CHAPTER 3

FACILITY REQUIREMENTS

INTRODUCTION

The purpose of the Facility Requirements chapter is to define the existing and future development needs for ORS. ORS needs defined here are based on an evaluation of whether the current facility meets FAA standards, maintenance needs for existing facilities, facility expansion needs driven by current and future demand, and issues and needs identified by users, airport staff, the FAA, and other stakeholders. The facility requirements analysis begins with a discussion of the critical (design) aircraft. The critical (design) aircraft is the most demanding aircraft with at least 500 annual operations that operates, or is expected to operate, at the airport. This is the aircraft that drives ORS design standards, safety zones, separation between facilities, and overall facility layout. The outcome of this airport master plan is a long-term resolution of current non-standard items that will move ORS from a classification for B-I (small) critical aircraft to B-II (small) critical aircraft.

3.1 CRITICAL (DESIGN) AIRCRAFT

This section identifies the design aircraft category and associated facility requirements in accordance with FAA planning guidelines. As noted in Chapter 2 *ORS Forecasts*, some of the aircraft that utilize ORS, such as the Cessna Caravan and the Pilatus PC-12 fall within the A-II category, while others, such as the Cessna Citation and the Beechcraft King Air are members of the B-II design group.

As explained in Chapter 2, categories of aircraft are grouped by performance (namely approach speed) and dimensions (wingspan, tail height, main landing gear width, and cockpit-to-main gear distance). It was also noted that there are more than 500 operations per year of aircraft in the B-category approach speed, such as the Beechcraft King Air 200, and that the Cessna Grand Caravan (an A-II aircraft with more than 500 operations per year by itself at ORS) has a minimum approach speed of 95 knots during icing conditions. Therefore, the critical design aircraft is a composite of the airplanes operating at ORS rather than a specific one, and the Runway Design Code (RDC) is B-II-1A-5000. This RDC accounts for the approach speed, dimensions, and visibility minimums of the mix of airplanes which account for most of critical operations at ORS.

3.2 AIRFIELD AND AIRSPACE REQUIREMENTS

3.2.1 Airfield Capacity

Airfield capacity is an estimate of the number of aircraft operations a runway can handle without an unacceptable level of delay. When demand begins to approach capacity, unacceptable delays can occur. Factors affecting capacity can include runway configuration, obstructions, ATC procedures, weather conditions, and fleet mix. FAA Advisory Circular 150/5060-5 *Airport Capacity and Delay*, contains capacity estimates for various airfield layouts and fleet mixes. This Advisory Circular estimates an Annual Service Volume (ASV) of 230,000 aircraft operations and an hourly capacity of 98 visual operations for an airfield like ORS. Total annual ORS operations reached 42,340 in 2017 (the base year) and are projected to grow slowly through the planning period to reach a maximum level of roughly 56,000 operations by 2037, far below the limit of 230,000 annual operations estimated in the Advisory Circular. Therefore, the ORS runway has adequate capacity through the 2038 planning period.

3.2.2 Runway Requirements

3.2.2.1 Runway Orientation

ORS has one runway oriented on an approximate north/south axis along the magnetic headings of 160 degrees and 340 degrees. This provides wind coverage of 99.89% at 13 knots, which is well within the 95% crosswind coverage requirement for B-II aircraft.

3.2.2.2 Runway 16-34 Length, Width, and Surface

This section addresses the ability of Runway 16-34 to meet FAA design standards for the Runway Design Code (RDC) B-II-1A-5000 design aircraft mix described in Section 3.1.

Some considerations when determining appropriate runway length include airport elevation, prevailing winds, average maximum temperature for the hottest month, and design aircraft performance at maximum operating

Table 3-1: Runway length analysis

Runway 16-34	
Mean Daily Maximum Temperature of the Hottest Month of Year:	70°F (July)
Airport Elevation:	34.7 feet (MSL)
Service:	Small Aircraft (less than 12,500 lbs.)
Aircraft Category	**FAA Recommended Runway Length**
Small airplanes with less than 10 passenger seats:	
95 percent of these small airplanes	2,900’
100 percent of these small airplanes	3,400’
Small airplanes with 10 or more passenger seats	3,800’

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

weight. A runway length analysis performed using the criteria in FAA Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design* to determine the runway length requirements for various aircraft configurations is shown in **Table 3-1**. This analysis indicates that the present runway length of 2,901 feet is adequate to meet current and future operational demands for approximately 95 percent of all small airplanes with less than 10 passenger seats.

Advisory Circular 150/5325-4B also contains a provision that justifies a runway length that can serve 100 percent of the fleet (**Table 3-1**). This provision is for airports “primarily intended to serve communities located on the fringe of a metropolitan area or a relatively large population remote from a metropolitan area.” As stated earlier, the airport is somewhat unique because it serves a population in excess of 5,000 people isolated on an island off the continental mainland. In addition, the island is a popular tourist destination in the summer, which results in peak demand for air service. Many of these flights originate and terminate in Seattle, a major metropolitan area. Also, instrument meteorological conditions (IMC) prevail during the late fall, winter, and early spring months, and business and air taxi operations continue during these periods. The only reliable transportation to other areas is by the airport and the ferry system. Options that include additional runway length will be explored in the Alternatives chapter.

FAA AC 150/5300-13A *Airport Design* requires that runways intended for B-II aircraft have a width of 75 feet with 10-foot turf shoulders as a minimum. Runway 16-34 is currently 60 feet wide with unpaved shoulders of unknown width.

The existing runway surface is asphalt with a reported pavement strength sufficient to support aircraft with single-wheel main gear and gross weights up to 12,500 pounds. An aggregate friction seal coat was applied in May 2017. The most recent addition of structural asphalt to the runway was a two-inch overlay constructed in 1986. In 2017 the taxilane north of the AWOS was reconstructed, as well as was the EMS access road to the helipad.

3.2.2.3 Runway Separation and Safety Standards

Separation standards are established by the FAA with the purpose of preventing conflicts between two aircraft passing on surfaces such as runways and taxiways. A summary of these and other characteristics regarding airfield geometry are provided in **Table 3-2**. These areas are graphically depicted in **Figure 3-1**.

The current separation distance between Runway 16-34 and parallel Taxiway A is 150 feet—the requirement for a B-I (small) airport. For a B-II (small) designation, however, the separation requirement between a runway and its parallel taxiway is 240 feet. In addition, the current 194.5-foot separation between the runway and adjacent aircraft parking is much less than the 250 feet required for a B-II (small) airport.

On the west side of the runway there is a short section of parallel taxiway that extends approximately 420 feet north and 190 feet south from Taxiway B1. The separation distance between this section of parallel taxiway and the runway centerline is about 180 feet. Another short section extends north of Taxiway B2 for approximately 200 feet and south for 70 feet. This taxiway is about 150 feet from the runway centerline. These parallel taxiways, designated Taxiway B, provide access to private hangars and through-the-fence operations on the west side of the airfield. Neither section meets the minimum separation distance of 240 feet for a B-II (small) airport.

A Runway Safety Area (RSA) is a defined, graded area surrounding the runway that, in the event of the departure of an aircraft from the runway, must be capable under normal (dry) conditions of supporting the aircraft without causing structural damage to it or injury to its occupants. The existing RSA is 30 feet too narrow and 60 feet too short (beyond each runway end) to meet FAA design standards for a B-II(small) airport.

The FAA has identified land use standards for Runway Protection Zones (RPZ). An RPZ is an area at ground level prior to the threshold or beyond the runway end to enhance the safety and protection of people and property on the ground. FAA Advisory Circular 150/5300-13A *Airport Design* states, "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." Examples of incompatible uses include buildings, recreation uses, roads and parking, fuel and hazardous material storage, and above ground utilities. Ideally, land containing RPZ areas will be owned by the airport sponsor and will be cleared and kept clear of incompatible objects and activities.

Brandt's Landing Lane, a small road around the north end of the runway, is the only encroachment into the Runway 16 RPZ. This road is infrequently used and is controlled by a gate across it at the property boundary on the west side of the runway alignment. Airport operations require the gate to be closed during nighttime hours. Incompatible land uses within the Runway 34 RPZ include Mount Baker Road and Lovers Lane.

The FAA's guidance on land uses within RPZ's recommends avoiding introducing new uses, modifying/expanding existing incompatible uses, and removing or mitigating the incompatible uses, if practical. Consideration should be given to ways to remove or relocate Brandt's Landing Lane on the north end of the runway and Mount Baker Road and Lovers Lane on the south end.

Runway Object Free Areas (ROFA) and Runway Object Free Zones (ROFZ) enhance aircraft safety by providing clearance around runways and providing adequate airspace. The ROFA is centered on the runway centerline at ground level. Objects non-essential for air navigation or aircraft ground maneuvering must not be placed within the ROFA. This includes parked aircraft. The existing ROFA is 250 feet too narrow and 60 feet too short (beyond each runway end) to meet FAA standards. Aircraft also currently park within the ROFA, which is another non-standard condition. The ROFZ is compliant with design standards.

Although blast pads are not required for this airport, the 256 feet of pavement on the south end of the runway and the 231 feet of pavement on the north end of the runway are marked as blast pads. The standard blast pad length is 60 feet for the current B-I (small) designation and 150 feet for the expected B-II (small) designation. The current blast pads are narrower and much longer than standard and could cause confusion regarding the purpose of the pavement. If blast pads are to be included with the runway environment in the future, they should comply with applicable standards.

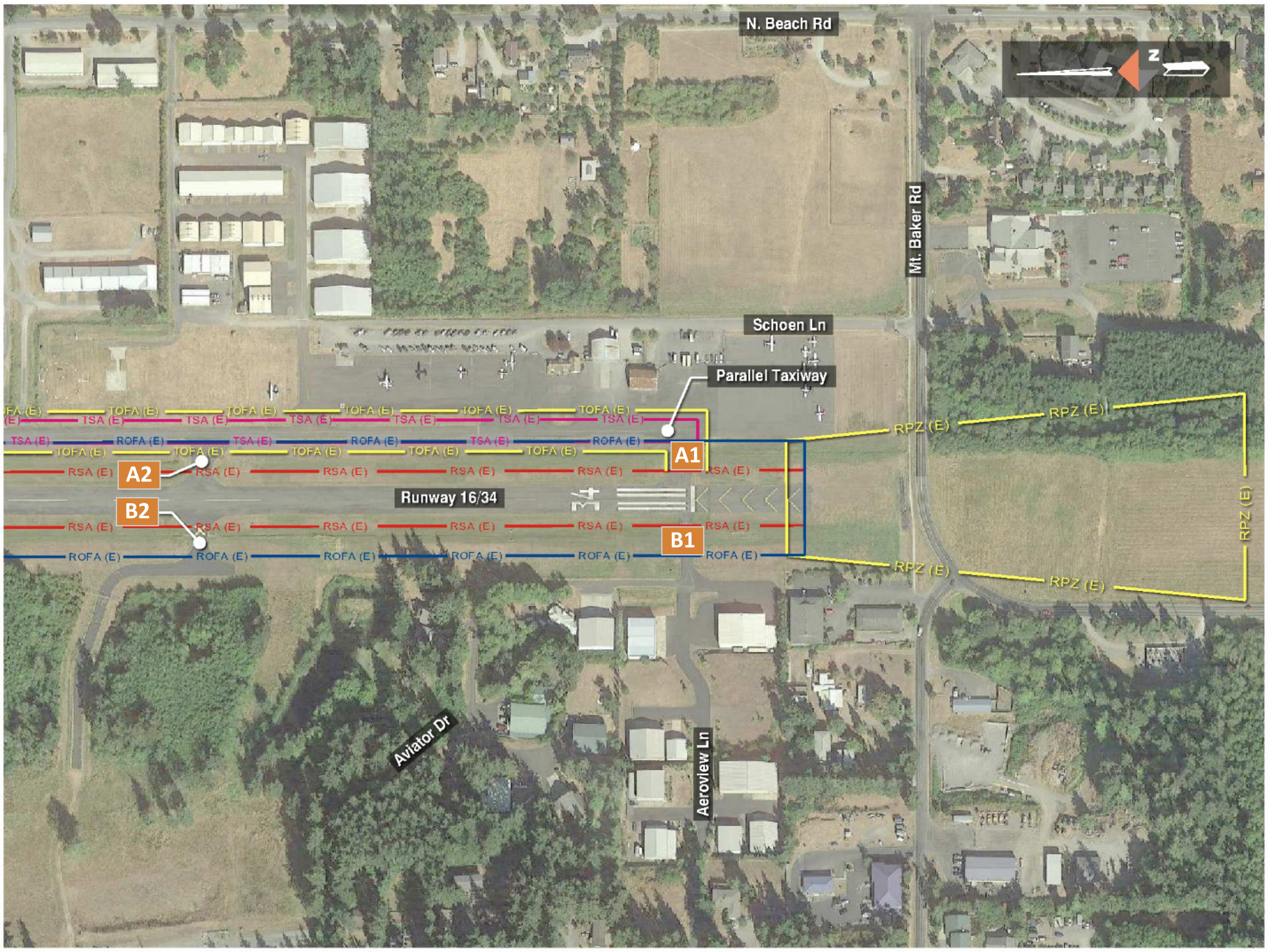
A Building Restriction Line (BRL) indicates where buildings must not be in relation to aircraft movement areas and overlying airspace. For the existing and future Primary Surface width of 500 feet, the BRL must extend to 390 feet either side of the runway centerline for buildings up to 20 feet high, and to 495 feet for buildings up to 35 feet high. Both of these BRL limits enclose numerous buildings on both sides of the runway. In addition, the terrain along the south end of the runway rises significantly to the east and to the west causing even greater encroachments into the airspace. Notable classifications of this airspace are explained in Section 3.2.5.1 *Part 77 Surfaces* below. Some of

Table 3-2: Runway 16-34 requirements

Runway	FAA Design Standard	Existing Condition	Compliance Condition If Met (☒)
Runway 16-34 (NPI/Visual)	B-II (small)	B-I (small)	
Runway Length	2,901’	2,901’	▪
Runway Width	75’	60’	
Runway Shoulder Width	10’	unknown	
Blast Pad Width	95’	60’	
Blast Pad Length	150’	256’(south), 231’(north)	
Runway Safety Area Width	150’	120’	
Runway Safety Area Length Beyond RW End	300’	240’	
Obstacle Free Zone Width and Length	250’ x 200’	250’ x 200’	▪
Runway Object Free Area Width	500’	250’	
Runway Object Free Area Length Beyond RW End	300’	240’	
Runway Protection Zone Length	1,000’	1,000’	▪
Runway Protection Zone Inner Width	250’	250’	▪
Runway Protection Zone Outer Width	450’	450’	▪
Runway Protection Zone Land Uses Runway 16	Owned by the Port No roadways Clear of structures	Mixed ownership by the Port and private individuals. Nina Lane crosses RPZ.	
Runway Protection Zone Land Uses Runway 34	Owned by the Port No roadways Clear of structures	Owned by the Port with the exception of Mt Baker Road which crosses the RPZ	
Runway Separation, Runway centerline to:			
Holding position	125’	125’	▪
Parallel taxiway/taxilane centerline	240’	150’	
Aircraft parking area	250’	194.5’	
Building restriction line	Varies	Varies	

Sources: FAA AC 150/5300-13A

Figure 3.1. Runway protection areas



these buildings, primarily those in the southwest corner of the airfield, are associated with the through-the-fence operations which have access to the runway via Taxiway B1. Future development should include the removal of these structures from within the BRL.

3.2.3 Taxiways and Helipad

3.2.3.1 Taxiways

Taxiways and taxilanes are surfaces at ORS that provide aircraft with safe and efficient transitions from lease lots and tie down areas to runways. Airplane Design Group (ADG) dimensions, in conjunction with Taxiway Design Group (TDG) standards, are used to create safe aircraft taxi routes. The FAA sets standards for width, safety areas, and object free areas along with appropriate geometry for turns and intersections. An emphasis is put on identifying and reducing potential areas of conflict in movement areas referred to as “hot spots.” The taxiway fillets (turning geometry) are determined using TDG dimensions, which are based on the Main Gear Width (MGW) and the Cockpit-to-Main-Gear Distance (CMG) of the design aircraft. ORS taxiway fillet design is based on a critical design aircraft with a TDG 1A designation. The Cessna Grand Caravan, which has an 11’ 8” MGW, falls under the 1A TDG.

Taxiway and taxilane safety areas (TSA) reduce the risk of damage to aircraft deviating from the

Table 3-3: Taxiway and taxilane requirements

Taxiway/Taxilane	Applicable FAA Standard – ADG, TDG	Existing Condition	Compliance Condition If Met (■)
Parallel Taxiway (A[1])	**B-II, 1A**	**B-I, 1A**	
Width	25’	25’	■
Taxiway Safety Area	79’	49’	
Taxiway Object Free Area	131’	89’	
Taxiway A1[1]	**B-II, 1A**	**B-I, 1A**	
Width	25’	35’	■
Taxiway Safety Area	79’	49’	
Taxiway Object Free Area	131’	89’	
Taxiway A2[1]	**B-II, 1A**	**B-I, 1A**	
Width	25’	45’	■
Taxiway Safety Area	79’	49’	
Taxiway Object Free Area	131’	89’	
Taxiway A3[1]	**B-II, 1A**	**B-I, 1A**	
Width	25’	35’	■
Taxiway Safety Area	79’	49’	
Taxiway Object Free Area	131’	89’	
Taxiway A4[1]	**B-II, 1A**	**B-I, 1A**	
Width	25’	115’	■
Taxiway Safety Area	79’	49’	
Taxiway Object Free Area	131’	89’	
Taxiway B1[1]	**B-I, 1A**	**B-I, 1A**	
Width	25’	25’	■
Taxiway Safety Area	49’	49’	■
Taxiway Object Free Area	89’	89’	■
Taxiway B2[1, 2]	**B-I, 1A**	**B-I, 1A**	
Width	25’	35’	■
Taxiway Safety Area	49’	49’	■
Taxiway Object Free Area	89’	89’	■

[1] Existing taxiways are designated Taxiway A for the parallel taxiway, and Taxiways A1-A4 for the connector taxiways on the east side of the runway from south to north. Corresponding taxiways on the west side are designated as B1 and B2, aligning with connectors on the east side of the runway.

[2] Taxiway B2 is currently marked with a painted taxiway closure X and is not in use.

main taxiway surface (**Figure 3-1**). The taxiway and taxilane Object Free Areas (OFA) provide clear space around taxiing aircraft free of vehicle service roads, parked aircraft, and other objects (except for necessary air or ground navigation facilities). In conjunction with ADG distances, taxiway OFA dimensions are based on wingtip clearances when aircraft are moving along a marked centerline.

Table 3-3 provides the FAA recommended design standards for taxiways and taxilanes, compares them to existing taxiways and taxilanes at ORS, and identifies deficiencies.

Taxiway A runs parallel to Runway 16-34 on its east side and is linked to it via connecting Taxiways A1, A2, A3, and A4, which are labeled from south to north (See **Figure 3.2**). Taxiways B1 and B2 are located on the west side of the runway and are opposite Taxiways A1 and A2. The connecting taxiways vary in width from 25 feet at B1 to 115 feet at A4. The standard width for a TDG 1A taxiway is 25 feet. All taxiways meet at least the minimum width requirement. Currently, there is a need for a holding apron at Taxiway A4 to alleviate congestion of traffic departing on Runway 16. The holding apron should be at least 200 feet long and will require a taxiway-to-taxiway separation distance of 105 feet for a B-II airport. The Alternatives chapter shows configurations of proposed holding aprons at Taxiway A4.

As shown in **Figure 3-2** Taxiway A1 has direct access from the apron to the runway. This configuration creates situational awareness issues with pilots and could allow an inadvertent runway incursion. AC 150/5300-13A Chapter 4 *Taxiway and Taxilane Design* illustrates preferred taxiway routes from parking aprons to the runway. It is advisable that the taxiway structure be changed to prevent direct access from the apron to the runway. Simply painting an island on the pavement between the apron and Taxiway A directly in front of A1 so that a turn is required by aircraft taxiing to the runway would resolve the issue.

The centerline striping leading from Taxiway A onto Taxiways A1, A2, and A3 converge past the hold lines because of constraints imposed by the existing runway/taxiway separation distance. These markings could inadvertently

Figure 3-2

lead an aircraft to pass the hold line and enter the runway environment. In addition, reopening Taxiway B2 to provide access to planned development west of the runway would create a high-energy crossing between Taxiways A2 and B2 within the middle third of the runway.

There are currently no based helicopters at ORS, although medical helicopters and transient helicopters routinely operate there and utilize the helipad described previously. The Alternatives chapter contains multiple options for locating a helipad.

3.2.4 Navaids, Weather, Lighting, Marking, Signage

3.2.4.1 Navaids and Weather Reporting Equipment

Runway 16 is served by a four-light Precision Approach Path Indicator (PAPI) that is owned and maintained by the FAA. It has a visual glide path aiming angle of 3.48 degrees to allow approaching aircraft to clear obstructions. This PAPI was installed in 2017. Runway 34 is served by a two-light PAPI that is owned and maintained by ORS. It has a 4.00-degree glide path angle for obstruction clearance. Per FAA guidance, a glide path angle higher than three degrees requires publication of the fact in the FAA Chart Supplement. In addition, a note in the Chart Supplement for the Runway 34 PAPI states that this PAPI has been baffled to limit the horizontal visibility of it west of the runway centerline to avoid obstacles. It further states, “During descent, close alignment to the runway centerline is necessary.” It is desirable that conflicts with obstructions that necessitate the high glide path angles and baffled PAPI be resolved. Relocation or realignment of the ORS runway will require that these PAPI’s be relocated, recalibrated, and flight checked by the FAA Flight Standards Office.

The rotating beacon for ORS, installed in 2006, is located at midfield 350 feet east of the runway centerline near the segmented circle and AWOS equipment. No changes are planned for the rotating beacon.

There are three wind cones on the airfield. The primary wind cone is in the center of the segmented circle. There is also a secondary wind cone 170 feet north of the approach end of Runway 16 near the airport property line approximately 200 feet east of the runway centerline. Another wind cone is mounted on top of a private hangar 260 feet east of the Runway 34 centerline and 160 feet south of the airport terminal. Wind speed and direction can be markedly different at these three locations. All three are within either the Runway Object Free Area or the Taxiway Object Free Area of the planned B-II Airport configuration. They will need to be moved or mounted on frangible couplings in conjunction with future airport improvement work.

The weather-reporting equipment at ORS is an AWOS-III, which received equipment upgrades in 2017. The AWOS is located at midfield 350 feet east of the runway centerline. If the chosen alternative includes a configuration that puts the AWOS equipment inside the Object Free Area, the equipment will need to be relocated.

3.2.4.2 Airside Lighting, Markings, and Signage

Runway lighting at ORS includes Runway End Identifier Lights (REIL’s) and a Medium-Intensity Runway Lighting (MIRL) system. Taxiway and parking area lighting consists of a mixture of incandescent and LED lights and some solar-powered lights. Runway markings are non-precision markings applied in 2017. Taxiway, taxilane, and parking area markings were also all newly applied in 2017. Airfield signage consists of lighted and unlighted runway and taxiway signs providing aircraft with direction and destination information. In addition, Runway Distance Remaining signs are installed on the west side of the runway. No further work is planned for these items. If the runway and/or taxiway is widened, relocated, or realigned, however, revisions will need to be made to each of these airfield elements.

3.2.5 Airspace Requirements

3.2.5.1 Part 77 Surfaces

Part 77 of Title 14 of the Code of Federal Regulations (14 CFR Part 77) is the federal code governing navigable airspace. This code classifies airspace in the United States into various categories of surfaces based on dimensions, use, allowable penetrations, etc.

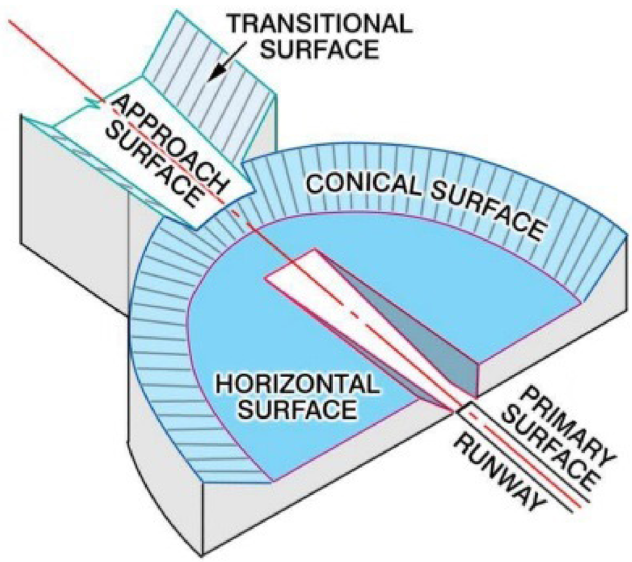
The different kinds of airspace are collectively referred to as Part 77 surfaces. The Part 77 surfaces affecting an airport include the Primary Surface, Approach Surfaces to the runways, Transitional Surfaces, Horizontal Surfaces, and Conical Surfaces. These surfaces are graphically shown in **Figure 3-3**. **Table 3-4** contains information on the dimensions of the various surfaces for the existing and planned conditions.

Protecting the airspace around ORS by preventing incompatible land uses within and beyond the airport property is important to the safety of aircraft operations. The San Juan County Code (SJCC) contains restrictions on anything (e.g. structures, vegetation, etc.) that might encroach into ORS Part 77 surfaces. In addition to height limitations, 18.40.030 SJCC contains prohibitions on activities that could interfere with operations

Table 3-4: Part 77 surfaces

Component	Identified Need or FAA Standard	Existing Condition	Corrective Action
RW 16: Non-Precision Instrument Approach, 1 statute mile visibility (min.), Utility Runway			
Length of Primary Surface	200’ beyond runway end	440’ beyond runway end	NONE
Width of Primary Surface	500’	500’	NONE
Radius of Horizontal Surface	5,000’	5,000’	NONE
Approach Surface Outer Width	2,000’	1,500’	Adjust to meet standards
Approach Surface Length	5,000’	5,000’	NONE
Approach Slope	20:1	20:1	NONE
RW 34: Non-Precision Instrument Approach, 1 statute mile visibility (min.), Utility Runway			
Length of Primary Surface	200’ beyond runway end	465’ beyond runway end	
Width of Primary Surface	500’	500’	NONE
Radius of Horizontal Surface	5,000’	5,000’	NONE
Approach Surface Outer Width	2,000’	1,500’	Adjust to meet standards
Approach Surface Length	5,000	5,000	NONE
Approach Slope	20:1	20 :1	NONE
BRL (Transitional Surface)	35’ Transitional Surface clearance at BRL	Varies	Remove or light obstructions

Figure 3-3: Part 77 surfaces



at the airport, including land use that produces a bird-strike hazard, lights that could cause a visual hazard, activity that produces smoke or haze, etc. The Airport should continue to work with local and state governments to prevent incompatible land uses using the SJCC and other means. As explained above, numerous buildings on both sides of the runway are within the Building Restriction Line (BRL) and encroach into the overlying airspace.

3.2.5.2 Instrument Procedures

ORS has three Instrument Approach Procedures (IAPs) and a Departure Procedure (DP). All are RNAV (GPS) procedures and require that aircraft using them be equipped with the appropriate GPS equipment to fly the procedures. GPS, a type of satellite navigation system, is becoming the most common type of area navigation and is replacing older equipment that utilizes ground-based navaids such as VOR, VORTAC, and NDB stations.

The three instrument approach procedures at ORS are the RNAV RWY 16 approach, the RNAV RWY 34 approach, and the RNAV -A approach (**Figures 3-4.A, 3-4.B**, and **3-4.C**, respectively). All three approach procedures have non-standard minimum criteria for takeoff operations, and all three have non-standard minimum criteria before ORS can be listed as an alternate airport in an IFR flight plan. In each case, flight visibility and cloud height requirements are greater than standard criteria because of obstructions in the surrounding airspace. Night landings on Runway 34 are not authorized using any of these instrument procedures.

The FEGBA TWO departure is an RNAV Standard Instrument Departure (SID) for ORS that allows GPS-equipped aircraft to take off to the south and transition to the enroute phase of an IFR flight (**Figure 3-4.D**). It requires contact with ATC for radar vectors into controlled airspace, and it requires a lateral navigation accuracy of one nautical mile (RNAV-1) for its use. It also has non-standard takeoff minimums due to obstructions in the surrounding airspace. Any modifications to the runway location or orientation at ORS must consider the effects that such changes will have on these instrument procedures. It is unlikely any small shift in the runway would have a major effect on the minimums of the existing instrument procedures. Due to terrain, instrument procedure minimums are unlikely to improve.