it is the Port of Port Angeles' understanding the short-term pavement rehabilitation project (i.e., mill and overlay of existing pavement surfaces) is eligible for AIP funding for a runway length of 5,000 feet and a runway width of 150 feet. The pavement rehabilitation for existing taxiways serving a runway length of 5,000 feet is also eligible for AIP funding. To provide runway and taxiway pavement rehabilitation for a runway length exceeding AIP funding eligibility requirements, the Port understands it might be required to do so using Port or other funds. Additionally, when pavement reconstruction is required, Port or other funds might be required for any runway and taxiway pavements exceeding AIP funding eligibility requirements at the time of project implementation.

As presented earlier in Inventory and Facility Requirements chapters, Runway 13/31 is not required to provide adequate wind coverage. The necessary improvements required would not be eligible for FAA funding. The Port of Port Angeles is committed to keeping Runway 13/31 functional as long as feasible but anticipates closing the runway sometime after the Runway 8/26 pavement rehabilitation project is complete. Runway 13/31 will be an important airport facility for general aviation aircraft to use during pavement rehabilitation. At the time the runway is closed, physically separating the runway pavements is recommended to avoid potential pilot confusion. However, the Port has an agreement with the Federal Emergency Management Agency (FEMA) to use Runway 13/31 for staging in the event of an emergency. Therefore, limited access to the pavement will need to be maintained. Any work performed will be completed to FAA standards, but no FAA funds are anticipated during the timeframe of the Master Plan Update.

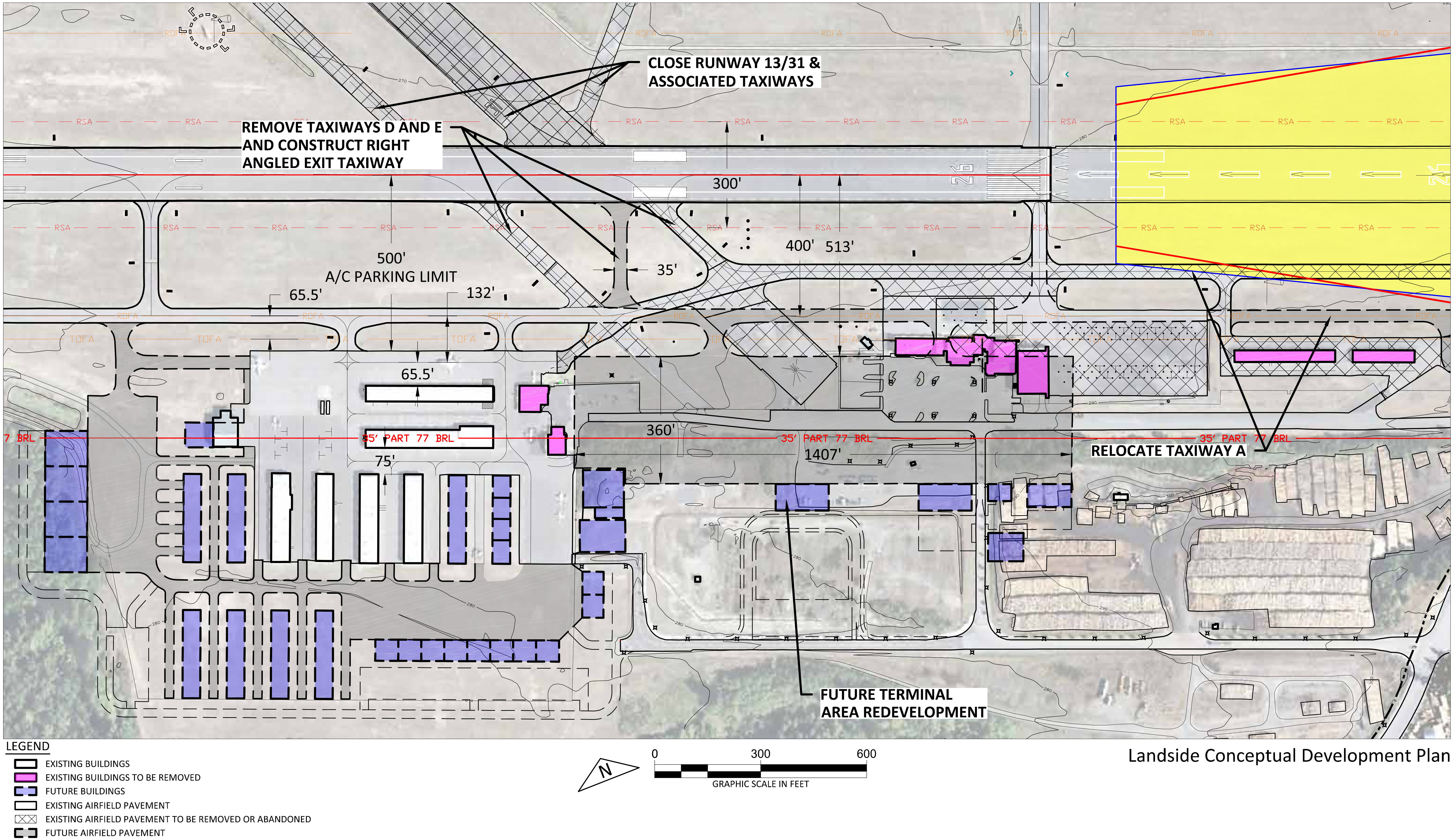
AIRSIDE PROJECTS. The major airside projects associated with the preferred airside development and the anticipated implementation timeline are presented in **Table 5-3**.

Table 5-3. Summary of Preferred Airside Development Projects

PROJECT	1-5 YEARS	6-10 YEARS	11-20 YEARS
Mount the localizer antenna on frangible couplings.	X		
Runway pavement rehabilitation for a length of 5,000 feet and width of 150 feet (currently AIP eligible).	X		
Taxiway pavement rehabilitation for taxiways serving a runway length of 5,000 feet (currently AIP eligible).	X		
Removal of Taxiways D and E and construction of right angled taxiway (currently AIP eligible).	X		
Prepare EA for removal of trees within Lincoln Park (currently AIP eligible).	X		
Removal of trees within Lincoln Park that penetrate or come close to penetrating the threshold siting surface Runway 26 displaced threshold (currently AIP eligible).	X		
Runway pavement rehabilitation for a length exceeding 5,000 feet and width of 150 feet (currently not AIP eligible).		X	
Taxiway pavement rehabilitation for taxiways serving a runway length exceeding 5,000 feet and relocation of localizer antenna equipment building, glide slope equipment building, and glide slope antenna beyond ROFA (currently not AIP eligible).			X
Relocation of Taxiway A to 400 feet from Runway 8/26 centerline between Taxiways B and E (currently not AIP eligible).			X

PREFERRED LANDSIDE DEVELOPMENT DETERMINATION

As stated in the previous chapter, it is determined that the terminal area facilities as presented in the 2011 Master Plan are slightly excessive based on the forecast activity prepared for this study. The overall layout and allocation of space for the relocated terminal functions (including terminal building, apron, and automobile access and parking), air cargo facilities, Aircraft Rescue and Fire Fighting (ARFF) facility, airport maintenance facility, emergency operations center, general aviation storage facilities, and fuel storage facility remain valid for use during the planning period of this Master Plan Update. However, local market conditions indicate that individual hangars approximately 2,500-square foot in size are more in demand than T-hangars. Therefore, the preferred landside development will retain most of the facilities as presented in the 2011 Master Plan and Airport Layout Plan (ALP) with the exception that four individual hangars will replace one of the T-hangars in the west GA area, as presented in **Exhibit 5-8**. The hangars will be developed in accordance with Airplane Design Group I (ADG I) design standards. Additionally, the FAA has noted that the Emergency Operations Center (EOC) is a non-aeronautical use.



Landside Conceptual Development Plan

PORT OF PORT ANGELES WASHINGTON

Exhibit 5-8. Conceptual Landside Development Plan

LANDSIDE PROJECTS. The major landside projects associated with the preferred landside development and the anticipated implementation timeline are presented in **Table 5-4**.

Table 5-4. Summary of Preferred Landside Development Projects

PROJECT	1-5 YEARS	6-10 YEARS	11-20 YEARS
Prepare Cat Ex/EA for the construction of individual hangars in west GA area.	X		
Construct individual hangars in west GA area.	X		
Prepare Cat Ex/EA for the relocation of east GA area T-hangars to west GA area, the removal or relocation of existing FBO building and hangar, and the expansion of individual and T-hangars in west GA area.		X	
Relocate east GA area T-hangars to west GA area.		X	
Remove or relocate existing FBO building and hangar.		X	
Expand individual hangars in west GA area.		X	X
Expand T-hangars in west GA area.		X	X
Prepare Cat Ex/EA for terminal facilities relocation, ARFF facility construction, and FBO facility in west GA area.			X
Relocate terminal building, air cargo building, terminal apron, and automobile access.			X
Construct ARFF facility.			X
Construct FBO facility in west GA area			X

LAND USE COMPATIBILITY

Future land use compatibility efforts surrounding the Airport undertaken by the City of Port Angeles should address specific safety and height restriction issues associated with the operation of the Airport. The authority needed to address land use compatibility is provided by a variety of Washington State statutes contained in the Revised Code of Washington (RCW), primarily the Planning Enabling Act (Chapter 36.70 RCW) and the Growth Management Act (Chapter 36.70A RCW). In fact, RCW 36.70.547 of the Growth Management Act requires local governmental jurisdictions to discourage development of incompatible land uses adjacent to public use airports through adoption of comprehensive plan policies and development regulations.

The City of Port Angeles has taken steps to recognize the importance of the Airport to the local economy by citing the Airport as an "Essential Public Facility" as noted in Policy P3G.03 of the Industrial Goals and Policies section of the City's Comprehensive Plan. As such, it has also been deemed as requiring the appropriate expenditure of City resources to enhance its operation, as noted in the Transportation Goals and Policies section of the Comprehensive Plan, where it says in Policy P-4B-8 that "traffic circulation to and from the airport and around associated industrial areas should be improved".

HEIGHT HAZARD OVERLAY ZONING

Generally speaking, airport height hazard zoning regulations are developed to provide political subdivisions with the authority to adopt and enforce zoning ordinances and maps that prevent the construction of hazards to air navigation. In Washington State, the standard for height hazards subscribes to the Federal delineation, as described in Federal Aviation Regulations (FAR) Part 77, Objects Affecting Navigable Airspace.

FAR Part 77 was established to assist airport sponsors and local government jurisdictions in identifying and governing those objects around airports that may become obstructions or hazards to safe air navigation. The City of Port Angeles recognizes the importance of removal of such obstructions and hazards, and as part of its implementation of the Comprehensive Plan has stated that the city will, "Negotiate a vegetation easement with the Port of Port Angeles, providing long-term resolution to concerns regarding trees at Lincoln Park" (Paragraph 0.901 of the Implementation Section). It is recommended that the Port of Port Angeles continue to work with the City of Port Angeles to maintain the current height restrictions surrounding the Airport based on FAR Part 77 imaginary surfaces. The FAA has limited authority to ensure that the imaginary surfaces around airports are maintained free of obstructions.

INTERLOCAL AGREEMENT

The Port of Port Angeles has an existing interlocal agreement with the City of Port Angeles for the purpose of coordination on the elimination and prevention of encroachments into the Runway 26 approach path. The agreement was entered into on September 12, 2017 pursuant to RCW 39.34, the Interlocal Cooperation Act. The agreement recognizes the importance of protecting the approach to Runway 26 and commits each party to work collectively to preserve the integrity of both Lincoln Park and the airport. It provides for the Port's Executive Director and the City Manager to annually, or as often as needed, identify trees within Lincoln Part that are of such height and so located to penetrate, or are within five feet of penetrating, the approach path to Runway 26 that interferes with the use of Runway 26 to a length of 5,000 feet. A Tree Removal and Restoration Plan will be agreed upon by both parties, all permits will be obtained at Port expense, and trees will be removed, and site repair work completed in compliance with all applicable codes, permits, rules, regulations, and laws. The plan began in 2017 with the removal of approximately 38 trees and additional trees will be removed as needed.

CHAPTER 6
AIRPORT PLANS

INTRODUCTION

Previous chapters of this Master Plan Update have established and quantified the future development plans for William R. Fairchild International Airport. This chapter presents the various individual drawings associated with the Airport Layout Plan (ALP) drawing set that graphically depicts the proposed facilities expansion and improvements. A brief written description of the individual elements accompanies the drawings.

AIRPORT LAYOUT DRAWING

Exhibit 6-1 presents all existing and ultimate airport facilities necessary for the Port of Port Angeles to meet he aviation demand throughout the 20-year planning period. It provides detailed information on dimensional standards that defined the relationship between airport facilities and applicable FAA design criteria. The major components

Runway System

Dimensions: CLM's runway configuration will be structured around Runway 8/26, designed and maintained in accordance with the RDC B-II-2400. The Port of Port Angeles desires to maintain the existing runway dimensions of 6,347 feet in length and 150 feet in width. The existing Runway 26 displaced threshold location will be maintained, limiting the Landing Distance Available (LDA) to 4,993 feet. The localizer antenna will be mounted on frangible couplings to mitigate the non-standard Runway Safety Area (RSA) conditions. Ultimately, the localizer equipment building and the glide slope antenna equipment will be relocated to mitigate the non-standard Runway Object Free Area (ROFA) conditions.

Pavement: The existing Runway 8/26 gross weight bearing capacity (i.e., 115,000 pounds dual tandem wheel, 66,000 pounds dual wheel, and 55,000 pounds single wheel main landing gear configuration) will be retained throughout the planning period.

Instrument Approach Procedures: The existing Instrument Approach Procedures (IAPs), with visibility minimums not less than ½ statute mile to Runway 8 and not less than one statute mile to Runway 26 will be retained.

Runway Protection Zones: The existing Runway Protection Zones (RPZs) will be retained since no IAP improvements are planned.

Runway Lighting, Marking, and Navigation Aids: The existing Medium Intensity Runway Lights (MIRL), Runway 8 Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR), Runway 26 Precision Approach Path Indicator (PAPI) lights, Runway 8 precision markings, Runway 26 non-precision markings are adequate for use throughout the planning period. The Runway 8 Visual Approach Slope Indicator (VASI) lights will be replaced by PAPI lights.

Taxiway System

Configuration: Between Taxiways B and E, the existing Runway 8/26 parallel taxiway (Taxiway A) will be relocated to 400 feet from the runway centerline, eliminating the current dogleg and provide aircraft a less complicated ability to transit the entire length of the taxiway making maneuvers. The acute angled Taxiways D and E will be eliminated and a new right-angled taxiway will be provided at the current intersection of Runway 8/26 and Taxiway D. Direct access from the terminal apron to the Runway 26 displaced threshold via Taxiway C will be realigned to alleviate the direct taxiway access to the runway. With the removal of Runway 13/31 and its associated taxiways, the high energy taxiway crossings and acute angled taxiways will be alleviated.

Dimensions: The existing taxiway dimensions will be retained.

Pavement: The existing gross weight bearing capacity of the taxiways will be retained.

AIRPORT AIRSPACE DRAWING

The CLM Airport Airspace Drawing is based on Federal Aviation Regulations (FAR) Part 77, Objects Affecting Navigable Airspace. The FAR Part 77 criteria have been established to provide guidance in controlling the height of objects near airports to protect airspace and approaches form hazards that could negatively affect the safe and efficient operation of aircraft. The criteria specify a set of imaginary surfaces that, when penetrated, designate an object as being an obstruction. However, some obstructions can be determined to be non-hazardous by an aeronautical study because of their location and/or marked and lighted as specified in the aeronautical study determination.

Exhibits 6-2 through **6-4** present plan and profile views depicting the FAR Part 77 criteria as it applies to CLM. The Part 77 criteria are based on ultimate runway configuration and length, ultimate approach visibility minimums, and the ultimate airport elevation. Therefore, the criteria for CLM are based on greater than utility aircraft (i.e., runway designed for aircraft with gross weights greater than 12,500 pounds), with a precision approach to Runway 8, a non-precision approach with visibility not less than one statute mile to Runway 26, and an ultimate airport elevation of 291.3 feet Above Mean Sea Level (AMSL).

Five distinct imaginary surfaces are specified by FAR Part 77 criteria, which include the primary, transitional, horizontal, conical, and approach surfaces. A brief description of each surface is presented in the following text. Slopes are expressed as a ratio corresponding to the horizontal distance required for every foot in elevation (i.e. a slope of 20:1 indicates that 20 feet of horizontal distance is required for every foot in elevation gain).

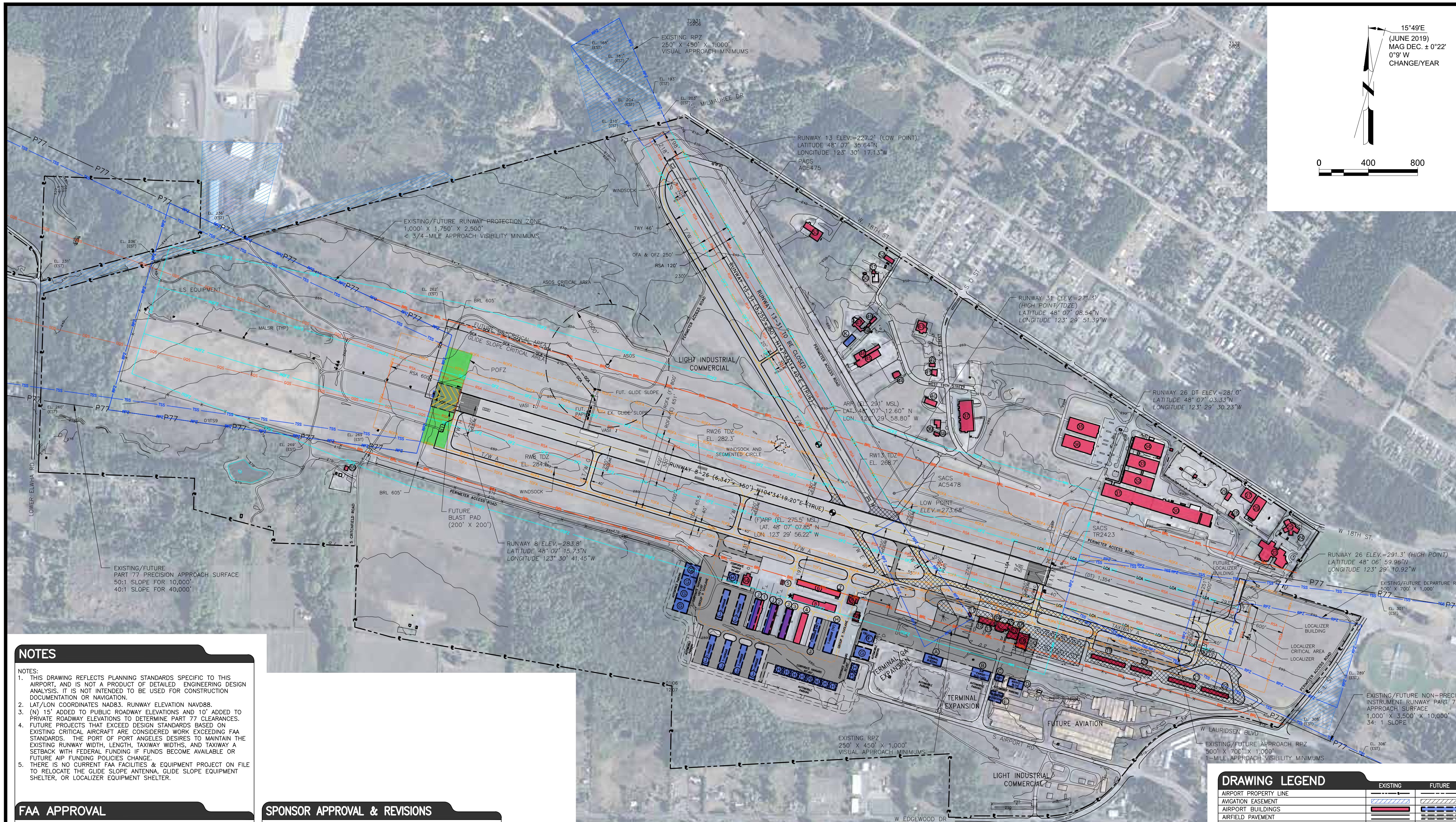
Primary Surface: The primary surface is a longitudinal surface centered on the runway extending 200 feet beyond each runway end. The elevation of any point on the primary surface is the same as the nearest point on the runway centerline. The primary surface width is 1,000 feet.

Transitional Surface: Transitional surfaces extend upward and outward at right angles to the runway centerline, and the extended runway centerline, at the edges of the primary surface and precision surfaces that extend beyond the conical surface. Transitional surfaces have a slope of 7:1 and end where they intersect the horizontal surface.

Horizontal Surface: The horizontal surface is a horizontal plane established at an elevation of 150 feet above the airport elevation. The perimeter of the horizontal surface is established by swinging arcs from the center of each end of the primary surface and connecting the arcs with tangent lines. The radii of the arcs are 10,000 feet.

Conical Surface: The conical surface extends upwards and outward from the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet.

Approach Surfaces: Approach surfaces are longitudinally centered on the extended runway centerlines, extended outward and upward from each end of the primary surface. The inner edges have the same width as the primary surface. The horizontal distances, slopes, and outer edge widths are based on the IAP visibility minimums of each runway. For Runway 8, the horizontal distance is 10,000 feet at a slope of 50:1, followed by a horizontal distance of 40,000 feet at a slope of 40:1. The outer edge width is 16,000 feet. For Runway 26, the horizontal distance is 10,000 feet at a slope of 20:1 with an outer edge width of 3,500 feet.



NOTES

NOTES:

1. THIS DRAWING REFLECTS PLANNING STANDARDS SPECIFIC TO THIS AIRPORT, AND IS NOT A PRODUCT OF DETAILED ENGINEERING DESIGN ANALYSIS. IT IS NOT INTENDED TO BE USED FOR CONSTRUCTION DOCUMENTATION OR NAVIGATION.
2. LAT/LON COORDINATES NAD83. RUNWAY ELEVATION NAVD88.
3. (N) 15' ADDED TO PUBLIC ROADWAY ELEVATIONS AND 10' ADDED TO PRIVATE ROADWAY ELEVATIONS TO DETERMINE PART 77 CLEARANCES.
4. FUTURE PROJECTS THAT EXCEED DESIGN STANDARDS BASED ON EXISTING CRITICAL AIRCRAFT ARE CONSIDERED WORK EXCEEDING FAA STANDARDS. THE PORT OF PORT ANGELES DESIRES TO MAINTAIN THE EXISTING RUNWAY WIDTH, LENGTH, TAXIWAY WIDTHS, AND TAXIWAY A SETBACK WITH FEDERAL FUNDING IF FUNDS BECOME AVAILABLE OR FUTURE AIP FUNDING POLICIES CHANGE.
5. THERE IS NO CURRENT FAA FACILITIES & EQUIPMENT PROJECT ON FILE TO RELOCATE THE GLIDE SLOPE ANTENNA, GLIDE SLOPE EQUIPMENT SHELTER, OR LOCALIZER EQUIPMENT SHELTER.

FAA APPROVAL

SPONSOR APPROVAL & REVISIONS

SPONSOR APPROVAL/DATE

NO.	DESCRIPTION	DATE

BUILDING LEGEND

NO.	DESCRIPTION	TOP ELEVATION	OBS LIGHTED
1	PRIVATE T-HANGAR (RELOCATED)	298.3'	
2	PRIVATE T-HANGAR (RELOCATED)	295.5'	
3	PRIVATE T-HANGAR (RELOCATED)	299.3'	
4	PRIVATE T-HANGAR	297.9'	
5	FUEL STORAGE FACILITY	–	
6	T-SHADE	299.18'	
7	FIRE STATION	299.18'	
8	T-HANGAR	298.7'	
9	FBO – (LIFE FLIGHT NETWORK)	296.89'	
10	FBO – (LIFE FLIGHT NETWORK)	303.6'	
11	FAA EQUIPMENT BUILDING	299.48'	
12	GA HANGAR	311.58'	
13	GA HANGAR	311.58'	
14	TERMINAL BUILDING	315.50'	
15	U.S. CUSTOMS	315.50'	
16	U.S. CUSTOMS AIRCRAFT PARKING	–	
17	FBO MAINTENANCE HANGAR	325.98'	
18	FEDEX	323.72'	
19	T-HANGAR	315.6'	
20	T-HANGAR	314.0'	
21	T-HANGAR	312.7'	
22	T-HANGAR	312.5'	

BUILDING LEGEND

NO.	DESCRIPTION	TOP ELEVATION	OBS LIGHTED
23	FAIRCHILD INDUSTRIAL PARK	306.2'	
24	FAIRCHILD INDUSTRIAL PARK	309.4'	
25	FAIRCHILD INDUSTRIAL PARK	309.7'	
26	FAIRCHILD INDUSTRIAL PARK	321.6'	
27	FAIRCHILD INDUSTRIAL PARK	322.0'	
28	FAIRCHILD INDUSTRIAL PARK	307.4'	
29	FAIRCHILD INDUSTRIAL PARK	313.6'	
30	FAIRCHILD INDUSTRIAL PARK	315.8'	
31	FAIRCHILD INDUSTRIAL PARK	309.8'	
32	FAIRCHILD INDUSTRIAL PARK	309.1'	
33	FAIRCHILD INDUSTRIAL PARK	309.2'	
34	FAIRCHILD INDUSTRIAL PARK	307.9'	
35	FAIRCHILD INDUSTRIAL PARK	307.6'	
36	FAIRCHILD INDUSTRIAL PARK	307.8'	
37	FAIRCHILD INDUSTRIAL PARK	395.0'	
38	FAIRCHILD INDUSTRIAL PARK	287.8'	
39	FAIRCHILD INDUSTRIAL PARK	291.0'	
40	FAIRCHILD INDUSTRIAL PARK	290.5'	
41	FAIRCHILD INDUSTRIAL PARK	282.2'	
42	FAIRCHILD INDUSTRIAL PARK	280.5'	
43	FAIRCHILD INDUSTRIAL PARK	266.3'	
44	FAIRCHILD INDUSTRIAL PARK	279.8'	

BUILDING LEGEND

NO.	DESCRIPTION	TOP ELEVATION	OBS LIGHTED
45	FAIRCHILD INDUSTRIAL PARK	282.6'	
46	FAIRCHILD INDUSTRIAL PARK	286.0'	
47	FAIRCHILD INDUSTRIAL PARK	266.0'	
48	FAIRCHILD INDUSTRIAL PARK	263.0'	
49	FAIRCHILD INDUSTRIAL PARK	262.0'	
50	FAIRCHILD INDUSTRIAL PARK	259.5'	
51	FAIRCHILD INDUSTRIAL PARK	259.0'	
52	FAIRCHILD INDUSTRIAL PARK	257.1'	
53	FAIRCHILD INDUSTRIAL PARK	267.3'	
54	PRIVATE EXECUTIVE HANGAR	301.5'	
55	K9 TRAINING FACILITY	283.5'	
A	FUTURE TERMINAL BUILDING	TBD	
B	FUTURE AIR CARGO BUILDING	TBD	
C	FUTURE AIRCRAFT RESCUE AND FIREFIGHTING BUILDING (ARFF)	TBD	
D	FUTURE MAINTENANCE BUILDING	TBD	
E	FUTURE BUSINESS LOCATION	TBD	
F	FUTURE FIXED BASED OPERATOR (FBO)	TBD	
G	FUTURE LARGE CORPORATE HANGARS	TBD	
H	FUTURE CORPORATE HANGARS	TBD	
J	FUTURE T-HANGARS	TBD	
K	FUTURE FAIRCHILD INDUSTRIAL PARK	TBD	

DRAWING LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
AVIGATION EASEMENT		
AIRPORT BUILDINGS		
AIRFIELD PAVEMENT		
BUILDING DEMO OR PAVEMENT REMOVED	N/A	
PAVED ROADS		
RUNWAY PROTECTION ZONE	RPZ	N/A
GLIDE PATH QUALIFICATION SURFACE	GQS	N/A
PART 77 APPROACH SURFACE	N/A	P77
BUILDING RESTRICTION LINE	BRL	
RUNWAY OBSTACLE FREE ZONE	OFZ	N/A
INNER APPROACH OBSTACLE FREE ZONE	IAOFZ	N/A
INNER TRANSITIONAL OBSTACLE FREE ZONE	ITOFZ	N/A
PRECISION OBSTACLE FREE ZONE		N/A
GLIDE SLOPE CRITICAL AREA	GCA	GCA
LOCALIZER CRITICAL AREA	LCA	N/A
ACTUAL RUNWAY SAFETY AREA	RSA	N/A
STANDARD RUNWAY SAFETY AREA	RSA	N/A
ACTUAL RUNWAY OBJECT FREE AREA	ROFA	N/A
STANDARD RUNWAY OBJECT FREE AREA	ROFA	N/A
AIRPORT SECURITY FENCE (8' HEIGHT)		
TAXIWAY/TAXILANE OBJECT FREE AREA	TOFA	TOFA
THRESHOLD SITING SURFACE	TSS	N/A
APRON/TAXIWAY/TAXILANE MARKING		
AIRPORT BEACON (EL. 313.08')	★	N/A
LIGHTED WIND CONE & SEGMENTED CIRCLE		N/A
VISUAL APPROACH SLOPE INDICATOR (VASI)	••	N/A
PRECISION APPROACH PATH INDICATOR (PAPI)	••••	■■■■
RUNWAY END IDENTIFIER LIGHTS (REIL)		N/A
AIRPORT REFERENCE POINT (ARP)		N/A
FUTURE CLOSED PAVEMENT MARKINGS	N/A	X

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WILLIAM R. FAIRCHILD INTERNATIONAL AIRPORT
AIRPORT LAYOUT PLAN

1402 FAIRCHILD AIRPORT RD
PORT ANGELES, WA 98363

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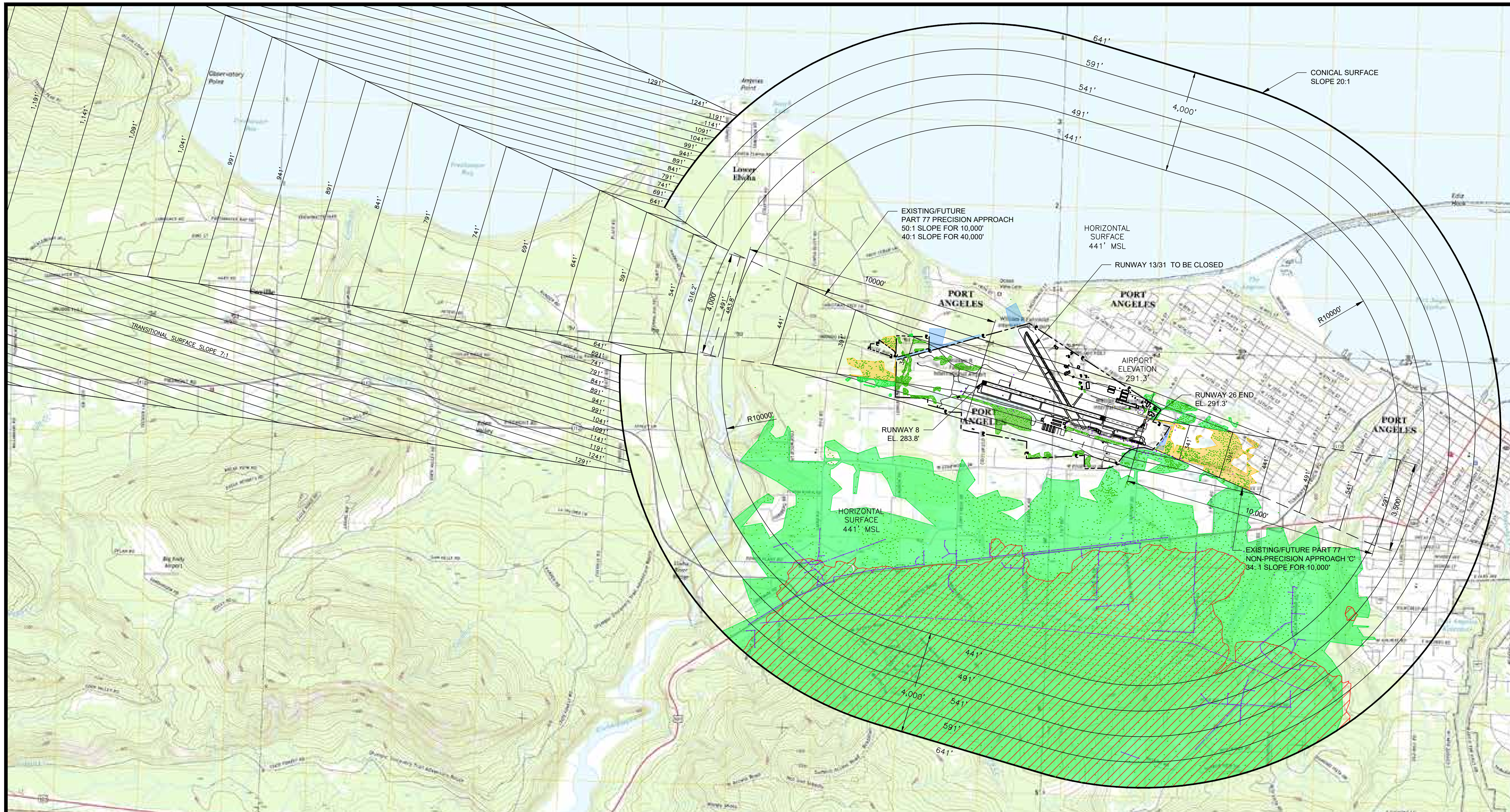
SHEET CONTENTS
AIRPORT LAYOUT DRAWING

SHEET NO.
3

PORT OF PORT ANGELES WASHINGTON

Exhibit 6-1. Airport Layout Drawing



USGS 7.5' QUADRANGLE COMPOSITE

OBSTRUCTION DATA

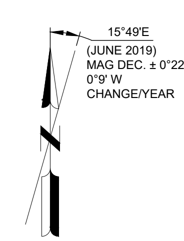
#	ITEM	ELEVATION (MSL)	PENETRATION	DISPOSITION
(red hatch)	GROUND	VARIES	VARIES	TO REMAIN
(green shading)	TREES	VARIES	VARIES	TO REMAIN
(yellow hatch)	TREES	(V) 308.9'–463.0'	(V) 12.2'–146.8'	TO BE REMOVED
(green hatch)	TREES	(V) 308.9'–463.0'	(V) 12.2'–146.8'	TO BE REMOVED

* OBSTRUCTIONS LISTED ARE ESTIMATES ONLY. FURTHER FIELD SURVEYS ARE REQUIRED TO IDENTIFY INDIVIDUAL OBSTRUCTIONS. ALL TREE OBSTRUCTIONS ON AIRPORT PROPERTY WILL BE REMOVED.

- = RED HATCH INDICATES AREAS IN WHICH TERRAIN PENETRATES IMAGINARY SURFACES
- = GREEN SHADING INDICATES AREAS IN WHICH TREES PENETRATE IMAGINARY SURFACES
- = YELLOW HATCH INDICATES TREE AREA OFF AIRPORT PROPERTY WITHIN APPROACH SURFACE TO BE REMOVED
- = GREEN HATCH INDICATES TREE AREAS ON AIRPORT PROPERTY TO BE REMOVED

NOTES:

1. ELEVATION IN FEET ABOVE MEAN SEA LEVEL (MSL) AT TOP OF OBJECT. THIS VALUE INCLUDES 15 FEET ADDED TO NON–INTERSTATE ROADWAYS, 17 FEET ADDED TO INTERSTATE HIGHWAYS, AND 23 FEET ADDED TO RAILROADS.
2. US GEOLOGICAL SURVEY (USGS) DIGITAL RASTER GRAPHIC (DRG) COMPOSITE FROM GEO PDFS DATED MARCH 2017.
3. OBSTRUCTION DATA SOURCE: AIRPORT AND AERONAUTICAL SURVEY IN ACCORDANCE WITH AC 150–5300–16, –17, AND –18 (2008); QUANTUM SPATIAL FEB 2016.
4. SEE INNER APPROACH DRAWINGS FOR DETAILS ON CLOSE–IN OBSTRUCTIONS.
5. CLALLAM COUNTY CODE, CHAPTER 33.08 ESTABLISHES LAND USES THAT ARE COMPATIBLE WITH THE CONTINUED AIRPORT OPERATIONS AND PROTECTS NAVIGABLE AIRSPACE FROM OBSTRUCTIONS WHICH ARE OF SUFFICIENT HEIGHT AS TO CONSTITUTE A DANGER TO AIRCRAFT FLIGHT.
6. 5,650 OBJECTS HAVE BEEN IDENTIFIED AS PART 77 OBSTRUCTIONS, 4,480 TREES AND 1,170 NON–TREES. 674 TREES ARE APPROACH SURFACES OBSTRUCTIONS AS WELL AS 22 NON–TREES. PLEASE REFER TO INNER APPROACH DRAWINGS FOR DETAILS.



0 2000 4000

REVISIONS

NO.	DESCRIPTION	DATE

DRAWING LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
AVIGATION EASEMENT		
AIRFIELD PAVEMENT		
PART 77 APPROACH SURFACE		P77
PART 77 APPROACH SURFACE (NON–CONTROLLING)		P77
POWER LINE		
TREE OBSTRUCTION		

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SHEET CONTENTS
AIRPORT AIRSPACE PLAN

SHEET NO.
4

Exhibit 6-2. Airport Airspace Plan Drawing

USGS 7.5' QUADRANGLE COMPOSITE

OBSTRUCTION DATA

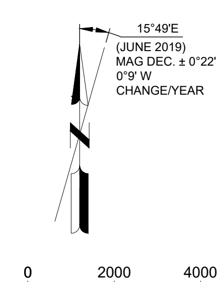
#	ITEM	ELEVATION (MSL)	PENETRATION	DISPOSITION
(red hatch)	GROUND	VARIES	VARIES	TO REMAIN
(green shading)	TREES	VARIES	VARIES	TO REMAIN
(yellow hatch)	TREES	(V) 308.9'–463.0'	(V) 12.2'–146.8'	TO BE REMOVED
(green hatch)	TREES	(V) 308.9'–463.0'	(V) 12.2'–146.8'	TO BE REMOVED

* OBSTRUCTIONS LISTED ARE ESTIMATES ONLY. FURTHER FIELD SURVEYS ARE REQUIRED TO IDENTIFY INDIVIDUAL OBSTRUCTIONS. ALL TREE OBSTRUCTIONS ON AIRPORT PROPERTY WILL BE REMOVED.

- = RED HATCH INDICATES AREAS IN WHICH TERRAIN PENETRATES IMAGINARY SURFACES
- = GREEN SHADING INDICATES AREAS IN WHICH TREES PENETRATE IMAGINARY SURFACES
- = YELLOW HATCH INDICATES TREE AREA OFF AIRPORT PROPERTY WITHIN APPROACH SURFACE TO BE REMOVED
- = GREEN HATCH INDICATES TREE AREAS ON AIRPORT PROPERTY TO BE REMOVED

NOTES:

1. ELEVATION IN FEET ABOVE MEAN SEA LEVEL (MSL) AT TOP OF OBJECT. THIS VALUE INCLUDES 15 FEET ADDED TO NON–INTERSTATE ROADWAYS, 17 FEET ADDED TO INTERSTATE HIGHWAYS, AND 23 FEET ADDED TO RAILROADS.
2. US GEOLOGICAL SURVEY (USGS) DIGITAL RASTER GRAPHIC (DRG) COMPOSITE FROM GEO PDFS DATED MARCH 2017.
3. OBSTRUCTION DATA SOURCE: AIRPORT AND AERONAUTICAL SURVEY IN ACCORDANCE WITH AC 150–5300–16, –17, AND –18 (2008); QUANTUM SPATIAL FEB 2016.
4. SEE INNER APPROACH DRAWINGS FOR DETAILS ON CLOSE–IN OBSTRUCTIONS.
5. CLALLAM COUNTY CODE, CHAPTER 33.08 ESTABLISHES LAND USES THAT ARE COMPATIBLE WITH THE CONTINUED AIRPORT OPERATIONS AND PROTECTS NAVIGABLE AIRSPACE FROM OBSTRUCTIONS WHICH ARE OF SUFFICIENT HEIGHT AS TO CONSTITUTE A DANGER TO AIRCRAFT FLIGHT.
6. 5,650 OBJECTS HAVE BEEN IDENTIFIED AS PART 77 OBSTRUCTIONS, 4,480 TREES AND 1,170 NON–TREES. 674 TREES ARE APPROACH SURFACES OBSTRUCTIONS AS WELL AS 22 NON–TREES. PLEASE REFER TO INNER APPROACH DRAWINGS FOR DETAILS.



REVISIONS

NO.	DESCRIPTION	DATE

DRAWING LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
AVIGATION EASEMENT		
AIRFIELD PAVEMENT		
PART 77 APPROACH SURFACE		P77
PART 77 APPROACH SURFACE (NON–CONTROLLING)		P77
POWER LINE		
TREE OBSTRUCTION		

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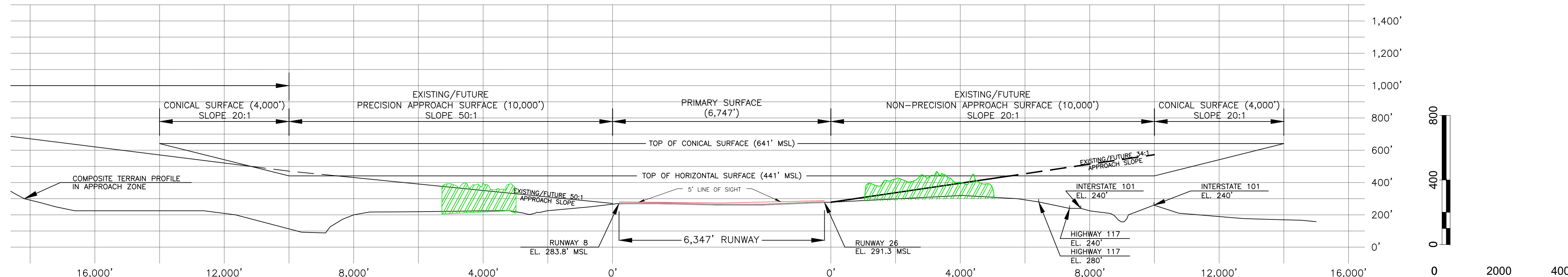
SHEET CONTENTS
AIRPORT AIRSPACE EXTENDED APPROACH PLAN

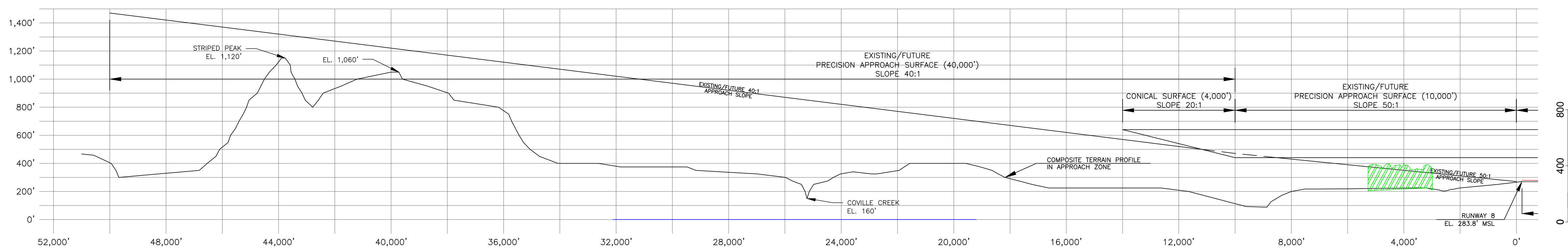
SHEET NO.
5

PORT OF PORT ANGELES WASHINGTON

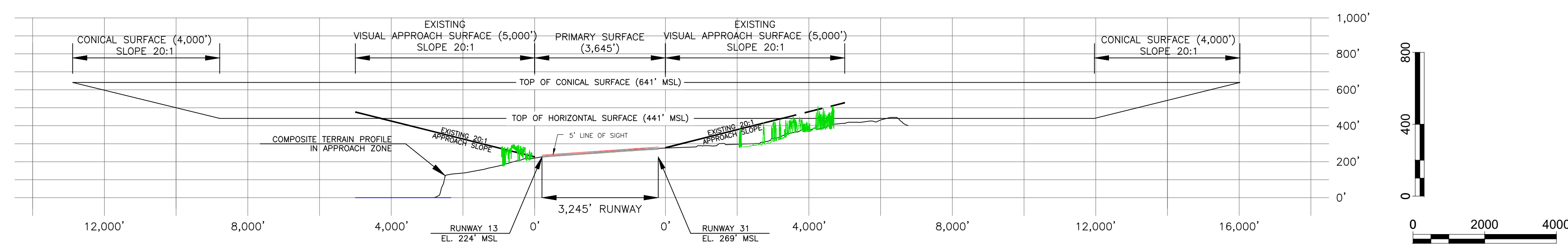
Exhibit 6-3. Airport Airspace Extended Approach Plan Drawing



RUNWAY 8/26 APPROACH PROFILES



RUNWAY 8 EXTENDED APPROACH PROFILE



RUNWAY 13/31 APPROACH PROFILES

NOTES:

1. ELEVATION IN FEET ABOVE MEAN SEA LEVEL (MSL) AT TOP OF OBJECT. THIS VALUE INCLUDES 15 FEET ADDED TO NON-INTERSTATE ROADWAYS, 17 FEET ADDED TO INTERSTATE HIGHWAYS, AND 23 FEET ADDED TO RAILROADS.
2. US GEOLOGICAL SURVEY (USGS) DIGITAL RASTER GRAPHIC (DRG) COMPOSITE FROM GEO PDFS DATED MARCH 2017.
3. OBSTRUCTION DATA SOURCE: AIRPORT AND AERONAUTICAL SURVEY IN ACCORDANCE WITH AC 150-5300-16, -17, AND -18 (2008); QUANTUM SPATIAL FEB 2016.
4. SEE INNER APPROACH DRAWINGS FOR DETAILS ON CLOSE-IN OBSTRUCTIONS.
5. CLALLAM COUNTY CODE, CHAPTER 33.08 ESTABLISHES LAND USES THAT ARE COMPATIBLE WITH THE CONTINUED AIRPORT OPERATIONS AND PROTECTS NAVIGABLE AIRSPACE FROM OBSTRUCTIONS WHICH ARE OF SUFFICIENT HEIGHT AS TO CONSTITUTE A DANGER TO AIRCRAFT FLIGHT.
6. 5,650 OBJECTS HAVE BEEN IDENTIFIED AS PART 77 OBSTRUCTIONS, 4,480 TREES AND 1,170 NON-TREES. 674 TREES ARE APPROACH SURFACES OBSTRUCTIONS AS WELL AS 22 NON-TREES. PLEASE REFER TO INNER APPROACH DRAWINGS FOR DETAILS.

REVISIONS

NO.	DESCRIPTION	DATE

DRAWING LEGEND

	EXISTING	FUTURE
PART 77 APPROACH SURFACE	————	—— P77 ——
PART 77 APPROACH SURFACE (NON-CONTROLLING)	— — — —	— — —P77 ——
TREE OBSTRUCTING AREA	(hatched)	

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SHEET CONTENTS
AIRPORT AIRSPACE
APPROACH PROFILES

SHEET NO.
6

PORT OF PORT ANGELES
WASHINGTON

Exhibit 6-4. Airport Airspace Approach Profiles Drawing

INNER PORTION OF THE APPROACH SURFACE DRAWINGS

Detailed drawings of the FAR Part 77 imaginary approach surfaces are provided in **Exhibits 6-5** through **6-8**. The drawings provide large-scale plan and profile views of the approach surface from each runway end to a distance where the approach surface reaches 100 feet above the runway end elevation. They are intended to facilitate identification of the roadways, structures, utility lines, vegetation, and other potential obstructions that may exist within the confines of the approach surface areas near the runway thresholds.

DEPARTURE SURFACE DRAWINGS

Runway Departure Surface Drawings are large-scale plan and profile illustrations depicting the dimensions and slopes of the imaginary surfaces associated with departure ends of the runway. Runways providing instrument departure capability should not have any objects penetrate the departure surface beginning at the elevation of the departure runway end at a slope of 40:1. Based on a 200-foot per nautical mile (NM) climb rate, a standard departure is designed to provide a minimum of 48 feet per NM clearance above objects that do not penetrated the Obstacle Clearance Surface (OCS). However, due to the size of the departure surface, it is not uncommon to have obstacles penetrate the surface, and recent changes to the Terminal Instrument Procedures (TERPS) criteria have made the OCS more restrictive.

The FAA has options for mitigating departure surface obstructions by requiring that non-standard climb rates and/or non-standard (i.e., higher) departure minimums be published for airports or individual runway ends. Runway 8 currently has non-standard takeoff minimums of 300 feet Above Ground Level (AGL) and one statute mile visibility minimums. Runway 13 has standard takeoff minimums but has a non-standard climb rate of 454 feet per NM to 1,100 feet AMSL. **Exhibit 6-9** presents the departure surfaces at CLM.

TERMINAL AREA PLAN

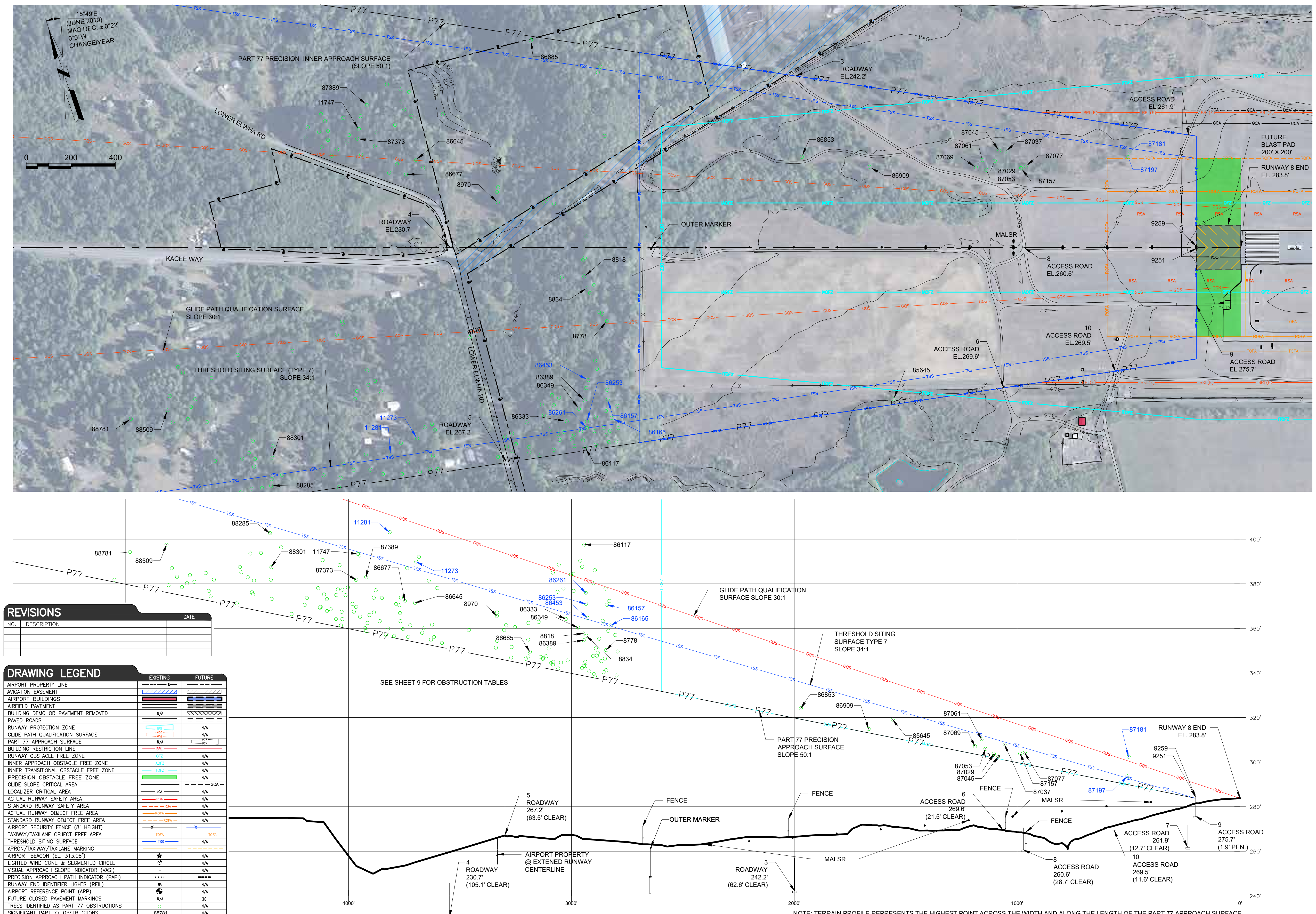
Exhibit 6-10 presents a detailed view of the terminal area at CLM. It provides a large-scale drawing of the existing and proposed terminal building, terminal apron, aircraft storage hangars, tie-down aprons, air cargo building, Aircraft Rescue and Fire Fighting (ARFF) facility, Fixed Base Operator (FBO) hangars and buildings, vehicle parking facilities, and roadways. It also provides dimensional criteria for apron sizes, layout of aircraft tie-downs, and clearance distances between runway, taxiways, and taxilanes centerlines with hangars, buildings, aircraft parking spaces, and other objects.

AIRPORT LAND USE PLAN

Exhibit 6-11 presents the recommended use of all land within the ultimate airport property line and near CLM. On-airport land use designations provide the Port to Port Angeles with a guide for leasing potential revenue-producing areas on the airport. All existing and future development will be compatible with the primary purpose and function of CLM and will generate lease revenue to support the operation of the airport. The off-airport land use designations provide guidance to local authorities for establishing appropriate land use zoning near the airport. FAA Grant Assurance #21, entitled Compatible Land Use, states, "The Airport Sponsor will take appropriate action, to the extent reasonable including the adoption of zoning laws, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft."

AIRPORT PROPERTY MAP

Exhibit 6-12 provides how various parcels of land within the airport property line were acquired (e.g., either from federal funds, surplus property, local funds, or other means) and the dates of acquisition. The purpose is to provide documentation of the current and future aeronautical use of land acquired with federal funds and to identify parcels recommended for future acquisition or release. According to existing property records, there are a total of 809.5 acres of fee simple property owned by the Port of Port Angeles designated as airport property, with some additional 26.2 acres of property having an avigation easement. No future property acquisition is recommended, nor is the release of excess property.



REVISIONS

NO.	DESCRIPTION	DATE

DRAWING LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
AVIGATION EASEMENT		
AIRPORT BUILDINGS		
AIRFIELD PAVEMENT		
BUILDING DEMO OR PAVEMENT REMOVED	N/A	
PAVED ROADS		
RUNWAY PROTECTION ZONE	RPZ	N/A
GLIDE PATH QUALIFICATION SURFACE	GQS	N/A
PART 77 APPROACH SURFACE	N/A	P77
BUILDING RESTRICTION LINE	BRL	
RUNWAY OBSTACLE FREE ZONE	OFZ	N/A
INNER APPROACH OBSTACLE FREE ZONE	IAOFZ	N/A
INNER TRANSITIONAL OBSTACLE FREE ZONE	ITOFZ	N/A
PRECISION OBSTACLE FREE ZONE		N/A
GLIDE SLOPE CRITICAL AREA		GCA
LOCALIZER CRITICAL AREA	LCA	N/A
ACTUAL RUNWAY SAFETY AREA	RSA	N/A
STANDARD RUNWAY SAFETY AREA	RSA	N/A
ACTUAL RUNWAY OBJECT FREE AREA	ROFA	N/A
STANDARD RUNWAY OBJECT FREE AREA	ROFA	N/A
AIRPORT SECURITY FENCE (8' HEIGHT)		
TAXIWAY/TAXILANE OBJECT FREE AREA	TOFA	TOFA
THRESHOLD SITING SURFACE	TSS	N/A
APRON/TAXIWAY/TAXILANE MARKING		
AIRPORT BEACON (EL. 313.08')		N/A
LIGHTED WIND CONE & SEGMENTED CIRCLE		N/A
VISUAL APPROACH SLOPE INDICATOR (VASI)		N/A
PRECISION APPROACH PATH INDICATOR (PAPI)		
RUNWAY END IDENTIFIER LIGHTS (REIL)		N/A
AIRPORT REFERENCE POINT (ARP)		N/A
FUTURE CLOSED PAVEMENT MARKINGS	N/A	
TREES IDENTIFIED AS PART 77 OBSTRUCTIONS		N/A
SIGNIFICANT PART 77 OBSTRUCTIONS	88781	N/A
SIGNIFICANT TSS AND PART 77 OBSTRUCTIONS	11747	N/A

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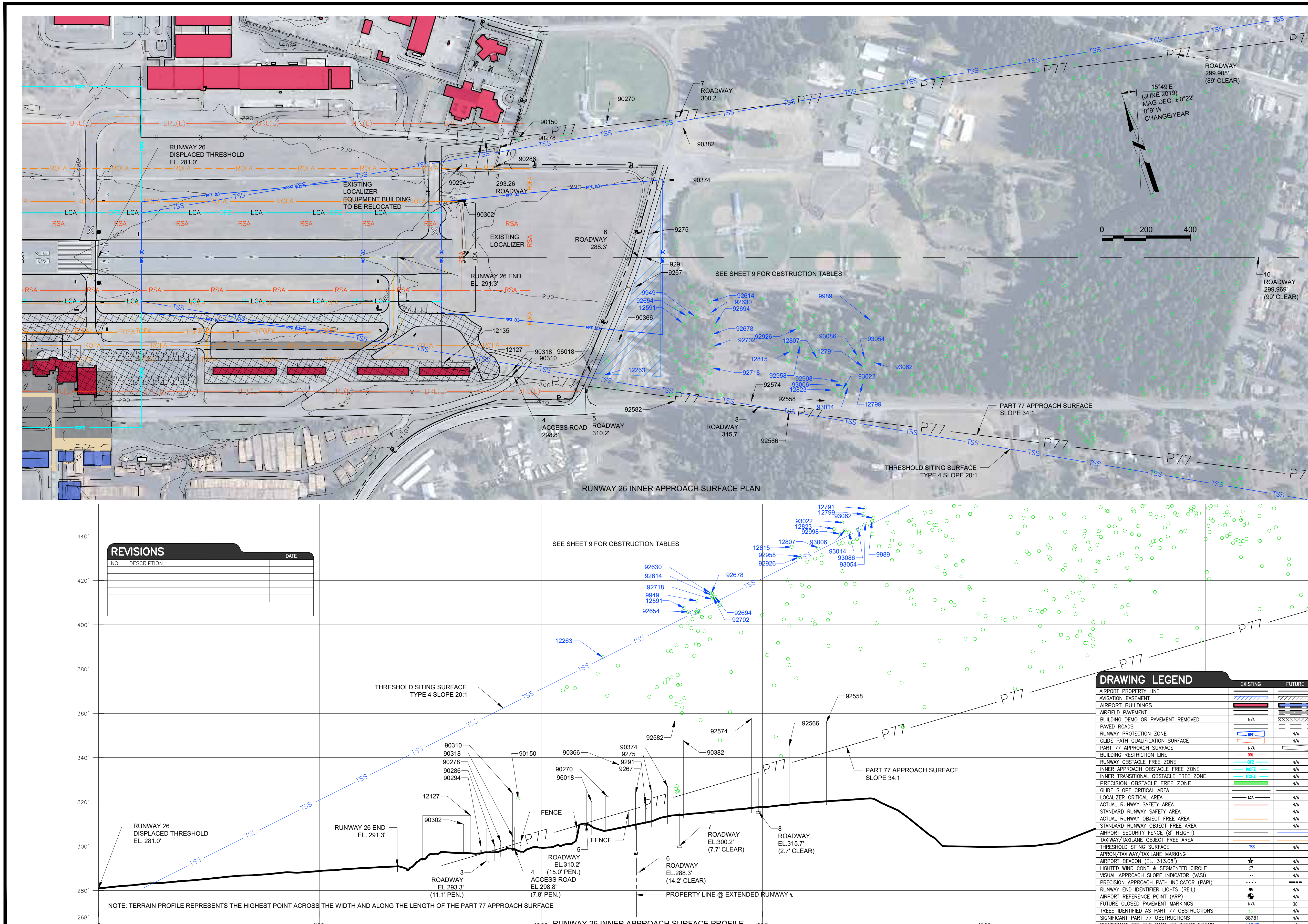
SHEET CONTENTS
INNER PORTION OF THE APPROACH SURACE RUNWAY 8

SHEET NO.
7

Exhibit 6-5. Inner Portion of the Approach Surface Runway 8 Drawing



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SHEET CONTENTS
INNER PORTION OF THE APPROACH SURACE RUNWAY 26

SHEET NO.
8

Exhibit 6-6. Inner Portion of the Approach Surface Runway 26 Drawing

RUNWAY 8 PART 77 APPROACH SURFACE OBSTRUCTIONS

NUMBER	DESCRIPTION	TOP ELEVATION	PENETRATION	HEIGHT ABOVE GROUND	GROUND ELEVATION	DISPOSTION
8818	TREE	357.673	19	119.023	238.65	REMOVE
9251	NAVAID	284.425	1	3.001	281.424	LIGHTED
9259	NAVAID	284.425	1	3.055	281.37	LIGHTED
11281	TREE	403.099	47	151.979	251.12	REMOVE
11747	TREE	393.351	34	174.671	218.68	REMOVE
85645	TREE	319.055	8	49.785	269.27	REMOVE
86117	TREE	397.523	59	132.183	265.34	REMOVE
86261	TREE	375.788	37	113.468	262.32	REMOVE
86685	TREE	349.497	6	152.427	197.07	REMOVE
86853	TREE	324.151	5	69.341	254.81	REMOVE
86909	TREE	314.87	2	51.87	263	REMOVE
87029	TREE	303.732	2	38.912	264.82	REMOVE
87037	TREE	307.85	7	44.6	263.25	REMOVE
87045	TREE	302.45	1	39.32	263.13	REMOVE
87053	TREE	305.96	3	39.77	266.19	REMOVE
87061	TREE	310.212	7	45.862	264.35	REMOVE
87069	TREE	307.04	3	41.73	265.31	REMOVE
87077	TREE	304.272	5	37.972	266.3	REMOVE
87157	TREE	303.8	4	36.92	266.88	REMOVE
87181	TREE	302.416	13	39.276	263.14	REMOVE
87197	TREE	293.573	4	29.043	264.53	REMOVE
88285	TREE	402.62	36	127.66	274.96	REMOVE
88509	TREE	397.49	21	122.51	274.98	REMOVE
88781	TREE	394.25	15	119.27	274.98	REMOVE

NOTE: THIS TABLE ONLY SHOWS SIGNIFICANT OBJECTS. A TOTAL OF 168 TREE OBSTRUCTIONS WITHIN PART 77 APPROACH SURFACE TO BE REMOVED.

RUNWAY 8 THRESHOLD SITING SURFACE OBSTRUCTIONS

NUMBER	DESCRIPTION	TOP ELEVATION	PENETRATION	HEIGHT ABOVE GROUND	GROUND ELELVATION	DISPOSITION
9251	NAVAID	284.425	1	3.001	281.424	LIGHTED
9259	NAVAID	284.425	1	3.055	281.37	LIGHTED
11281	TREE	403.099	13	151.979	251.12	REMOVE
11273	TREE	389.9	3	135.8	254.10	REMOVE
86157	TREE	370.523	9	115.023	255.50	REMOVE
86165	TREE	361.276	0	101.876	259.40	REMOVE
86253	TREE	370.996	7	110.596	260.40	REMOVE
86261	TREE	375.788	12	113.798	261.99	REMOVE
86453	TREE	364.651	1	113.651	251.00	REMOVE
87181	TREE	302.416	10	39.276	263.14	REMOVE
87197	TREE	293.573	1	29.043	264.53	REMOVE

NOTE: THIS TABLE SHOWS ALL IDENTIFIED THRESHOLD SITING SURFACE OBSTRUCTIONS.

RUNWAY 8 GLIDEPATH QUALIFICATION SURFACE

NO GQS OBSTRUCTION IDENTIFIED

RUNWAY 26 PART 77 APPROACH SURFACE OBSTRUCTIONS

NUMBER	DESCRIPTION	TOP ELEVATION	PENETRATION	HEIGHT ABOVE GROUND	GROUND ELEVATION	DISPOSITION
8778	TREE	350.27	14	106.27	244.00	REMOVE
8834	TREE	356.655	18	116.255	240.40	REMOVE
8970	TREE	365.479	19	137.179	228.30	REMOVE
9267	POLE	323.704	7	34.733	288.97	TO BE LIGHTED
9275	POLE	324.796	6	37.359	287.44	TO BE LIGHTED
9291	UTILITY_LINE	319.235	1	31.463	287.77	MARKED
9949	TREE	410.831	86	115.431	295.40	REMOVE
9989	TREE	446.91	98	147.21	299.70	REMOVE
11273	TREE	389.9	36	135.8	254.10	REMOVE
12127	BUILDING	313.962	19	16.549	297.41	REMOVE
12135	GROUND	297.373	6	0	297.37	REMOVE
12263	TREE	385.297	73	80.797	304.50	REMOVE
12591	TREE	407.548	84	111.848	295.70	REMOVE
12791	TREE	452.465	105	152.565	299.90	REMOVE
12799	TREE	449.865	103	146.565	303.30	REMOVE
12807	TREE	434.75	94	134.85	299.90	REMOVE
12815	TREE	435.139	97	135.339	299.80	REMOVE
12823	TREE	443.246	100	136.146	307.10	REMOVE
86157	TREE	370.523	34	115.023	255.50	REMOVE
86165	TREE	361.276	25	101.876	259.40	REMOVE
86253	TREE	370.996	33	110.596	260.40	REMOVE
86261	TREE	375.788	37	113.488	262.30	REMOVE
86333	TREE	364.178	24	104.378	259.80	REMOVE
86349	TREE	360.331	21	103.331	257.00	REMOVE
86389	TREE	354.661	16	99.661	255.00	REMOVE
86453	TREE	364.651	26	113.651	251.00	REMOVE
86645	TREE	371.468	18	147.168	224.30	REMOVE
86677	TREE	372.211	17	146.911	225.30	REMOVE
87301	TREE	370.321	15	97.521	272.80	REMOVE
87373	TREE	381.728	23	159.828	221.90	REMOVE
87389	TREE	382.943	25	170.843	212.10	REMOVE
90150	TREE	321.525	20	27.425	294.10	REMOVE
90270	BUILDING	322.571	9	18.967	303.60	TO BE LIGHTED
90278	FENCE	302.085	3	8.505	293.58	TO BE LIGHTED
90286	FENCE	299.992	2	8.134	291.86	TO BE LIGHTED
90294	FENCE	299.587	3	6.75	292.84	TO BE LIGHTED
90302	ANTENNA	309.915	16	18.967	290.95	TO BE RELOCATED
90310	POLE	323.887	23	25.853	298.03	TO BE LIGHTED
90318	FENCE	304.143	3	7.594	296.55	TO BE LIGHTED
90366	POLE	336.78	22	42.221	294.56	TO BE LIGHTED
90374	POLE	326.857	6	36.754	290.10	TO BE LIGHTED
90382	POLE	347.647	24	49.511	298.14	TO BE LIGHTED
92558	POLE	355.95	14	51.705	304.25	TO BE LIGHTED
92566	POLE	345.285	8	38.103	307.18	TO BE LIGHTED
92574	POLE	357.57	25	52.11	305.46	TO BE LIGHTED
92582	POLE	356.827	35	51.975	304.85	TO BE LIGHTED
92614	TREE	413.493	87	118.693	294.80	REMOVE
92630	TREE	414.506	88	119.106	295.40	REMOVE
92654	TREE	405.798	82	110.998	294.80	REMOVE

NOTE: THIS TABLE ONLY SHOWS SIGNIFICANT OBJECS. A TOTAL OF 506 TREE OBSTRUCTIONS WITHIN PART 77 APPROACH SURFACE TO BE REMOVED.

RUNWAY 26 THRESHOLD SITING SURFACE OBSTRUCTIONS

NUMBER	DESCRIPTION	TOP ELEVATION	PENETRATION	HEIGHT ABOVE GROUND	GROUND ELEVATION	DISPOSTION
9949	TREE	410.831	5	115.43	295.40	REMOVE
9989	TREE	446.91	1	147.21	299.70	REMOVE
12263	TREE	385.297	0	80.80	304.50	REMOVE
12591	TREE	407.548	4	111.85	295.70	REMOVE
12791	TREE	452.465	8	152.57	299.90	REMOVE
12799	TREE	449.865	6	146.57	303.30	REMOVE
12807	TREE	434.75	1	134.85	299.90	REMOVE
12815	TREE	435.139	7	135.34	299.80	REMOVE
12823	TREE	443.246	6	136.15	307.10	REMOVE
92614	TREE	413.493	4	118.69	294.80	REMOVE
92630	TREE	414.506	5	119.11	295.40	REMOVE
92654	TREE	405.798	1	111.00	294.80	REMOVE
92678	TREE	414.303	5	116.90	297.40	REMOVE
92694	TREE	412.548	2	116.15	296.40	REMOVE
92702	TREE	412.413	2	114.21	298.20	REMOVE
92718	TREE	411.468	2	109.17	302.30	REMOVE
92926	TREE	430.301	1	130.60	299.70	REMOVE
92958	TREE	430.908	1	131.11	299.80	REMOVE
92998	TREE	440.966	2	137.27	303.70	REMOVE
93006	TREE	442.788	3	137.79	305.00	REMOVE
93014	TREE	441.708	1	136.71	305.00	REMOVE
93022	TREE	446.163	7	138.96	307.20	REMOVE
93054	TREE	445.623	1	145.72	299.90	REMOVE
93062	TREE	448.188	2	148.29	299.90	REMOVE
93086	TREE	442.923	0	143.02	299.90	REMOVE

NOTE: THIS TABLE SHOWS ALL IDENTIFIED THRESHOLD SITING SURFACE OBSTRUCTIONS.

NOTE: OBSTRUCTION DATA SOURCE: AIRPORT AND AERONAUTICAL SURVEY IN ACCORDANCE WITH AC 150-5300-16, -17, AND -18 (2008); QUANTUM SPATIAL FEB 2016

REVISIONS

NO.	DESCRIPTION	DATE

DRAWING LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
AVIGATION EASEMENT		
AIRPORT BUILDINGS		
AIRFIELD PAVEMENT		
BUILDING DEMO OR PAVEMENT REMOVED		
PAVED ROADS		
RUNWAY PROTECTION ZONE	RPZ (E)	RPZ (F)
GLIDE PATH QUALIFICATION SURFACE	GQS	
PART 77 APPROACH SURFACE		P77
BUILDING RESTRICTION LINE	BRL (E)	BRL (F)
RUNWAY OBSTACLE FREE ZONE	OFZ (E)	OFZ (F)
INNER APPROACH OBSTACLE FREE ZONE	IAOFZ	IAOFZ (F)
INNER TRANSITIONAL OBSTACLE FREE ZONE	ITOFZ	ITOFZ (F)
PRECISION OBSTACLE FREE ZONE		
GLIDE SLOPE CRITICAL AREA	GSCA	
LOCALIZER CRITICAL AREA	LCA	
RUNWAY SAFETY AREA	RSA	RSA
RUNWAY OBJECT FREE AREA	ROFA	ROFA
AIRPORT SECURITY FENCE (8' HEIGHT)	x	x
TAXIWAY/TAXILANE OBJECT FREE AREA	TOFA (E)	TOFA (F)
THRESHOLD SITING SURFACE	TSS (E)	TSS (F)
APRON/TAXIWAY/TAXILANE MARKING		
AIRPORT BEACON		
LIGHTED WIND CONE & SEGMENTED CIRCLE		
PRECISION APPROACH PATH INDICATOR (PAPI)		
RUNWAY END IDENTIFIER LIGHTS (REIL)		
AIRPORT REFERENCE POINT (ARP)		
TREES		

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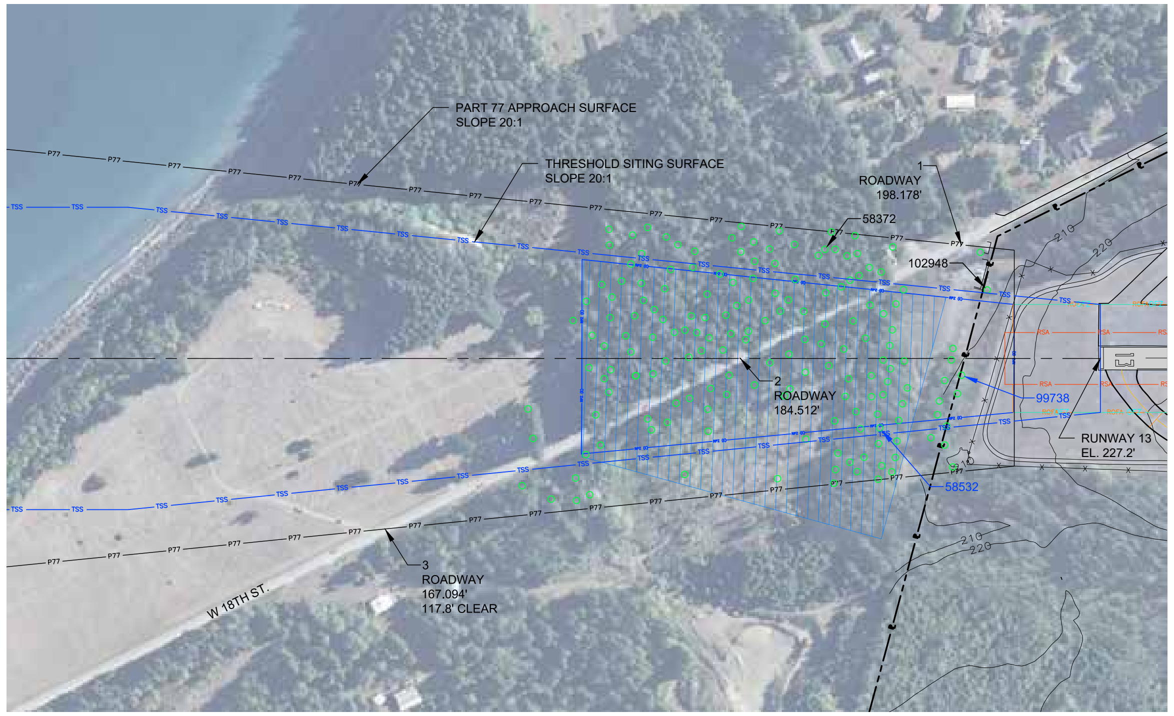
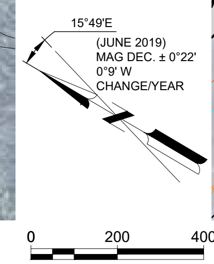
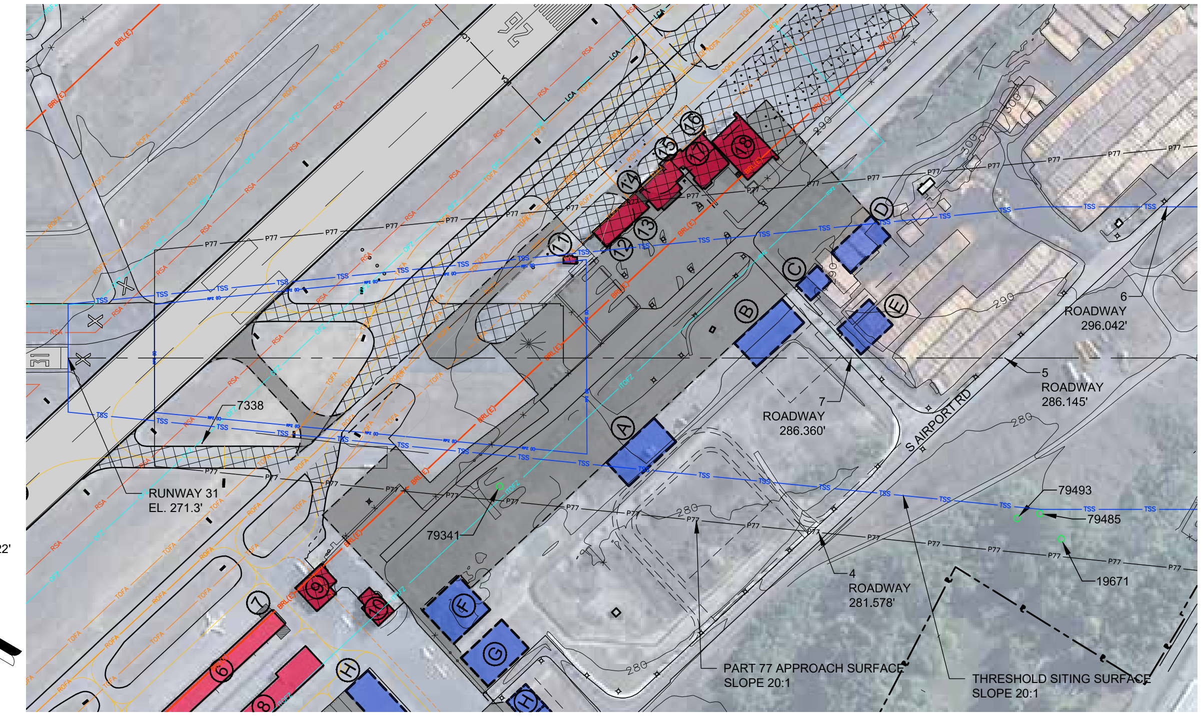
SHEET CONTENTS
APPROACH OBSTRUCTION TABLES

SHEET NO.
9

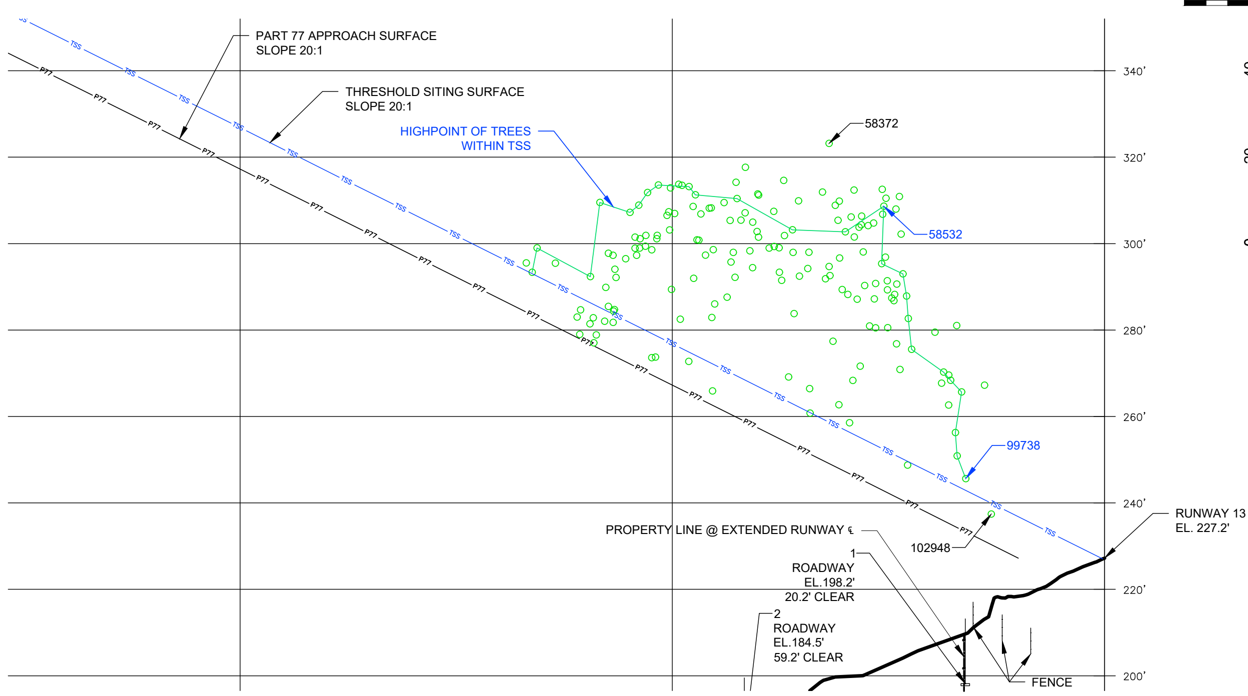


RUNWAY 13 INNER APPROACH SURFACE PLAN

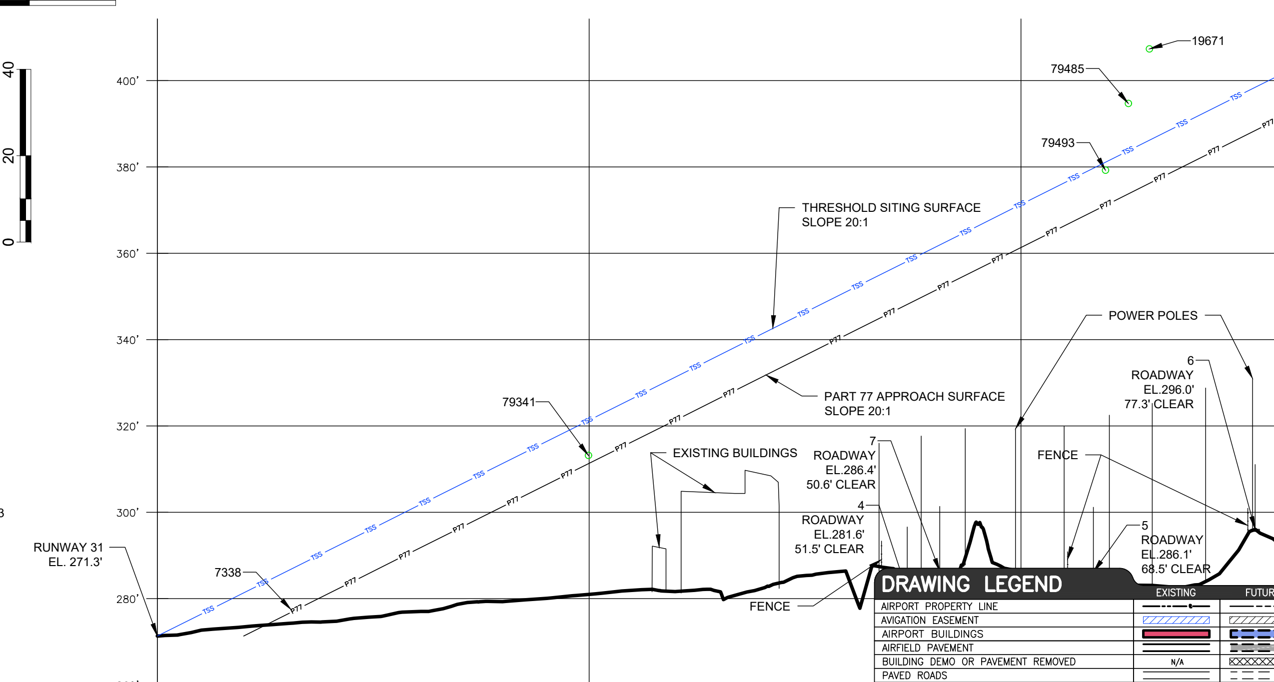




RUNWAY 31 INNER APPROACH SURFACE PLAN



RUNWAY 13 INNER APPROACH SURFACE PROFILE



RUNWAY 31 INNER APPROACH SURFACE PROFILE

NOTE: TERRAIN PROFILE REPRESENTS THE HIGHEST POINT ACROSS THE WIDTH AND ALONG THE LENGTH OF THE PART 77 APPROACH SURFACE

RUNWAY 13 PART 77 APPROACH SURFACE OBSTRUCTIONS

NUMBER	DESCRIPTION	TOP ELEVATION	PENETRATION	HEIGHT ABOVE GROUND	GROUND ELEVATION	DISPOSITION
58372	TREE	323.182	74	145.212	177.97	REMOVE
102948	TREE	237.413	7	30.963	206.45	REMOVE

NOTE: THIS TABLE ONLY SHOWS SIGNIFICANT OBJECTS. A TOTAL OF 168 TREE OBSTRUCTIONS WITHIN PART 77 APPROACH SURFACE TO BE REMOVED.

RUNWAY 13 THRESHOLD SITING SURFACE OBSTRUCTIONS

NUMBER	DESCRIPTION	TOP ELEVATION	PENETRATION	HEIGHT ABOVE GROUND	GROUND ELEVATION	DISPOSITION
58532	TREE	308.656	66	102.546	206.11	REMOVE
99738	TREE	245.615	12	33.465	212.15	REMOVE

NOTE: THIS TABLE ONLY SHOWS SIGNIFICANT OBJECTS. A TOTAL OF 110 TREE OBSTRUCTIONS WITHIN THRESHOLD SITING SURFACE TO BE REMOVED.

RUNWAY 31 PART 77 APPROACH SURFACE OBSTRUCTIONS

NUMBER	DESCRIPTION	TOP ELEVATION	PENETRATION	HEIGHT ABOVE GROUND	GROUND ELEVATION	DISPOSITION
7338	RUNWAY_LIGHT	277.434	1	1.474	275.96	TO REMAIN
19671	TREE	407.33	31	124.53	282.8	REMOVE
79341	TREE	313.148	2	33.598	279.55	REMOVE
79485	TREE	394.688	21	113.158	281.53	REMOVE
79493	TREE	379.231	8	99.111	280.12	REMOVE

NOTE: NO THRESHOLD SITING OBSTRUCTIONS HAVE BEEN IDENTIFIED.

RUNWAY 13/31 TO BE CLOSED

REVISIONS

NO.	DESCRIPTION	DATE

DRAWING LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
AVIGATION EASEMENT		
AIRPORT BUILDINGS		
AIRFIELD PAVEMENT		
BUILDING DEMO OR PAVEMENT REMOVED	N/A	
PAVED ROADS		
RUNWAY PROTECTION ZONE	RPZ	N/A
GLIDE PATH QUALIFICATION SURFACE	GQS	N/A
PART 77 APPROACH SURFACE	N/A	P77
BUILDING RESTRICTION LINE	BRL	
RUNWAY OBSTACLE FREE ZONE	OFZ	N/A
INNER APPROACH OBSTACLE FREE ZONE	IAOFZ	N/A
INNER TRANSITIONAL OBSTACLE FREE ZONE	ITOFZ	N/A
PRECISION OBSTACLE FREE ZONE		N/A
GLIDE SLOPE CRITICAL AREA	GCA	GCA
LOCALIZER CRITICAL AREA	LCA	N/A
RUNWAY SAFETY AREA	RSA	RSA
RUNWAY OBJECT FREE AREA	ROFA	ROFA
AIRPORT SECURITY FENCE (8' HEIGHT)		
TAXIWAY/TAXILANE OBJECT FREE AREA	TOFA	TOFA
THRESHOLD SITING SURFACE	TSS	N/A
APRON/TAXIWAY/TAXILANE MARKING		
AIRPORT BEACON (EL. 313.08')		N/A
LIGHTED WIND CONE & SEGMENTED CIRCLE		N/A
VISUAL APPROACH SLOPE INDICATOR (VASI)		N/A
PRECISION APPROACH PATH INDICATOR (PAPI)		
RUNWAY END IDENTIFIER LIGHTS (REIL)		N/A
AIRPORT REFERENCE POINT (ARP)		N/A
FUTURE CLOSED PAVEMENT MARKINGS	N/A	X
TREES IDENTIFIED AS PART 77 OBSTRUCTIONS		N/A
SIGNIFICANT PART 77 OBSTRUCTIONS	88781	N/A
SIGNIFICANT TSS AND PART 77 OBSTRUCTIONS	11747	N/A

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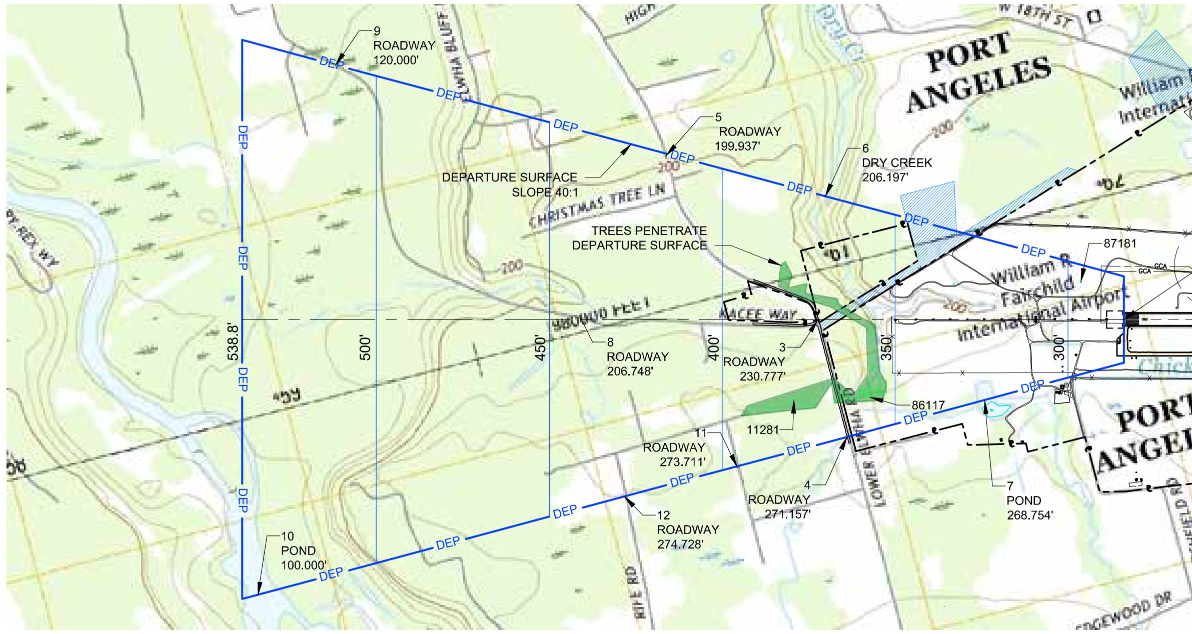
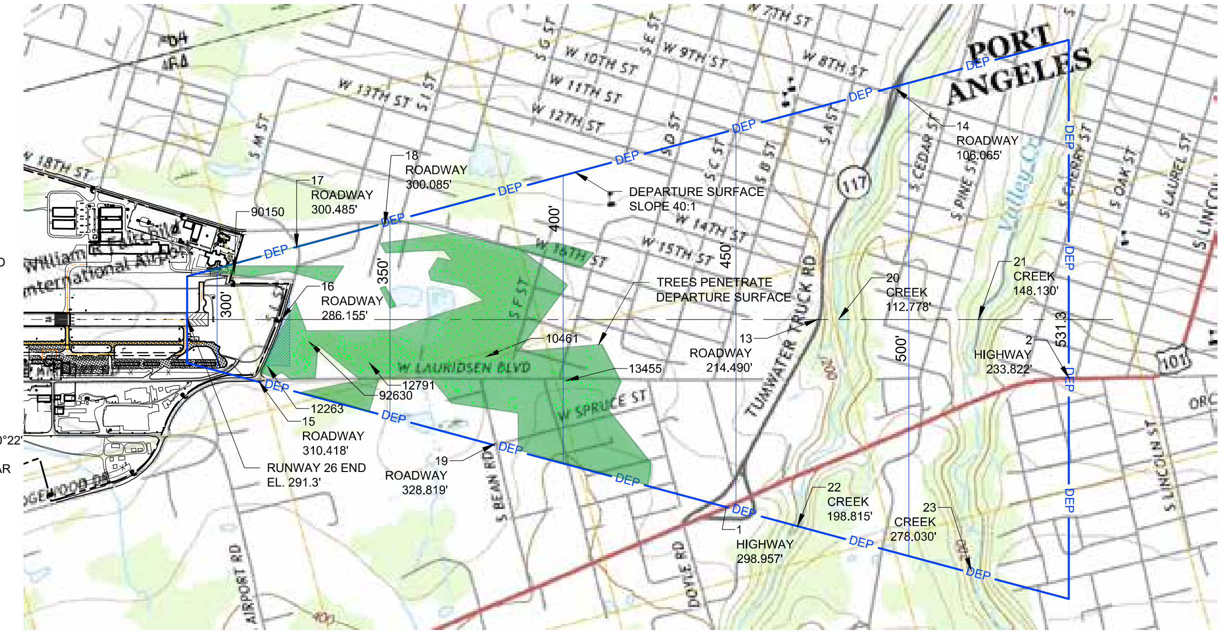
SHEET CONTENTS
INNER PORTION OF THE APPROACH RUNWAY 13-31

SHEET NO.
10

Exhibit 6-8. Inner Portion of the Approach Surface Runway 13/31 Drawing



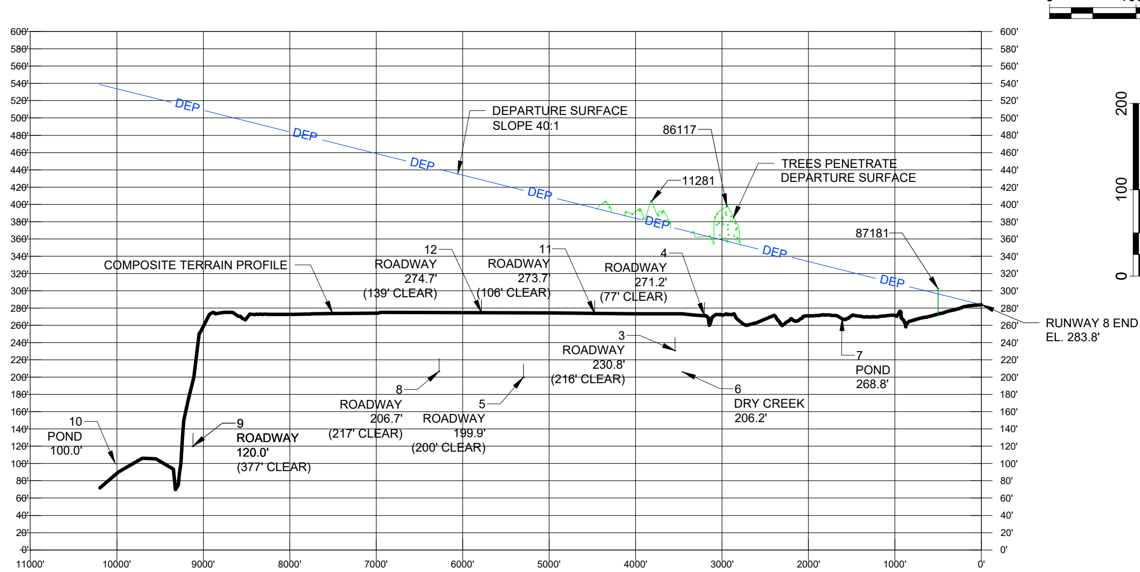
RUNWAY 26 DEPARTURE SURFACE PLAN



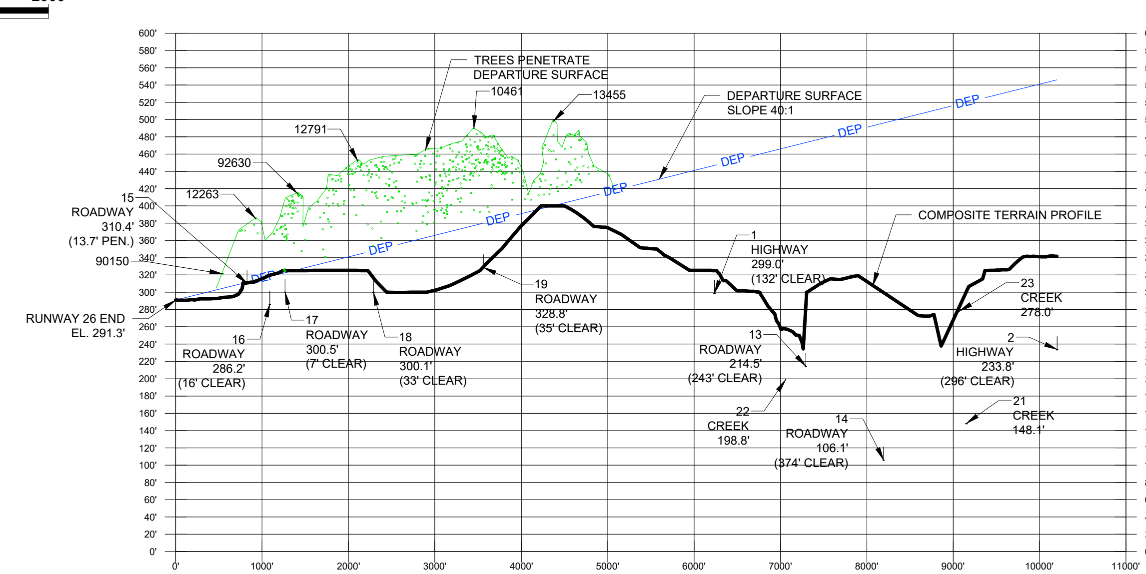
0 1000 2000

RUNWAY 8 DEPARTURE SURFACE PLAN

USGS 7.5' QUADRANGLE COMPOSITE



RUNWAY 26 DEPARTURE SURFACE PROFILE



RUNWAY 8 DEPARTURE SURFACE PROFILE

RUNWAY 26 DEPARTURE SURFACE OBSTRUCTIONS

NUMBER	DESCRIPTION	TOP ELEVATION	PENETRATION	HEIGHT ABOVE GROUND	GROUND ELEVATION	DISPOSITION
11281	TREE	403.099	23.9	151.1	252	REMOVE
86117	TREE	397.523	40.2	130.5	267	REMOVE
87181	TREE	302.416	6.1	39.4	263	REMOVE

NOTE: THIS TABLE ONLY SHOWS SIGNIFICANT OBJECTS. A TOTAL OF 42 TREE OBSTRUCTIONS WITHIN DEPARTURE SURFACE TO BE REMOVED.

RUNWAY 8 DEPARTURE SURFACE OBSTRUCTIONS

NUMBER	DESCRIPTION	TOP ELEVATION	PENETRATION	HEIGHT ABOVE GROUND	GROUND ELEVATION	DISPOSITION
15	ROADWAY	310.481	13.7	15.0	310.481	TO REMAIN
10461	TREE	489.663	112.0	175.9	313.8	REMOVE
12263	TREE	385.297	70.8	79.4	305.9	REMOVE
12791	TREE	452.465	108	152.57	299.90	REMOVE
13455	TREE	498.078	97	146.78	351.3	REMOVE
90150	TREE	321.525	17	27.33	294.2	REMOVE
92630	TREE	414.506	88	120.0	294.5	REMOVE

NOTE: THIS TABLE ONLY SHOWS SIGNIFICANT OBJECTS. A TOTAL OF 501 TREE OBSTRUCTIONS WITHIN DEPARTURE SURFACE TO BE REMOVED.

NOTES:

1. ELEVATION IN FEET ABOVE MEAN SEA LEVEL (MSL) AT TOP OF OBJECT. THIS VALUE INCLUDES 15 FEET ADDED TO NON-INTERSTATE ROADWAYS, 17 FEET ADDED TO INTERSTATE HIGHWAYS, AND 23 FEET ADDED TO RAILROADS.
2. US GEOLOGICAL SURVEY (USGS) DIGITAL RASTER GRAPHIC (DRG) COMPOSITE FROM GEO PDFS DATED MARCH 2017.
3. OBSTRUCTION DATA SOURCE: AIRPORT AND AERONAUTICAL SURVEY IN ACCORDANCE WITH AC 150-5300-16, -17, AND -18 (2008); QUANTUM SPATIAL FEB 2016.
4. SEE INNER APPROACH DRAWINGS FOR DETAILS ON CLOSE-IN OBSTRUCTIONS.
5. CLALLAM COUNTY CODE, CHAPTER 33.08 ESTABLISHES LAND USES THAT ARE COMPATIBLE WITH THE CONTINUED AIRPORT OPERATIONS AND PROTECTS NAVIGABLE AIRSPACE FROM OBSTRUCTIONS WHICH ARE OF SUFFICIENT HEIGHT AS TO CONSTITUTE A DANGER TO AIRCRAFT FLIGHT.
6. 5,650 OBJECTS HAVE BEEN IDENTIFIED AS PART 77 OBSTRUCTIONS, 4,480 TREES AND 1,170 NON-TREES. 674 TREES ARE APPROACH SURFACES OBSTRUCTIONS AS WELL AS 22 NON-TREES. PLEASE REFER TO INNER APPROACH DRAWINGS FOR DETAILS.

REVISIONS

NO.	DESCRIPTION	DATE

DRAWING LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
AVIGATION EASEMENT		
AIRPORT BUILDINGS		
AIRFIELD PAVEMENT		
BUILDING DEMO OR PAVEMENT REMOVED		
PAVED ROADS		
DEPARTURE SURFACE		
APRON/TAXIWAY/TAXILANE MARKING		
TREE OBSTRUCTIONS TO DEPARTURE SURFACE		
TREES		

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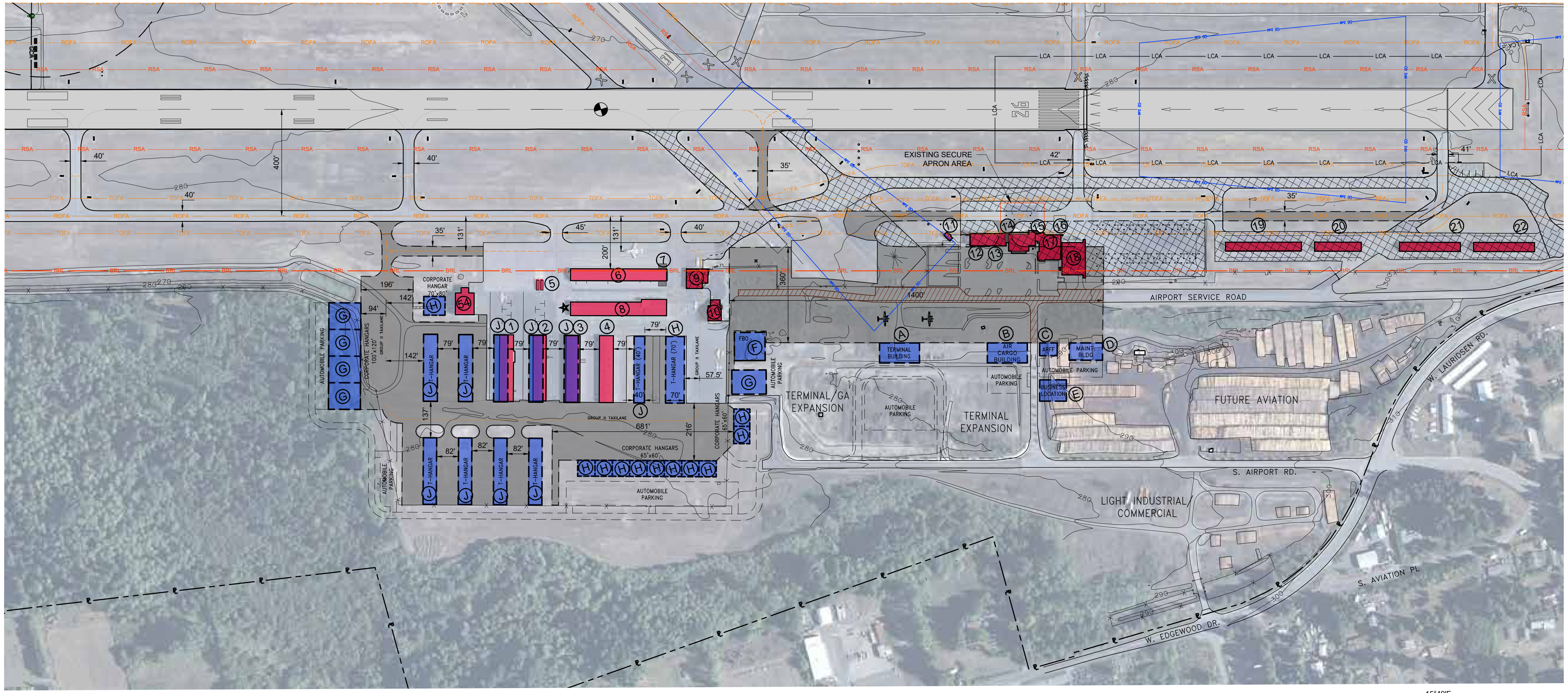
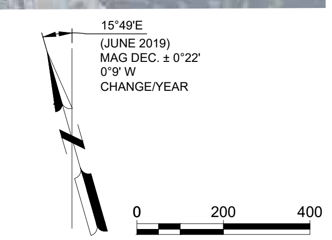
SHEET CONTENTS
RUNWAY 8-26 DEPARTURE SURFACES

SHEET NO.
11

Exhibit 6-9. Runway 8/26 Departure Surfaces Drawing





BUILDING LEGEND

NO.	DESCRIPTION	TOP ELEVATION	OBS LIGHTED
1	PRIVATE T-HANGAR	298.3'	
2	PRIVATE T-HANGAR	295.5'	
3	PRIVATE T-HANGAR	299.3'	
4	PRIVATE T-HANGAR	297.9'	
5	FUEL STORAGE FACILITY	–	
6	T-SHADE	299.18'	
7	FIRE STATION	299.18'	
8	T-HANGAR	298.7'	
9	FBO – (RITE BROTHERS AVIATION)	296.89'	
10	FBO – (RITE BROTHERS AVIATION)	303.6'	
11	FAA EQUIPMENT BUILDING	299.48'	
12	GA HANGAR	311.58'	
13	GA HANGAR	311.58'	
14	TERMINAL BUILDING	315.50'	
15	U.S. CUSTOMS	315.50'	
16	U.S. CUSTOMS AIRCRAFT PARKING	–	
17	FBO MAINTENANCE HANGAR	325.98'	
18	FEDEX	323.72'	
19	T-HANGAR	315.6'	
20	T-HANGAR	314.0'	
21	T-HANGAR	312.7'	
22	T-HANGAR	312.5'	

BUILDING LEGEND

NO.	DESCRIPTION	TOP ELEVATION	OBS LIGHTED
54	PRIVATE EXECUTIVE HANGAR	301.5'	
A	FUTURE TERMINAL BUILDING	TBD	
B	FUTURE AIR CARGO BUILDING	TBD	
C	FUTURE AIRCRAFT RESCUE AND FIREFIGHTING BUILDING (ARFF)	TBD	
D	FUTURE MAINTENANCE BUILDING	TBD	
E	FUTURE BUSINESS LOCATION	TBD	
F	FUTURE FIXED BASED OPERATOR (FBO)	TBD	
G	FUTURE LARGE CORPORATE HANGARS	TBD	
H	FUTURE CORPORATE HANGARS	TBD	
J	FUTURE T-HANGARS	TBD	

REVISIONS & NOTES

NO.	DESCRIPTION	DATE

NOTES:

DRAWING LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
AVIGATION EASEMENT		
AIRPORT BUILDINGS		
AIRFIELD PAVEMENT		
BUILDING DEMO OR PAVEMENT REMOVED	N/A	
PAVED ROADS		
PAVED ROAD TO BE REMOVED	N/A	
RUNWAY PROTECTION ZONE	RPZ	N/A
BUILDING RESTRICTION LINE	BRL	
GLIDE SLOPE CRITICAL AREA	GCA	GCA
LOCALIZER CRITICAL AREA	LCA	N/A
RUNWAY SAFETY AREA	RSA	RSA
RUNWAY OBJECT FREE AREA	ROFA	ROFA
AIRPORT SECURITY FENCE (8' HEIGHT)		
TAXIWAY/TAXILANE OBJECT FREE AREA	TOFA	TOFA
THRESHOLD SITING SURFACE	TSS	N/A
APRON/TAXIWAY/TAXILANE MARKING		
AIRPORT BEACON (EL. 313.08')	★	N/A
LIGHTED WIND CONE & SEGMENTED CIRCLE		N/A
VISUAL APPROACH SLOPE INDICATOR (VASI)		N/A
PRECISION APPROACH PATH INDICATOR (PAPI)		
RUNWAY END IDENTIFIER LIGHTS (REIL)		N/A
AIRPORT REFERENCE POINT (ARP)		N/A
FUTURE CLOSED PAVEMENT MARKINGS	N/A	X

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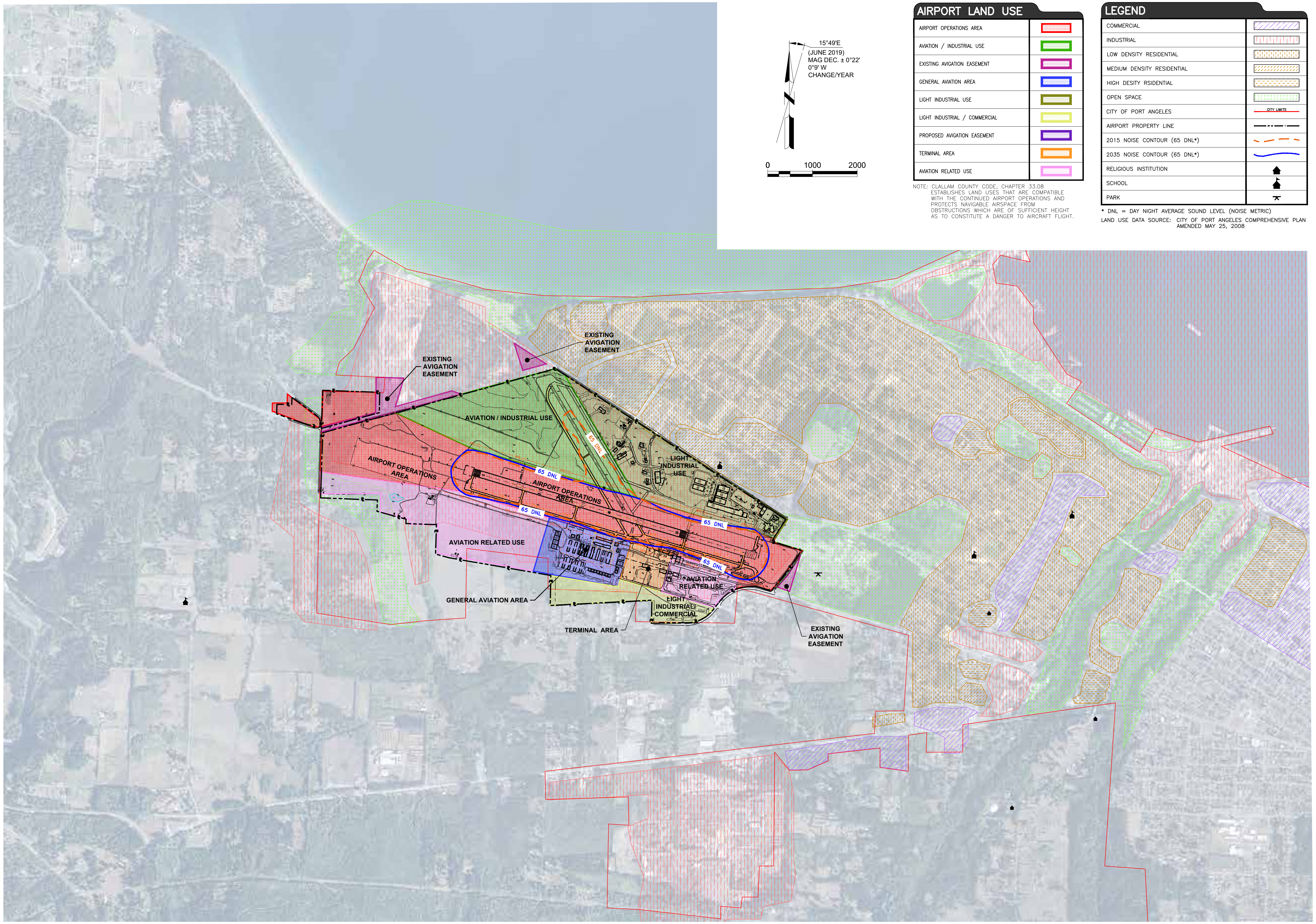
SHEET CONTENTS
TERMINAL AREA PLAN

SHEET NO.
12

PORT OF PORT ANGELES WASHINGTON

Exhibit 6-10. Terminal Area Plan



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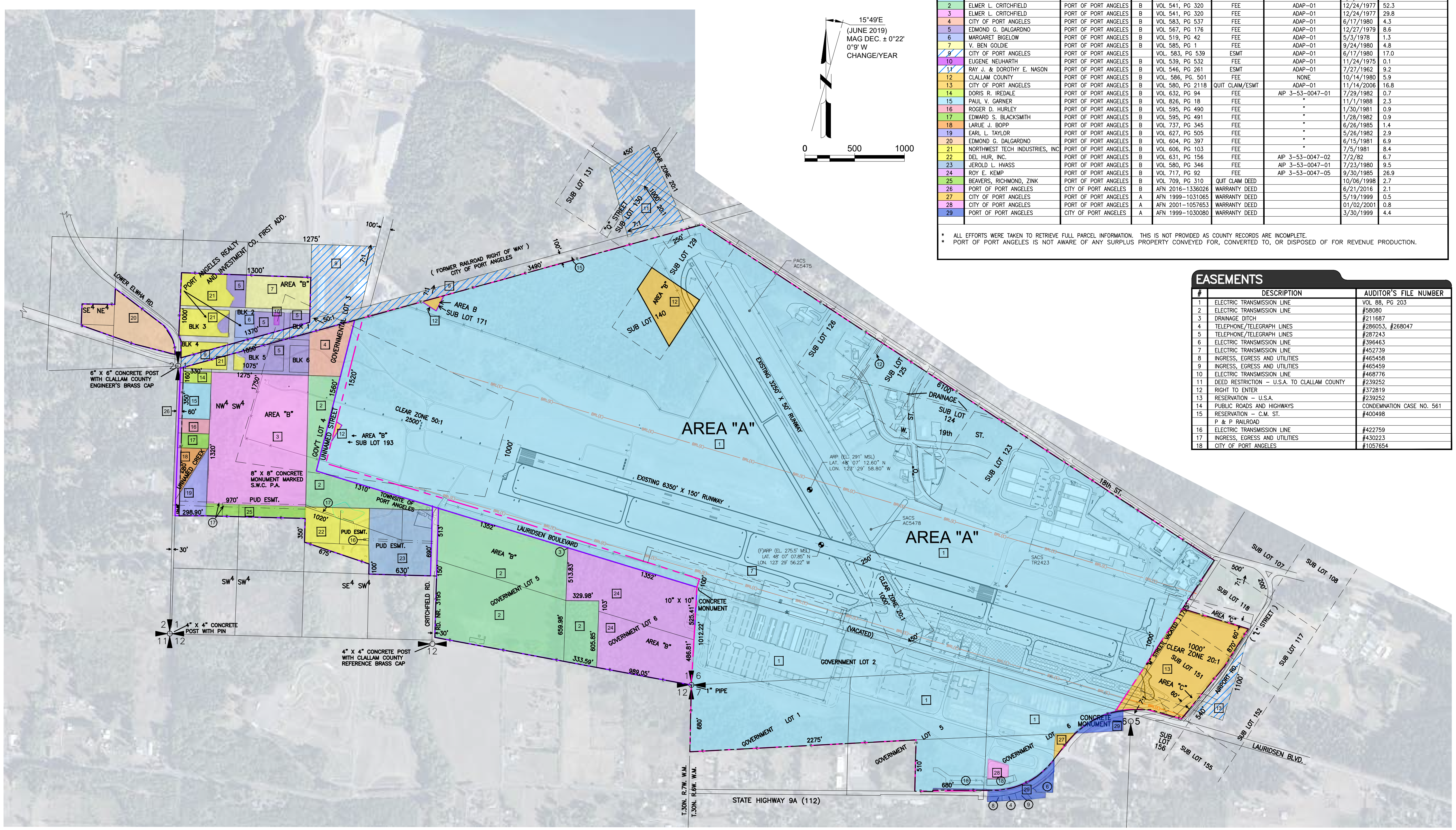
SHEET CONTENTS: AIRPORT LAND USE PLAN

SHEET NO. 13

Exhibit 6-11. Airport Land Use Plan



LAND PARCELS*

PARCEL	GRANTOR	GRANTEE	AREA	RECORDING	PORT INTEREST	FEDERAL AGREEMENT	DATE	ACREAGE
1	CLALLAM COUNTY	PORT OF PORT ANGELES	A	VOL 219, PG 166	FEE	SURPLUS PROPERTY PL 80-289	8/6/1951	614.9
2	ELMER L. CRITCHFIELD	PORT OF PORT ANGELES	B	VOL 541, PG 320	FEE	ADAP-01	12/24/1977	52.3
3	ELMER L. CRITCHFIELD	PORT OF PORT ANGELES	B	VOL 541, PG 320	FEE	ADAP-01	12/24/1977	29.8
4	CITY OF PORT ANGELES	PORT OF PORT ANGELES	B	VOL 583, PG 537	FEE	ADAP-01	6/17/1980	4.3
5	EDMOND G. DALGARDNO	PORT OF PORT ANGELES	B	VOL 567, PG 176	FEE	ADAP-01	12/27/1979	8.6
6	MARGARET BIGELOW	PORT OF PORT ANGELES	B	VOL 519, PG 42	FEE	ADAP-01	5/3/1978	1.3
7	V. BEN GOLDIE	PORT OF PORT ANGELES	B	VOL 585, PG 1	FEE	ADAP-01	9/24/1980	4.8
9	CITY OF PORT ANGELES	PORT OF PORT ANGELES		VOL. 583, PG 539	ESMT	ADAP-01	6/17/1980	17.0
10	EUGENE NEUHARTH	PORT OF PORT ANGELES	B	VOL 539, PG 532	FEE	ADAP-01	11/24/1975	0.1
11	RAY J. & DOROTHY E. NASON	PORT OF PORT ANGELES	B	VOL 546, PG 261	ESMT	ADAP-01	7/27/1962	9.2
12	CLALLAM COUNTY	PORT OF PORT ANGELES	B	VOL. 586, PG. 501	FEE	NONE	10/14/1980	5.9
13	CITY OF PORT ANGELES	PORT OF PORT ANGELES	B	VOL 580, PG 2118	QUIT CLAIM/ESMT	ADAP-01	11/14/2006	16.8
14	DORIS R. IREDALE	PORT OF PORT ANGELES	B	VOL 632, PG 94	FEE	AIP 3-53-0047-01	7/29/1982	0.7
15	PAUL V. GARNER	PORT OF PORT ANGELES	B	VOL 826, PG 18	FEE	"	11/1/1988	2.3
16	ROGER D. HURLEY	PORT OF PORT ANGELES	B	VOL 595, PG 490	FEE	"	1/30/1981	0.9
17	EDWARD S. BLACKSMITH	PORT OF PORT ANGELES	B	VOL 595, PG 491	FEE	"	1/28/1982	0.9
18	LARUE J. BOPP	PORT OF PORT ANGELES	B	VOL 737, PG 345	FEE	"	6/26/1985	1.4
19	EARL L. TAYLOR	PORT OF PORT ANGELES	B	VOL 627, PG 505	FEE	"	5/26/1982	2.9
20	EDMOND G. DALGARDNO	PORT OF PORT ANGELES	B	VOL 604, PG 397	FEE	"	6/15/1981	6.9
21	NORTHWEST TECH INDUSTRIES, INC	PORT OF PORT ANGELES.	B	VOL 606, PG 103	FEE	"	7/5/1981	8.4
22	DEL HUR, INC.	PORT OF PORT ANGELES	B	VOL 631, PG 156	FEE	AIP 3-53-0047-02	7/2/82	6.7
23	JEROLD L. HVASS	PORT OF PORT ANGELES	B	VOL 580, PG 346	FEE	AIP 3-53-0047-01	7/23/1980	9.5
24	ROY E. KEMP	PORT OF PORT ANGELES	B	VOL 717, PG 92	FEE	AIP 3-53-0047-05	9/30/1985	26.9
25	BEAVERS, RICHMOND, ZINK	PORT OF PORT ANGELES	B	VOL 709, PG 310	QUIT CLAIM DEED		10/06/1998	2.7
26	PORT OF PORT ANGELES	CITY OF PORT ANGELES	B	AFN 2016-1336026	WARRANTY DEED		6/21/2016	2.1
27	CITY OF PORT ANGELES	PORT OF PORT ANGELES	A	AFN 1999-1031065	WARRANTY DEED		5/19/1999	0.5
28	CITY OF PORT ANGELES	PORT OF PORT ANGELES	A	AFN 2001-1057653	WARRANTY DEED		01/02/2001	0.8
29	PORT OF PORT ANGELES	CITY OF PORT ANGELES	A	AFN 1999-1030080	WARRANTY DEED		3/30/1999	4.4

* ALL EFFORTS WERE TAKEN TO RETRIEVE FULL PARCEL INFORMATION. THIS IS NOT PROVIDED AS COUNTY RECORDS ARE INCOMPLETE.
* PORT OF PORT ANGELES IS NOT AWARE OF ANY SURPLUS PROPERTY CONVEYED FOR, CONVERTED TO, OR DISPOSED OF FOR REVENUE PRODUCTION.

EASEMENTS

#	DESCRIPTION	AUDITOR'S FILE NUMBER
1	ELECTRIC TRANSMISSION LINE	VOL 88, PG 203
2	ELECTRIC TRANSMISSION LINE	#58080
3	DRAINAGE DITCH	#211687
4	TELEPHONE/TELEGRAPH LINES	#286053, #268047
5	TELEPHONE/TELEGRAPH LINES	#287243
6	ELECTRIC TRANSMISSION LINE	#396463
7	ELECTRIC TRANSMISSION LINE	#452739
8	INGRESS, EGRESS AND UTILITIES	#465458
9	INGRESS, EGRESS AND UTILITIES	#465459
10	ELECTRIC TRANSMISSION LINE	#468776
11	DEED RESTRICTION – U.S.A. TO CLALLAM COUNTY	#239252
12	RIGHT TO ENTER	#372819
13	RESERVATION – U.S.A.	#239252
14	PUBLIC ROADS AND HIGHWAYS	CONDEMNATION CASE NO. 561
15	RESERVATION – C.M. ST.	#400498
	P & P RAILROAD	
16	ELECTRIC TRANSMISSION LINE	#422759
17	INGRESS, EGRESS AND UTILITIES	#430223
18	CITY OF PORT ANGELES	#1057654

NOTES

1. SOURCE OF DATA IS THE AIRPORT MASTER PLAN PREPARED FOR WILLIAM R. FAIRCHILD INTERNATIONAL AIRPORT DATED FEBRUARY 1989. THIS DATA IN TURN REFERENCED "PORT ANGELES EXHIBIT A – PROPERTY MAP 9/83".

REVISIONS

NO.	DESCRIPTION	DATE

DRAWING LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY (APPROX. 815 ACRES)		
AREA "A" – AIRPORT BOUNDARY – LAND OWNED IN FEE (PL 80-289)		
AREA "B" – AIRPORT BOUNDARY – LAND OWNED IN FEE		
AREA "C" – ACCESS AND UTILITIES EASEMENT		
AVIGATION EASEMENT		
AIRPORT BUILDINGS		
AIRFIELD PAVEMENT		
BUILDING DEMO OR PAVEMENT REMOVED		
PAVED ROADS		
RUNWAY PROTECTION ZONE	RPZ (E)	
PART 77 APPROACH SURFACE		
BUILDING RESTRICTION LINE	BRL (E)	
AIRPORT SECURITY FENCE (8' HEIGHT)		
AIRPORT BEACON (EL. 313.08')	★	
AIRPORT REFERENCE POINT (ARP)		
PARCEL OWNED OR RELEASED	29	
EASEMENT	6	

Mead & Hunt
Mead and Hunt, Inc.
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meadhunt.com

WILLIAM R. FAIRCHILD INTERNATIONAL AIRPORT
AIRPORT LAYOUT PLAN
1402 FAIRCHILD AIRPORT RD
PORT ANGELES, WA 98363

ISSUED

NOT FOR CONSTRUCTION

M&H NO.: 3170400-142007.01
DATE: SEPT 2019
DESIGNED BY: M&H
DRAWN BY: JWB
CHECKED BY: KJM
DO NOT SCALE DRAWINGS

SHEET CONTENTS
AIRPORT PROPERTY MAP - EXHIBIT 'A'

SHEET NO.
14

Exhibit 6-12. Airport Property Map

CHAPTER 7
Facilities Implementation Plan

INTRODUCTION

The long-term CLM implementation plan is intended to establish a strategy to fund the necessary airport improvement and maximize the potential to received federal and state grant funds. It also establishes a financially prudent plan for the proposed airport improvements and assists in establishing local economic viability. For the Port of Port Angeles, the FAA, and Washington State Department of Transportation (WSDOT) Aviation, the programming effort is a critical component of the Master Plan Update. From the FAA and WSDOT Aviation's perspective, the detailed listing of projects and cost estimates is critical for their use in establishing near-term priorities and budgeting expenditures at CLM. From the Port's perspective, the long-term improvement needs are identified and prioritized, and budgeting and financial decisions can be made with a comprehensive understanding of overall financial implications.

Future demand for facilities is difficult to accurately predict during the latter stages of the planning period. Therefore, emphasis is placed on the first five years of the planning period. In this time period, projections are more definable, and the magnitude of program accomplishment is more pronounced.

PROJECTS LIST, COST ESTIMATES, & IMPLEMENTATION SCHEDULE

A list of capital improvement projects needed to fulfill the airport development needs has been assembled and presented in **Tables 7-1, 7-2,** and **7-3**. The list is a result of the facility requirements analysis and the selected conceptual development plan, coupled with the existing Capital Improvement Program (CIP). The project list is divided into three phases: short-term (1-5 years), intermediate-term (6-10 years), and long-term (11-20 years). The short-term projects are listed in priority order by year; the intermediate- and long-term projects are listed in priority order without year designators.

Individual project costs have been prepared using unit prices extended by the size of the project and tempered with specific considerations related to the region, the facility, or the individual development sites. The estimates are intended for planning purposes only and should not be taken as construction cost estimates, which can only be provided following the preparation of engineering plans and specifications. The cost estimates are based on 2019 costs with no escalation made based on inflationary factors for future year estimates.

The costs have been categorized by the total project cost, that part anticipated to be funded from the FAA, the amount potentially funded by WSDOT Aviation, that amount anticipated to be borne locally by the Port of Port Angeles, and at that amount anticipated to be funded through private entities (i.e., individual tenants, business enterprises, or other private third-party sources). However, in some cases justified by projected revenue streams, the anticipated privately funded projects might be financed by revenue bonds or special tax assessments. Additionally, other local funding sources can include state or local economic development funds, regional commissions and organizations, or other governmental units.

FAA Order 5100.38D, Airport Improvement Program Handbook explains how the federal share of projects is calculated in states with large amounts of publicly owned land. It states the federal participation rate is a function of an airport's current size and statutory classification. Washington State non-primary general aviation airports such as CLM are eligible to receive 90 percent of the project costs from federal funds. The level of FAA funding is governed by congressional appropriations to the Airport Improvement Program (AIP), and the amount dedicated to any one specific airport is determined by demonstrated and documented need that is compared to the needs at other airports within the regional and national airport system.

CAPITAL IMPROVEMENT PROGRAM

To assist in the preparation of the WSDOT Aviation and FAA's efforts to provide grant funding to the most needed projects, the Port of Port Angeles prepares an annual State Capital Improvement Program (SCIP) project list. The purpose is to provide reasonable projections of capital needs that can then be used in fiscal programming to test for financial feasibility. To assist the Port of Port Angeles with its preparation of the SCIP, the first phase of the projects list and cost estimates have been organized in a format like that used by WSDOT Aviation.

Table 7-1. Phase I (1-5 Years) Development Plan Project Costs

PROJECT DESCRIPTION	TOTAL COST[1]	FEDERAL[2]	STATE	LOCAL/ PRIVATE[3]
2020 PROJECTS				
A.1 – Mount Localizer Antenna on Frangible Couplings, Including Flight Check	$95,000			$95,000
A.2 – Rehabilitate Runway 8/26 Pavement (5,000' x 150'), Phase 1 Preliminary Design	$709,000	$638,100	$35,450	$35,450
Sub-Total 2020 Total	**$804,000**	**$638,100**	**$35,450**	**$130,450**
2021 PROJECTS				
A.3 – Design and Construct Individual Hangar (70' x 250')	$3,150,000			$3,150,000
Sub-Total 2021 Total	**$3,150,000**			**$3,150,000**
2022 PROJECTS				
A.4 – Rehabilitate Runway 8/26 Pavement (5,000' x 150'), Phase 2 Construction	$6,278,000	$5,650,200	$313,900	$313,900
A.5 – Rehabilitate Taxiway A, Design and Construction	$612,000	$550,800	$30,600	$30,600
Sub-Total 2022 Total	**$6,890,000**	**$6,201,000**	**$344,500**	**$344,500**
2023 PROJECTS				
A.6 – Remove Taxiways D and E and Construct Right-Angled Taxiway4	$790,000			
Sub-Total 2023 Total	**$790,000**	**$711,000**	**$39,500**	**$39,500**
2024 PROJECTS				
A.7 – Prepare Environmental Assessment (EA) for Obstruction Tree Removal Within Lincoln Park[4]	$200,000			
Sub-Total 2024 Total	**$200,000**	**$180,000**		**$20,000**
Total Phase I (2020-2024)	**$11,824,000**	**$7,730,100**	**$419,450**	**$3,684,450**

Notes: 1 Cost estimates based on 2019 data, are intended for planning purposes only, and do not reflect a detailed engineering evaluation.

2 Eligible for FAA AIP, Non-Primary Entitlement (NPE) and Discretionary grants but subject to availability of funding. Further, just because a project is eligible under AIP related legislation, it does not mean that the ADO can fund the project. The project must meet the other requirements further outlined in FAA Order 5100.38D.

3 Local match requirements from current revenues, cash reserves, bonds, and other sources. Can include private monies, funding from revenue bond, or special tax assessments.

4 Funding sources to be determined.

Table 7-2. Phase II (6-10 Years) Development Plan Project Costs

PROJECT DESCRIPTION	TOTAL COST[1, 4]	FEDERAL[2]	STATE	LOCAL/ PRIVATE[3]
B.1 – Remove Obstruction Trees Within Lincoln Park That Penetrate or Come Close to Penetrating the Displaced Runway 26 Threshold Siting Surface	$62,000			
B.2 – Rehabilitate Runway 8/26 Pavement Exceeding 5,000', Design and Construction	$960,000			
B.3 – Rehabilitate Taxiway Pavements Serving Runway Length Exceeding 5,000'	$292,000			
B.4 – Relocate East GA Area Hangars to West GA Area	$4,220,000			
B.5 – Remove or Relocate Buildings #9 and #10	$1,280,000			
B.6 – Construct Individual Corporate Hangar	$2,100,000			
B.7 – Close Runway 13/31	$300,000			
B.8 – Construct Runway 8 Blast Pad	$166,000			
Total Phase II (2025-2029)	**$9,380,000**			

Notes: 1 Cost estimates based on 2019 data, are intended for planning purposes only, and do not reflect a detailed engineering evaluation.

2 Eligible for FAA AIP, Non-Primary Entitlement (NPE) and Discretionary grants.

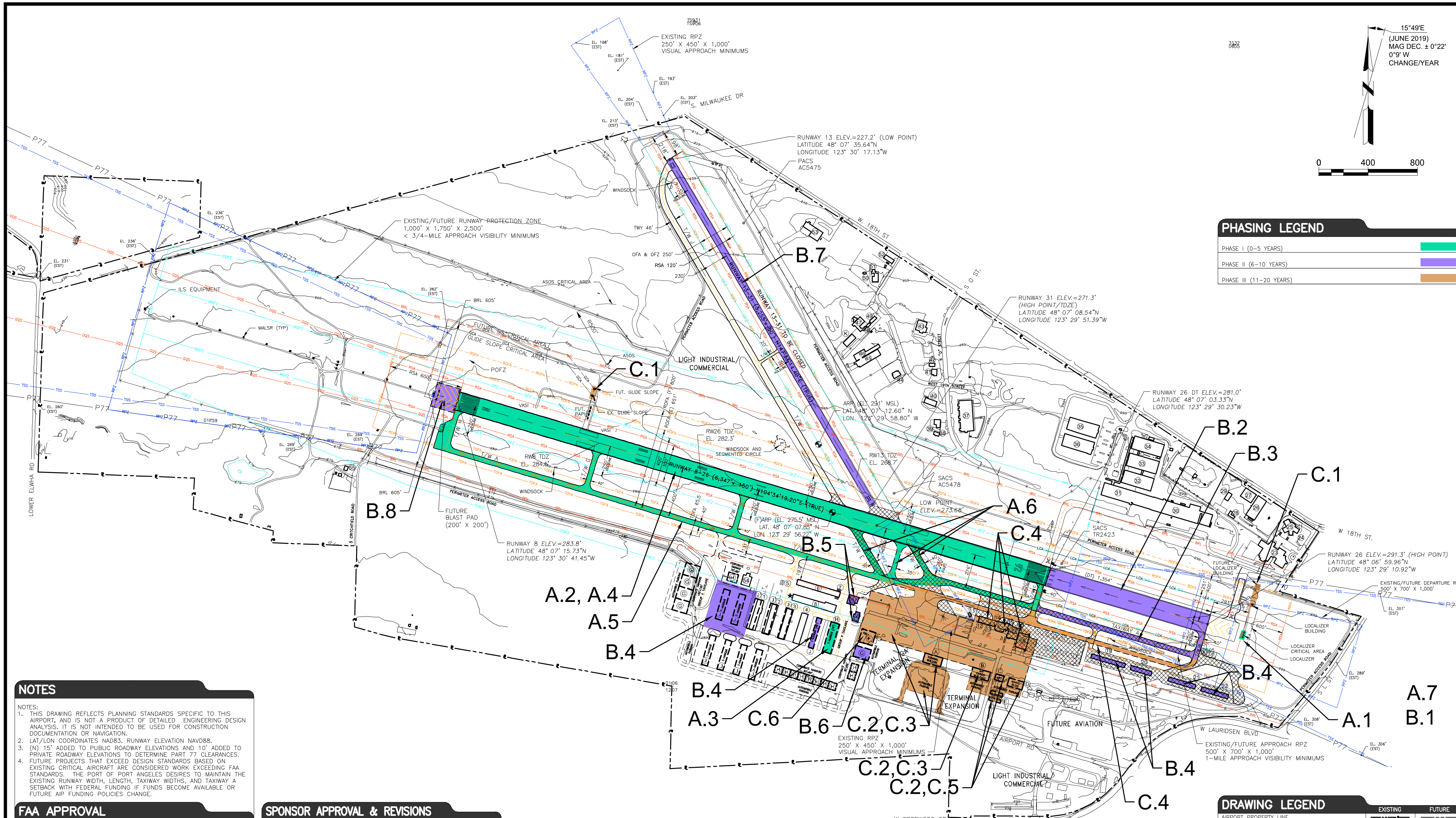
3 Local match requirements from current revenues, cash reserves, bonds, and other sources. Can include private monies, funding from revenue bond, or special tax assessments.

4 Funding sources to be determined.

5Anticipated to be spread over multiple years.

PHASING PLAN

The proposed improvement projects for each phase are illustrated graphically in **Exhibit 7-1**. The proposed scheduling of the projects is merely a suggestion and variance from them will almost certainly be necessary, especially during the later periods. The demand for certain facilities and the economic reality of their development are prime factors influencing the timing of individual project implantation. Care must be taken to provide for adequate lead time for detailed planning and construction of facilities to meet the aviation demand. It is also important to minimize disruptive scheduling where a portion of the facility may become inoperative due to construction, and to prevent extra cost resulting from improper project scheduling. It is anticipated project phasing will invariably be altered as local, state, and federal priorities evolve in the future.



PHASING LEGEND

- PHASE I (0–5 YEARS)
- PHASE II (6–10 YEARS)
- PHASE III (11–20 YEARS)

Mead & Hunt

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WILLIAM R. FAIRCHILD INTERNATIONAL AIRPORT
AIRPORT LAYOUT PLAN

1402 FAIRCHILD AIRPORT RD
PORT ANGELES, WA 98363

NOTES

NOTES:

1. THIS DRAWING REFLECTS PLANNING STANDARDS SPECIFIC TO THIS AIRPORT, AND IS NOT A PRODUCT OF DETAILED ENGINEERING DESIGN ANALYSIS. IT IS NOT INTENDED TO BE USED FOR CONSTRUCTION DOCUMENTATION OR NAVIGATION.
2. LAT/LON COORDINATES NAD83. RUNWAY ELEVATION NAVD88.
3. (N) 15' ADDED TO PUBLIC ROADWAY ELEVATIONS AND 10' ADDED TO PRIVATE ROADWAY ELEVATIONS TO DETERMINE PART 77 CLEARANCES.
4. FUTURE PROJECTS THAT EXCEED DESIGN STANDARDS BASED ON EXISTING CRITICAL AIRCRAFT ARE CONSIDERED WORK EXCEEDING FAA STANDARDS. THE PORT OF PORT ANGELES DESIRES TO MAINTAIN THE EXISTING RUNWAY WIDTH, LENGTH, TAXIWAY WIDTHS, AND TAXIWAY A SETBACK WITH FEDERAL FUNDING IF FUNDS BECOME AVAILABLE OR FUTURE AIP FUNDING POLICIES CHANGE.

FAA APPROVAL

SPONSOR APPROVAL & REVISIONS

SPONSOR APPROVAL/DATE

NO.	DESCRIPTION	DATE

BUILDING LEGEND

NO.	DESCRIPTION	TOP ELEVATION	OBS LIGHTED
1	PRIVATE T-HANGAR (RELOCATED)	298.3'	
2	PRIVATE T-HANGAR (RELOCATED)	295.5'	
3	PRIVATE T-HANGAR (RELOCATED)	299.3'	
4	PRIVATE T-HANGAR	297.9'	
5	FUEL STORAGE FACILITY	–	
6	T-SHADE	299.18'	
7	FIRE STATION	299.18'	
8	T-HANGAR	298.7'	
9	FBO – (LIFE FLIGHT NETWORK)	296.89'	
10	FBO – (LIFE FLIGHT NETWORK)	303.6'	
11	FAA EQUIPMENT BUILDING	299.48'	
12	GA HANGAR	311.58'	
13	GA HANGAR	311.58'	
14	TERMINAL BUILDING	315.50'	
15	U.S. CUSTOMS	315.50'	
16	U.S. CUSTOMS AIRCRAFT PARKING	–	
17	FBO MAINTENANCE HANGAR	325.98'	
18	FEDEX	323.72'	
19	T-HANGAR	315.6'	
20	T-HANGAR	314.0'	
21	T-HANGAR	312.7'	
22	T-HANGAR	312.5'	

BUILDING LEGEND

NO.	DESCRIPTION	TOP ELEVATION	OBS LIGHTED
23	FAIRCHILD INDUSTRIAL PARK	306.2'	
24	FAIRCHILD INDUSTRIAL PARK	309.4'	
25	FAIRCHILD INDUSTRIAL PARK	309.7'	
26	FAIRCHILD INDUSTRIAL PARK	321.6'	
27	FAIRCHILD INDUSTRIAL PARK	322.0'	
28	FAIRCHILD INDUSTRIAL PARK	307.4'	
29	FAIRCHILD INDUSTRIAL PARK	313.6'	
30	FAIRCHILD INDUSTRIAL PARK	315.8'	
31	FAIRCHILD INDUSTRIAL PARK	309.8'	
32	FAIRCHILD INDUSTRIAL PARK	309.1'	
33	FAIRCHILD INDUSTRIAL PARK	309.2'	
34	FAIRCHILD INDUSTRIAL PARK	307.9'	
35	FAIRCHILD INDUSTRIAL PARK	307.6'	
36	FAIRCHILD INDUSTRIAL PARK	307.8'	
37	FAIRCHILD INDUSTRIAL PARK	395.0'	
38	FAIRCHILD INDUSTRIAL PARK	287.8'	
39	FAIRCHILD INDUSTRIAL PARK	291.0'	
40	FAIRCHILD INDUSTRIAL PARK	290.5'	
41	FAIRCHILD INDUSTRIAL PARK	282.2'	
42	FAIRCHILD INDUSTRIAL PARK	280.5'	
43	FAIRCHILD INDUSTRIAL PARK	266.3'	
44	FAIRCHILD INDUSTRIAL PARK	279.8'	

BUILDING LEGEND

NO.	DESCRIPTION	TOP ELEVATION	OBS LIGHTED
45	FAIRCHILD INDUSTRIAL PARK	282.6'	
46	FAIRCHILD INDUSTRIAL PARK	286.0'	
47	FAIRCHILD INDUSTRIAL PARK	266.0'	
48	FAIRCHILD INDUSTRIAL PARK	263.0'	
49	FAIRCHILD INDUSTRIAL PARK	262.0'	
50	FAIRCHILD INDUSTRIAL PARK	259.5'	
51	FAIRCHILD INDUSTRIAL PARK	259.0'	
52	FAIRCHILD INDUSTRIAL PARK	257.1'	
53	FAIRCHILD INDUSTRIAL PARK	267.3'	
54	PRIVATE EXECUTIVE HANGAR	301.5'	
55	K9 TRAINING FACILITY	283.5'	
A	FUTURE TERMINAL BUILDING	TBD	
B	FUTURE AIR CARGO BUILDING	TBD	
C	FUTURE AIRCRAFT RESCUE AND FIREFIGHTING BUILDING (ARFF)	TBD	
D	FUTURE MAINTENANCE BUILDING	TBD	
E	FUTURE BUSINESS LOCATION	TBD	
F	FUTURE FIXED BASED OPERATOR (FBO)	TBD	
G	FUTURE LARGE CORPORATE HANGARS	TBD	
H	FUTURE CORPORATE HANGARS	TBD	
J	FUTURE T-HANGARS	TBD	
K	FUTURE FAIRCHILD INDUSTRIAL PARK	TBD	

DRAWING LEGEND

	EXISTING	FUTURE
AIRPORT PROPERTY LINE		
AVIGATION EASEMENT		
AIRPORT BUILDINGS		
AIRFIELD PAVEMENT		
BUILDING DEMO OR PAVEMENT REMOVED		
PAVED ROADS		
RUNWAY PROTECTION ZONE	RPZ (E)	
GLIDE PATH QUALIFICATION SURFACE	GQS	
PART 77 APPROACH SURFACE		P77
BUILDING RESTRICTION LINE	BRL (E)	BRL (F)
RUNWAY OBSTACLE FREE ZONE	OFZ (E)	OFZ (F)
INNER APPROACH OBSTACLE FREE ZONE	IAOFZ	IAOFZ (F)
INNER TRANSITIONAL OBSTACLE FREE ZONE	ITOFZ	ITOFZ (F)
PRECISION OBSTACLE FREE ZONE		
GLIDE SLOPE CRITICAL AREA	GSCA	
LOCALIZER CRITICAL AREA	LCA	
RUNWAY SAFETY AREA	RSA	RSA
RUNWAY OBJECT FREE AREA	ROFA	ROFA
AIRPORT SECURITY FENCE (8' HEIGHT)		
TAXIWAY/TAXILANE OBJECT FREE AREA	TOFA (E)	TOFA (F)
THRESHOLD SITING SURFACE	TSS	TSS
APRON/TAXIWAY/TAXILANE MARKING		
AIRPORT BEACON (EL. 313.08')		
LIGHTED WIND CONE & SEGMENTED CIRCLE		
PRECISION APPROACH PATH INDICATOR (PAPI)		
RUNWAY END IDENTIFIER LIGHTS (REIL)		
AIRPORT REFERENCE POINT (ARP)		

NOT FOR CONSTRUCTION

M&H NO.: 3170400-142007.01
DATE: SEPT 2019
DESIGNED BY: M&H
DRAWN BY: JWB
CHECKED BY: KJM
DO NOT SCALE DRAWINGS

SHEET CONTENTS
PHASING PLAN

SHEET NO.
1

PORT OF PORT ANGELES
WASHINGTON

Exhibit 7-1. Phasing Plan

Appendix One

FUEL SHEETS

Appendix Two

CLM 2015 TFMSC OPS

Appendix Three

CLM USER'S RUNWAY LENGTH REQUIREMENTS

Appendix Four

TAF COMPARISON & FAA FORECAST APPROVAL LETTER

Appendix Five

FAA PAVEMENT REHAB LETTER

Appendix Six

NON-REGULAR USE AIRCRAFT RUNWAY LENGTH ANALYSIS

As stated in Runway Length Analysis section of Chapter 4, Facility Requirements, CLM does accommodate larger business jet aircraft included in the family grouping of aircraft weighing between 12,500 and 60,000 pounds MTOW, as well as some use by business jet aircraft with MTOW in excess of 60,000 pounds. This Appendix presents a discussion on the runway length analysis by non-regular use aircraft, or in other words, a runway length analysis of aircraft whose annual operations are less the "Design Aircraft" as defined by the FAA (i.e., operations do not exceed the FAA defined "substantial use threshold" of 500 annual non touch-and-go operations) but that nonetheless substantially contribute to the overall economic wellbeing of CLM and should be provided for comparison purposes.

Within the family grouping of business jet aircraft weighing between 12,500 and 60,000 pounds MTOW, there are two groups, those that include 75 percent of the fleet and those that include 100 percent of the fleet. **Table A6-1** presents the business jets that make up 75 percent of the fleet (left column), and those that makeup of the remaining 25 percent of the fleet (right column), according to FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*.

Table A6-1. Business Jet Fleet

75 PERCENT OF THE FLEET MAKE & MODEL	REMAINING 25 PERCENT OF THE FLEET MAKE & MODEL
Aerospatiale Sn-601 Corvette	Bae Corporate 800/1000
Bae 125-700	Bombardier 600/601/601-3A/601-3A ER/ 604 Challenger/BD-100 Continental
Beech 400A/Premier 1/2000 Starship	Cessna Citation 550 S/II/650 III/IV/750 X
Bombardier Challenger 300	Dassault Falcon 900C/900 EX/2000/2000 EX
Cessna Citation 500/501/525A/II/CJ2/550 Bravo/ 552/560 Encore/560 Excel/560 V Ultra/650 Sovereign	IAI Astra 1125/Galaxy 1126
Dassault Falcon 10/20/50/50 EX/900/900B	Learjet 45 XR/55/55B/55C/60
IAI Jet Commander 1121/Westwind 1123/1124	Hawker Horizon/800/800 XP/1000
Learjet 20/31/31A/31A ER/ 35/35A/36/36A/40/45	Sabreliner 65/75
Mitsubishi MU 300 Diamond	
Raytheon 390 Premier/Hawker 400/400 XP/600	
Sabreliner 40/60/75A/80/T-39	

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

Table A6-2 provides the turbojet-powered aircraft according to percentage of the fleet that use CLM on a regular basis, along with each aircraft's MTOW and annual operations estimated for the years 2015, 2020, and 2035. To determine which percentage of the fleet is appropriate to use is guided by paragraph 303.a.(2) of AC 150/5325-4B, which states, "If a relatively few airplanes under evaluation are listed in table 3-2, then Figure 3-2 should be used to determine the runway length." Table 3-2 in this sentence refers to the table in the AC that provides a listing of aircraft consisting of the remaining 25 percent of the airplanes that make up 100 percent of the fleet (i.e., **Table A6-1** above, right column). Therefore, it is felt that the 100 percent of the turbojet-powered fleet with MTOW greater than 12,500 pounds but less than 60,000 pounds is the appropriate percentage of fleet to determine appropriate runway length, since there are a "relatively few" aircraft from this family grouping under evaluation at CLM. As can also be noted from the table, the estimated future 2035 operations by aircraft within or greater than the 75 percent of the aircraft fleet weighing between 12,500 and 60,000 pounds MTOW does exceed 500 annual non touch-and-go operations.

Table A6-2. Critical Design Aircraft for Runway Length Determination

AIRCRAFT	MAXIMUM TAKEOFF WEIGHT (LBS.)	2015 OPERATIONS[1]	2020 OPERATIONS[1]	2035 OPERATIONS[1]
75% of the Turbojet-Powered Fleet With MTOW Greater Than 12,500 lbs. but Less Than 60,000 lbs.				
Learjet 35A	18,500	6	6	4
Learjet 31A	17,000	54	44	16
Dassault Falcon 50 EX	39,700	20	40	70
Challenger 300	38,850	22	24	36
Learjet 45	20,500	24	24	10
Beechjet 400	16,100	32	36	26
Cessna Citation 560 Excel (560XL)	20,200	36	35	20
Cessna CJ3	13,870	25	25	25
Cessna Citation 550 Bravo	14,800	36	35	20
Cessna Citation 560 Encore	16,630	25	25	10
Total Operations		280	294	237
100% of the Turbojet-Powered Fleet With MTOW Greater Than 12,500 lbs. but Less Than 60,000 lbs.				
Challenger 601	45,000	14	16	20
Learjet 60	23,500	26	30	40
Dassault Falcon 2000	35,800	10	10	16
Dassault Falcon 2000EX	41,300	10	10	16
Dassault Falcon 900 EX	48,300	18	20	24
Cessna Citation X (750)	36,100	12	14	30
Hawker 800XP	28,000	20	24	40
Total Operations		110	124	186
Turbojet-Powered Fleet With MTOW Greater Than 60,000 lbs.				
Gulfstream G-IV/G400/G450	74,600	14	16	20
Gulfstream G-V/G500	76,850	50	60	90
Gulfstream G550	91,000	4	8	20
Total Operations		68	84	130

Source: Reid Middleton and Mead & Hunt.

1 Does not include operations by business jets with MTOW less than 12,500 pounds such as the Cessna Mustang and Eclipse 500, which would increase the totals provided substantially.

Table A6-3 presents the recommended runway lengths based on aircraft family groupings that use CLM. It is derived from FAA AC 150/5325-4B, which provides standards and guidelines recommended strictly for use in the design of civil airports and include airplane performance data curves and tables for use in airport planning and runway length analysis. **Exhibits A6-1** and **A6-2** present the runway length curves (green arrows) derived from AC 150/5325-4B used to determine the runway lengths for 75 percent and 100 percent of the fleet presented in **Table A6-3**.

Table A6-3. Runway 8/26 Generalized Runway Length Recommendations, In Feet

	RUNWAY LENGTH (DRY CONDITIONS)	TOTAL (ADJUSTMENT)
Existing Runway 8/26 Length = 6,347		
Small Airplanes with Fewer than 10 Passenger Seats		
95% of Fleet	2,900	2,900
100% of Fleet	3,450	3,450
Small Airplanes Having 10 or More Passenger Seats	3,850	3,850
Large Airplanes (12,500 – 60,000 lbs. MTOW)		
75% of the Fleet		
60% Useful Load	4,600	5,290[1]
90% Useful Load	5,800	**6,670**[2]
100% of the Fleet		
60% Useful Load	4,850	5,500[3]
90% Useful Load	**6,950**	**7,126**[4]

Source: Reid Middleton, Inc. and Mead & Hunt analysis using FAA AC 150/5325-4B, Runway length Requirements for Airport Design.

Notes: 1 Increased by 15 percent, or 690 feet, due to wet and slippery runway conditions for turbojet-powered aircraft.

2 Increased by 15 percent, or 870 feet, due to wet and slippery runway conditions for turbojet-powered aircraft.

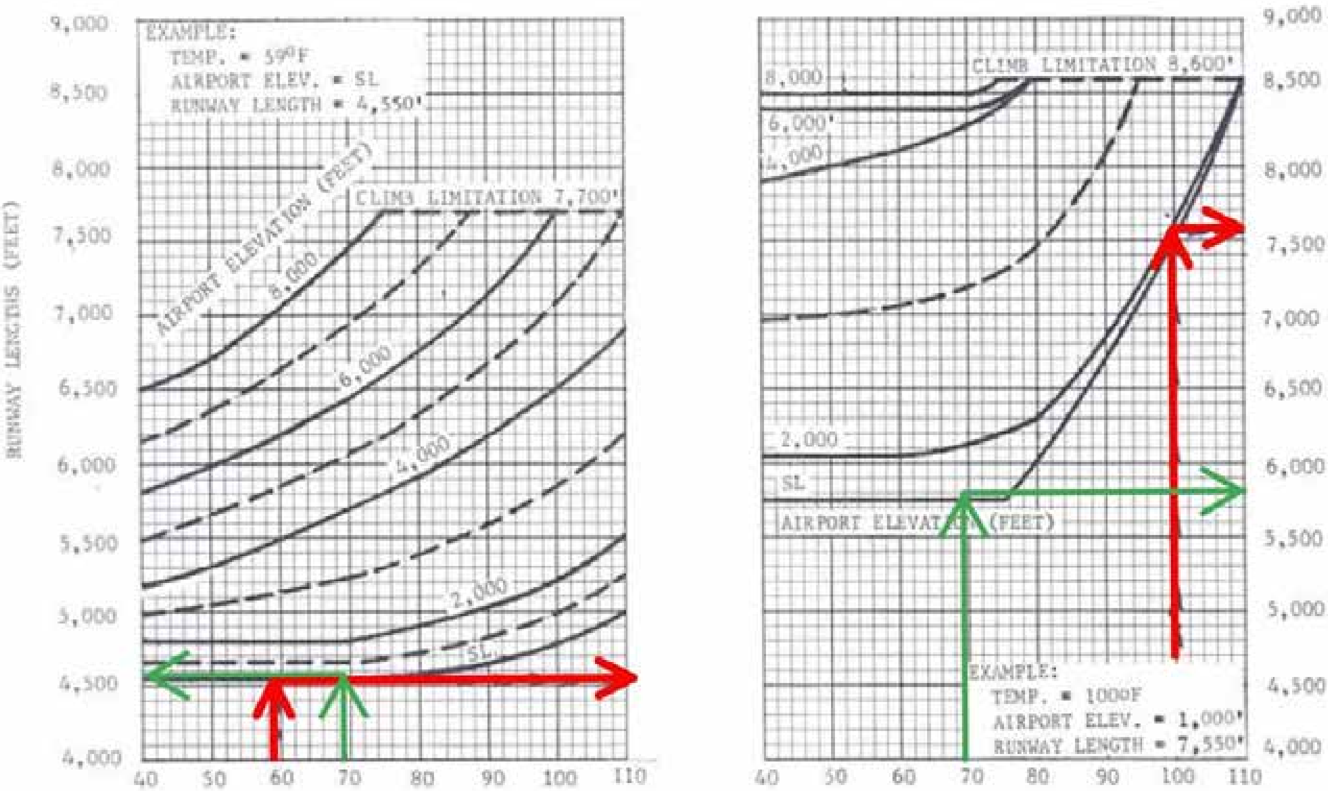
3 Increased by 650 feet to a maximum runway length of 5,500 feet, due to wet and slippery runway conditions for turbojet-powered aircraft.

4 Increased by 176 feet due to 17.6 feet runway centerline elevation difference.

Bold *text reflects a length that exceeds the existing takeoff runway length.*

Exhibit A6-1. Runway Length Curves for 75% of the Fleet

Figure 3-1. 75 Percent of Fleet at 60 or 90 Percent Useful Load

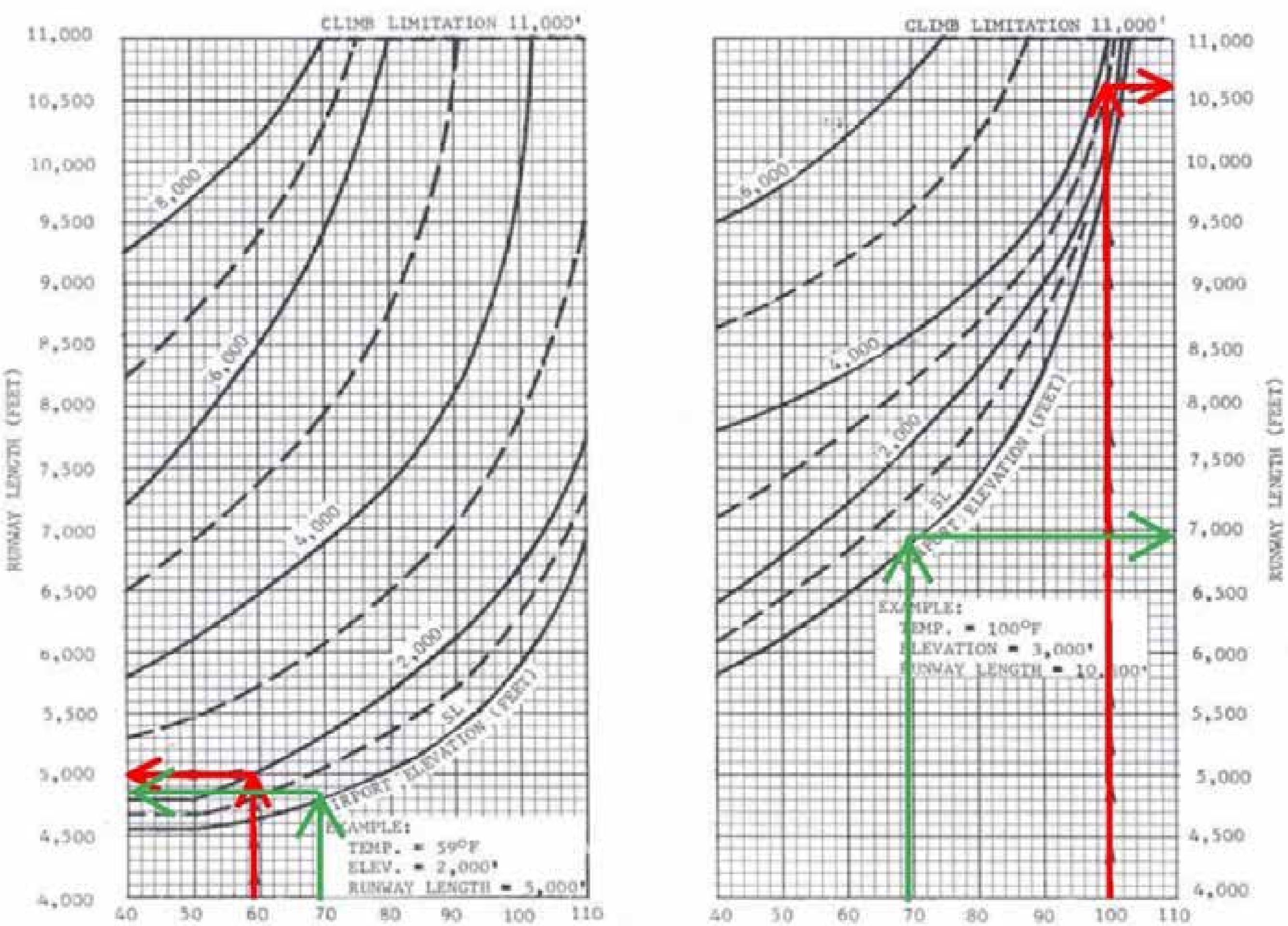


Mean Daily Maximum Temperature of Hottest Month of the Year in Degrees Fahrenheit

75 percent of feet at 60 percent useful load **75 percent of feet at 90 percent useful load**

Exhibit A6-2. Runway Length Curves for 100% of the Fleet

Figure 3-2. 100 Percent of Fleet at 60 or 90 Percent Useful Load



Mean Daily Maximum Temperature of Hottest Month of the Year in Degrees Fahrenheit

100 percent of feet at 60 percent useful load **100 percent of feet at 90 percent useful load**

The runway length recommendations are dependent on meeting the operational requirements of a certain percentage of the fleet at a certain percentage of the useful load (i.e., 75 percent of the fleet at 60 percent useful load). The useful load of an aircraft is defined as the difference between the maximum allowable structural gross weight and the operating weight empty. It is the load that can be carried by the aircraft comprised of passengers, fuel, and cargo.

Runway lengths for airplanes with the 12,500 to 60,000 pounds MTOW family grouping are based on no wind, a dry runway surface, and zero effective runway gradient. As directed in AC 150/5325-4B, the runway lengths presented in the table are increased to account for 1) takeoff operations when the effective runway gradient is other than zero, and 2) landing operations of turbojet-powered airplanes under wet and slippery runway conditions. The increases are not cumulative since the first length adjustment applies to takeoffs and the latter to landings. After both adjustments have been independently applied, the larger resulting runway length becomes the recommended runway length.

The effective runway gradient is added to the runway lengths obtained from the family grouping charts by increasing the distance at a rate of 10 feet for each foot of elevation difference between the high and low points of the runway centerline. The wet and slippery runways for turbojet-powered airplanes for the 60 percent useful load curves is increased by 15 percent, or up to a total runway length of 5,500 feet, whichever is less, and the 90 percent useful load curves are increased by 15 percent, or up to a total runway length of 7,000 feet, whichever is less. It should be noted that no adjustment is necessary for turboprop-powered airplanes.

Based on the data presented above, most of the operations conducted by business jet aircraft at CLM in 2015 were by aircraft in the 75 percent family grouping. However, as stated previously, CLM has a "relatively few" aircraft from the 100 percent family grouping under evaluation at CLM, so the 100 percent of the turbojet-powered fleet with MTOW greater than 12,500 pounds but less than 60,000 pounds should be utilized to determine appropriate runway length. As presented in **Table A6-3**, the existing runway length of 6,347 feet accommodates this family grouping at 60 percent useful load regardless of the runway conditions, but is slightly lacking in accommodating this family grouping for aircraft at 90 percent useful load.

INDIVIDUAL AIRCRAFT RUNWAY TAKEOFF LENGTH ANALYSIS

Table A6-4 on the next page presents the takeoff runway length analysis conducted by the most demanding individual business jet aircraft operating at CLM based on guidelines in Chapter 4 of AC 150/5325-4B using aircraft manufacturer published Airport Planning Manuals (APMs) for determining recommended runway takeoff lengths. The takeoff runway lengths are adjusted for airport elevation and non-zero effective runway gradients. The non-zero effective runway gradient adjustment equates to a 10-foot increase in runway length for each one foot of difference in the runway centerline elevation. The runway lengths provided are categorized for reference to the 75 percent and 100 percent of the fleet designations that were presented in the **Tables A6-1**, **A6-2**, and **A6-3**. Two columns are provided, one calculating runway length according to Standard Day conditions (i.e., 59° F) and one adjusted for the MNMT of the hottest month at CLM (i.e., 69.1° F). The table also provides the operations by the individual aircraft for years 2015, 2020, and 2035.

The takeoff runway length requirements for the Bombardier Canadair Challenger 601 and the Gulfstream G550 aircraft exceed the existing 6,347-foot length for Runway 8/26 during Hot Day conditions, but the specified runway lengths for both Standard Day and Hot Day conditions are based on MTOW loadings, which are often not required for takeoff operations at CLM.

Table A6-4. Existing Business Jet Runway Takeoff Length Requirements, In Feet

AIRCRAFT	MAXIMUM TAKEOFF WEIGHT (LBS.)	RUNWAY LENGTH STANDARD DAY[1]	RUNWAY LENGTH HOT DAY[2]	2015 OPERATIONS	2020 OPERATIONS	2035 OPERATIONS
Existing Runway 8/26 Takeoff Length Available = 6,347						
75% of the Fleet (> 12,500 lbs. to ≤ 60,000 lbs. MTOW)						
Learjet 35A	18,500	5,249	5,542	60	50	20
Dassault Falcon 50 EX	39,700	5,166	5,453	20	40	70
Challenger 300	38,850	5,084	5,367	22	24	36
Learjet 45	20,500	4,711	4,973	24	24	10
Beechjet 400	16,100	4,533	4,785	32	36	26
Cessna Citation Excel (560XL)	20,200	3,839	4,053	36	35	20
100% of the Fleet (> 12,500 lbs. to ≤ 60,000 lbs. MTOW)						
Canadair Challenger 601	45,000	6,298	**6,649**	14	16	20
Learjet 60	23,500	5,880	6,207	26	30	40
Dassault Falcon 2000	35,800	5,727	6,046	10	10	16
Dassault Falcon 900 EX	48,300	5,686	6,003	18	20	24
Cessna Citation X (750)	36,100	5,421	5,723	12	14	30
Hawker 800XP	28,000	5,308	5,604	20	24	40
> 60,000 lbs MTOW						
Gulfstream G-IV/G400/ G450	74,600	5,890	6,218	14	16	20
Gulfstream G-V/G500	76,850	5,482	5,787	50	60	90
Gulfstream G550	91,000	6,206	**6,552**	4	8	20

Source: Reid Middleton, Inc. and Mead & Hunt review of manufacturer specific airplane characteristics for airport planning documents.

Notes: 1 Runway length requirements based on CLM elevation of 291 feet AMSL and Standard Day temperature of 59° F and include a 176-foot adjustment (increase) due to 17.6-foot runway centerline elevation differential for Runway 8/26.

2 Runway length requirements based on CLM elevation of 291 feet AMSL and Hot Day temperature of 69.1° F and include a 176-foot adjustment (increase) due to 17.6-foot runway centerline elevation differential for Runway 8/26.

Bold *text reflects a length that exceeds the existing takeoff runway length.*

INDIVIDUAL AIRCRAFT RUNWAY LANDING LENGTH ANALYSIS

Typically, appropriate runway length analysis for airport design has focused on takeoff requirements, as aircraft takeoff performance dictates that more runway is needed on takeoff than on landing. However, runway landing length requirements have become a crucial part of the analysis with changes in the way large turbofan-powered aircraft are required to operate. The Takeoff and Landing Performance Assessment (TALPA) initiative, which became effective October 1, 2016, is aimed at reducing the risk of runway overruns by providing airport operators with a method to accurately and consistently determine runway conditions when a paved runway is not dry. The information enables airplane operators, pilots, and flight planners to determine the distance required to stop on a wet or contaminated paved runway in a more accurate manner. While this initiative is focused primarily on assessing and reporting runway pavement conditions through the use of a new assessment tool, it also acknowledges that landing performance data determined in compliance with part 25 during flight-testing and included in Airplane Flight Manuals (AFMs) is not representative of everyday operational practices (e.g., FAA Notice N 8900.375). Landing distances published in AFMs are shorter than actual landing distance in normal operations because rules applicable to normal operations require the addition of variable factors when determining minimum operational field lengths. Additionally, FAA AC 91-79A, *Mitigating the Risks of a Runway Overrun Upon Landing*, dated September 17, 2014, provides ways for pilots and aircraft operators to identify, understand, and mitigate risks associated with runway overruns during the landing phase of flight, and provides operators with detailed information to use for developing company standard operating procedures to mitigate those risks. The National Transportation Safety Board (NTSB) concluded that the FAA should provide current and comprehensive guidance regarding the risks associated with tailwind landings and raise awareness of the reduced margins of safety during tailwind landing operations, especially on wet or contaminated runways. These recommendations are also included in AC 91-79A.

Landing distances for large transport aircraft determined during certification tests are aimed at demonstrating the shortest performance distances for a given aircraft weight with a test pilot at the controls. Additionally, they are established with full awareness that operational rules for normal operations require the addition of factors to determine minimum operational field lengths. Therefore, the landing distances determined for large aircraft are much shorter than the landing distances achieved in normal operations. Additionally, in accordance with FAA certification rules, the FAA-approved Airplane Flight Manual (AFM) data are determined only for dry runway conditions. Some manufacturers provide supplemental FAA-approved AFM data for operation on wet grooved runways, and some manufacturers may also provide supplemental advisory landing distance data for conditions beyond those required by regulation. However, they are not to be used in lieu of the safety margins included AC 91-79A.

Table A6-5 presents the landing runway length analysis conducted for the most demanding individual business jet aircraft regularly operating at CLM using guidelines in Chapter 4 of AC 150/5325-4B and the aircraft manufacturer published APMs for determining recommended runway landing lengths. The landing runway lengths are adjusted for airport elevation (i.e., 291 feet AMSL) and MNMT of the hottest month (i.e., 69.1° F). The table also provides the operations by the individual aircraft for years 2015, 2020, and 2035.

The dry runway lengths are further adjusted based on Title 14 of the Code of Federal Regulations (14 CFR) Part 91.1037(b) and Part 135.385(b) **60 percent rule**, which govern the percentage of effective landing runway length at the destination or alternative airport of turbine-powered large transport category aircraft. 14 CFR Part 91.1037(c)(2) and Part 135.385(f) **80 percent rule** applies to eligible on-demand operators of turbine-powered large transport category aircraft with operations specifications (OpSpecs) and management specifications (MSpecs) permitting the operation at a particular destination or alternate airport. The 60 percent and/or 80 percent rules are applied to unfactored landing distances provided in the AFM to adjust for safety margins not accounted for in the aircraft certification process. Additionally, according to 14 CFR Parts 91.1037(e) and 135.385(d), the effective landing runway length is adjusted by another 15 percent for wet/slippery runway conditions, which occurs frequently at CLM, to further mitigate the risk of a runway overrun. CFR Part 91 prescribes rules governing the operation of aircraft within the United States. 14 CFR Part 135 prescribes rules governing the air transportation of persons or property for compensation or hire (i.e., charter, on demand, or air taxi operators), are issued a commercial operating certificate, and when operating turbojet engine powered aircraft have a passenger seat configuration of 30 or less seats.

Several aircraft runway landing length requirements exceed the Runway 26 available landing length of 4,993 feet when adjusted for the 60 percent or 80 percent rules and for wet runway conditions. As with the takeoff runway length analysis, the landing conditions are based on Maximum Landing Weight (MLW) loadings, which are often not required for landing operations at CLM.

Table A6-5. Existing Business Jet Runway Landing Length Requirements, In Feet

AIRCRAFT	FAA ACTUAL LANDING LENGTH (OVER 50' OBSTACLE)	DRY RUNWAY LENGTH (60%/80% RULE)[1]	WET RUNWAY LENGTH (60%/80% RULE)[2]	2015 OPERATIONS	2020 OPERATIONS	2035 OPERATIONS
Existing Runway 8 Landing Length Available			**6,347**			
Existing Runway 26 Landing Length Available			**4,993**			
75% of the Fleet (> 12,500 lbs. to ≤ 60,000 lbs. MTOW)						
Learjet 35A	2,900	**5,206**/3,905	**5,987**/4,491	60	50	20
Dassault Falcon 50 EX	4,875	**8,752**/6,564	**10,065/7,549**	20	40	70
Canadair Challenger 300	2,600	4,668/3,501	**5,368**/4,026	22	24	36
Learjet 45	2,668	4,790/3,592	**5,508**/4,131	24	24	10
Beechjet 400	3,514	**6,309**/4,732	**7,255/5,441**	32	36	26
Cessna Citation Excel (560XL)	3,180	**5,709**/4,282	**6,565**/4,924	36	35	20
100% of the Fleet (> 12,500 lbs. to ≤ 60,000 lbs. MTOW)						
Canadair Challenger 601	2,715	4,874/3,656	**5,605**/4,204	14	16	20
Learjet 60	3,420	**6,140**/4,605	**7,061/5,296**	26	30	40
Dassault Falcon 2000	5,220	**9,372/7,029**	**10,777/8,083**	10	10	16
Dassault Falcon 900 EX	3,660	**6,571**/4,928	**7,557/5,667**	18	20	24
Cessna Citation X (750)	3,400	**6,104**/4,578	**7,020/5,265**	12	14	30
Hawker 800XP	2,650	4,758/3,568	**5,471**/4,103	20	24	40

AIRCRAFT	FAA ACTUAL LANDING LENGTH (OVER 50' OBSTACLE)	DRY RUNWAY LENGTH (60%/80% RULE)[1]	WET RUNWAY LENGTH (60%/80% RULE)[2]	2015 OPERATIONS	2020 OPERATIONS	2035 OPERATIONS
> 60,000 lbs MTOW						
Gulfstream G-IV/G400/G450	3,260	**5,853**/4,390	**6,731/5,048**	14	16	20
Gulfstream G-V/G500	3,100	**5,565**/4,174	**6,400**/4,800	50	60	90
Gulfstream G550	2,770	4,973/3,730	**5,719**/4,289	4	8	20

Source: Reid Middleton, Inc. and Mead & Hunt review of manufacturer specific airplane characteristics for airport planning documents.

Notes: 1 Runway length requirements based on CLM elevation of 291 feet AMSL a Hot Day temperature of 69.1° F, and include an adjustment (increase) for FAA's 60 percent and 80 percent landing rule.

2 Runway length requirements based on CLM elevation of 291 feet AMSL, a Hot Day temperature of 69.1° F, and include an adjustment (increase) of 15 percent for wet/slippery runways.

***Bold** text reflects a length that exceeds the existing Runway 26 landing runway length of 4,993 feet.*

CONCLUSION – NON-REGULAR USE AIRCRAFT RUNWAY LENGTH

As presented in the Weather and Wind Analysis section of Chapter 4, Facility Requirements, the all-weather wind conditions at CLM favor the use of Runway 26 by nearly 19 percent compared to Runway 8 in consideration of the 13-knot crosswind component. The IFR wind conditions favor Runway 26 by more than 14 percent in consideration of the 13-knot crosswind component. Most aircraft approaching CLM do so from the east. Except when meteorological conditions dictate that aircraft utilize the ILS approach to Runway 8, it is more economical and sustainable for most aircraft operators to use Runway 26 for landing. Thus, it is prudent that Runway 26 provide adequate runway landing length for users of CLM, especially the operators of turbine-powered large transport category aircraft.

The analysis presented in **Table A6-5** demonstrates that the 4,993-foot landing distance provided by Runway 26 is lacking when compared to the factored landing length requirements of the large turbine-powered business jet aircraft that frequent CLM. While it is recognized that the hot day conditions and MLW do not always exist, by using these conditions it does provide the maximum safety benefits to landing aircraft for mitigating runway overruns risks. Therefore, based on this non-regular use aircraft runway length analysis, it is recommended that the Port of Port Angeles evaluate ways and means to regain, to the extent practical, the entire Runway 26 landing length of 6,347 feet.