3.22 Aviation

An important goal of the IBR Program is to avoid or minimize hazards to aircraft navigation at nearby airports and associated airspaces. This section discusses existing aircraft navigation conditions and evaluates the associated beneficial and adverse effects of the Modified LPA and the No-Build Alternative.

There are two airports near the study area: Pearson Field in Washington and Portland International Airport (PDX) in Oregon. Each of these airports has federally protected airspace regulated by the Federal Aviation Administration (FAA). Long-term effects to aviation were evaluated using federal aviation regulations, which are the FAA rules that govern all U.S. aviation activities. Federal aviation regulations relevant to the IBR Program include regulating air navigation systems, lights or glare that may affect visibility, and management of wildlife hazards that may increase the probability of aircraft strikes.

The information presented in this section is based on analyses found in the Aviation Technical Report.

3.22.1 Changes or New Information Since 2013

The Columbia River Crossing (CRC) Selected Alternative identified in the 2011 Record of Decision (ROD), as revised by the 2012 and 2013 re-evaluations, is referred to as the CRC Locally Preferred Alternative (CRC LPA). Over the past 10+ years since the CRC LPA was identified, the physical environment in the study area, community priorities, and regulations have changed, which necessitated design revisions and resulted in the IBR Modified LPA (see Section 2.5.2). Evaluation of potential impacts associated with aviation has been updated in this Draft SEIS to include:

- Changes to aviation conditions and needs.
- Changes to federal, state, and local aviation regulations.
- New bridge configurations added for evaluation due to changed conditions that would each have varying heights with respect to proximity to protected airspace.

The main IBR Program component relevant to aviation is the replacement bridges over the Columbia River. The CRC LPA and IBR Modified LPA would both include a pair of double-deck fixed-span bridge configurations with 193 feet maximum height of the bridge with signage and luminaires. The Modified LPA also includes two additional configuration options: a single-level fixed-span configuration and a single-level movable-span configuration.

Table 3.22-1 compares the impacts and benefits between the CRC LPA and the IBR Modified LPA from the changes listed above. Based on this analysis, the Modified LPA would have the same or similar effects as the CRC LPA on aviation. A detailed description of impacts and benefits to aviation from the Modified LPA and associated design options follows.

Table 3.22-1. Comparison of CRC LPA Effects and IBR Modified LPA Effects to Aviation

Technical Considerations	CRC LPA Effects as Identified in the 2011 Final EIS	Modified LPA Effects as Identified in the Draft SEIS	Explanation of Differences
Aviation Safety	Less intrusion into Pearson Field protected airspace compared to the existing Interstate Bridge. Reduced potential for bird nesting or roosting.	Same as CRC for all configuration options.	N/A

Note: The CRC LPA and Modified LPA effects are as compared to a No-Build Alternative, unless otherwise noted.
CRC = Columbia River Crossing; LPA = Locally Preferred Alternative; N/A = not applicable; SEIS = Supplemental Environmental Impact Statement

3.22.2 Existing Conditions

Protected airspace is regulated by FAA per 14 Code of Federal Regulations (CFR) Part 77, including several imaginary[1] surfaces, in space and on the ground, established in relation to an airport and its runways. Figure 3.22-1 illustrates the following protected surfaces for civil (commercial) airports, such as Pearson Field and PDX, as defined in 14 CFR § 77.19:

Approach, departure, and other protected air navigation surfaces represent imaginary lines extending upward and outward from the center of the runway that define the area for evaluation of potential obstructions to safe takeoffs and landings.

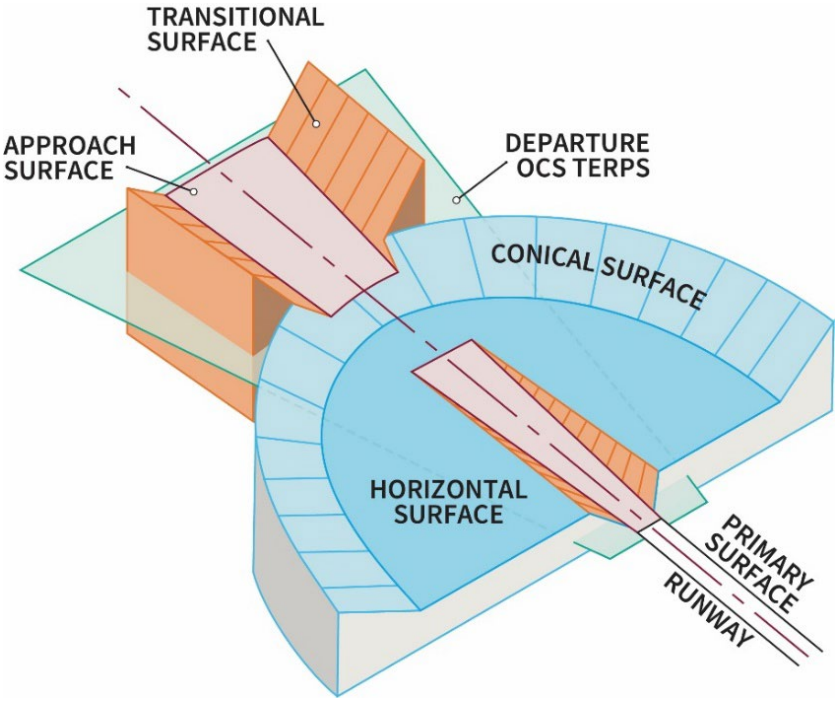
- **Horizontal surface**. A horizontal plane 150 feet above the established airport elevation.
- **Conical surface**. A surface extending outward and upward from the periphery of the horizontal surface at a slope of 20 feet of run to 1 foot of rise for a horizontal distance of 4,000 feet.
- **Primary surface**. A surface longitudinally centered on a runway.
- **Approach surface**. A surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. The approach surface protects the airspace for aircraft on approach to land, ensuring that there are no obstacles or structures that could pose a hazard to aircraft during their approach and landing phases.

Transitional surfaces. These surfaces extend outward and upward at right angles to the runway centerline and the runway centerline extended at a slope of 7 to 1 from the sides of the primary surface and from the sides of the approach surfaces. Transitional surfaces ensure obstacle clearance for aircraft during the initial phases of their approach and departure.

In addition, aircraft departures from airports are managed by procedures developed under FAA Order 8260.3E U.S. Standard for Terminal Instrument Procedures (TERPS) as established in 14 CFR Part 95 and Part 97. Departure procedures must evaluate obstacles that penetrate a 40 feet of run to 1 foot of rise slope beginning at the end of a runway, which is called the "obstacle clearance surface" (OCS). If obstacles penetrate the OCS, then the airport is required to establish obstacle departure procedures for aircraft pilots.

[1] Surfaces are called imaginary because a person cannot see them; however, they define volumes of airspace to protect air navigation.

Figure 3.22-1. Typical Civil Airport Protected Airspaces



Portland International Airport

PDX is located about 3 miles southeast of the Interstate Bridge on the Oregon side of the Columbia River. It is the Portland area's major regional and international airport and serves large commercial passenger and freight service, private aircraft, and the Oregon Air National Guard. Potential future expansions include runway extensions and the addition of a new runway; however, the most recent Airport Master Plan update determined that these facilities would not be required through the 2035 planning horizon (Portland Bureau of Planning and Port of Portland 2008). Protected Part 77 airspace for PDX in the vicinity of the Interstate Bridge is approximately 130 feet above the top of the lift-span towers, and the Interstate Bridge is outside the OCS for PDX. As a result, the existing Interstate Bridge creates no intrusion or hazard for aircraft navigation at PDX.

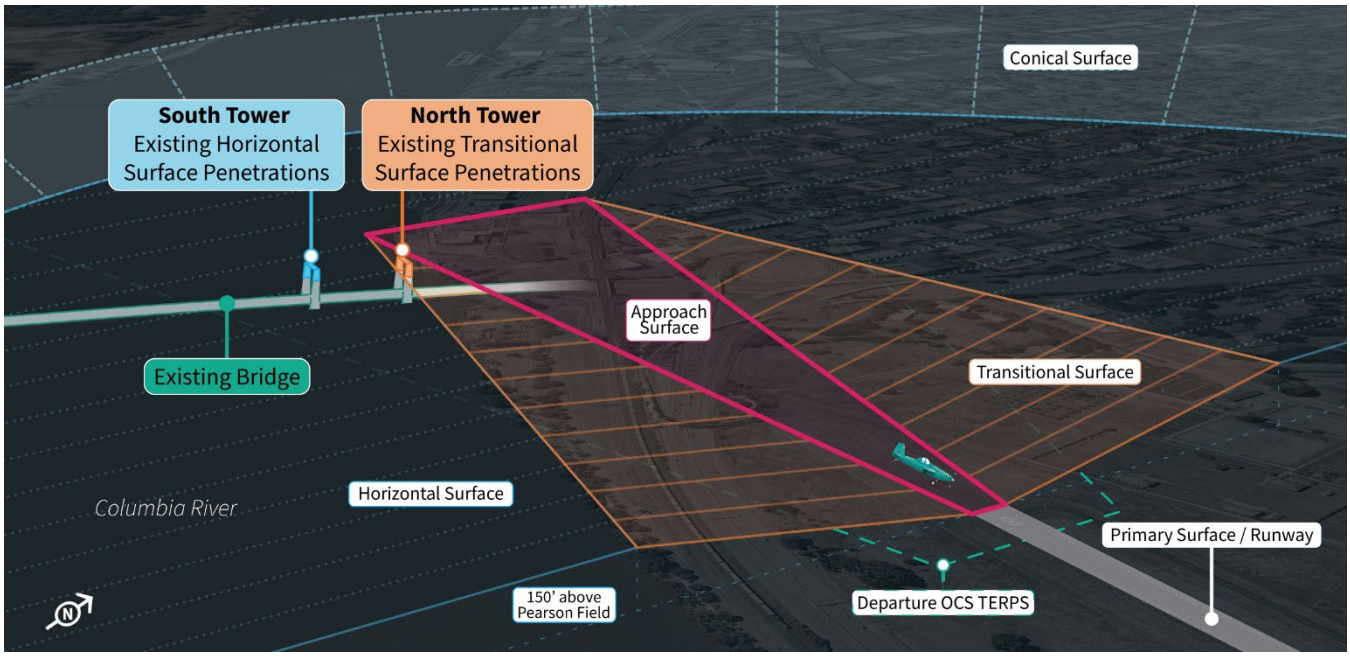
Pearson Field

Pearson Field, on the Washington side of the Columbia River, serves primarily small, piston-engine aircraft weighing 10,000 pounds or less. Because it is surrounded by developed urban uses and the Vancouver National Historic Reserve, there are no plans to expand facilities or operations at this airfield.

The existing Interstate Bridge and Pearson Field both predate current 14 CFR Part 77, Part 95, and Part 97 regulations. Currently, the Interstate Bridge lift-span towers intrude into Part 77–protected airspace (70 feet into the horizontal surface and 98 feet into the transitional surface) and the OCS for Pearson Field (see Figure 3.22-2). To mitigate these conditions, the existing lift-span towers are marked with lights, and the FAA issues obstacle departure procedures to avoid the Interstate Bridge lift towers.

Furthermore, the existing Interstate Bridge's open-truss framing unintentionally provides bird roosting and nesting areas, which in turn can contribute to potential wildlife strike hazards for aircraft. Wildlife strikes can cause damage to aircraft and potential loss of life; thus, birds and their habitat are an important concern at Pearson Field. To date, ODOT has used deterrents such as sound cannons to discourage birds from using the existing bridges.

Figure 3.22-2. Pearson Field Protected Airspace – Existing Bridge Penetrations



3.22.3 Long-Term Effects

No-Build Alternative

Under the No-Build Alternative, the Interstate Bridge lift-span towers would continue to intrude on Pearson Field's protected airspace. Existing obstacle departure procedures would remain in place for pilots. The open-truss structure of the existing bridge would continue to provide bird roosting and nesting habitat, functioning as a potential source of aircraft wildlife strike hazards. Hazards to aviation would remain because the Interstate Bridge lift-span towers have historically been an aviation hazard, and aircraft wildlife strike hazards from birds using the structure are documented and subject to mitigation measures.

Modified LPA

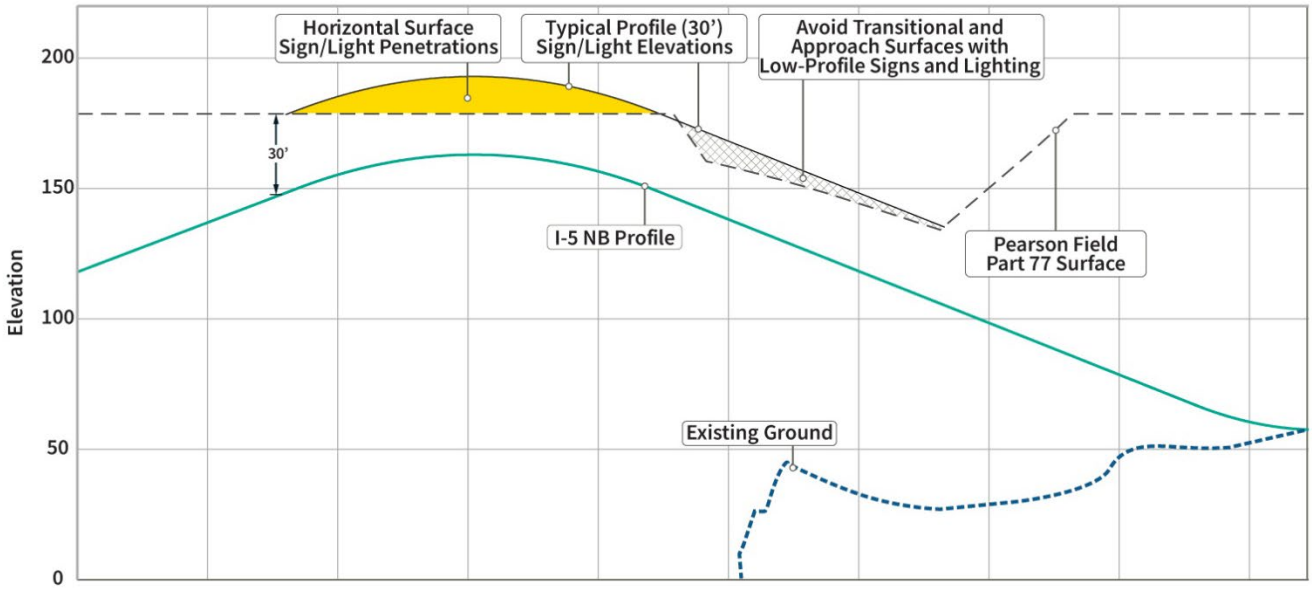
The Modified LPA, including all design options, would benefit aviation safety and efficiency. The new Columbia River bridges would be located slightly farther downstream and thus slightly farther from Pearson Field compared to the existing Interstate Bridge. The IBR Program has assumed a 17-foot vertical clearance envelope above the roadway surface to account for the height of vehicles operating on the highway. Above this envelope, the IBR Program assumes an additional 13-foot envelope to accommodate signs and lighting. The FAA provided feedback on potential penetrations, noting penetrations in the horizontal and transitional surfaces could be mitigated with low-profile signs and lighting, but penetrations in the approach surface could not be mitigated. Therefore, as bridge design progresses, the IBR Program will pursue designs that avoid penetrating the approach surface at Pearson Field. Effects to protected airspaces by bridge configuration include the following, summarized in Table 3.22-2:

- The roadway deck for the Modified LPA with a double-deck fixed-span configuration would have an approximate maximum height of 160 feet and would be outside protected airspace for Pearson Field. The 17-foot envelope above the deck for vehicle traffic would also avoid penetration of all protected airspace. The current design assumes a 13-foot envelope for signs and lighting above the vehicle envelope. If designed to the extent of this envelope, some signs and lighting would penetrate the horizontal surface to a maximum depth of

12.5 feet. Where needed, low-profile signs and lighting would be used to avoid intrusions into the approach and transitional surfaces (Figure 3.22-3 and Figure 3.22-4).

- The single-level fixed-span configuration (with the girder, extradosed, and finback bridge types)[2] would avoid intrusions to protected airspace.
- The lift-span towers for the Modified LPA with the single-level movable span configuration would penetrate the Pearson Field protected airspace, specifically the horizontal surface. The penetration would be located south of the existing tower locations, such that the new obstructions would not penetrate the Pearson Field transitional or approach surfaces (Figure 3.22-5). Therefore, although the single-level movable-span configuration would penetrate Pearson Field horizontal surface, it would not likely be a hazard to aviation.

Figure 3.22-3. Locations for Low-Profile Signs and Lights on Modified LPA with Double-Deck Fixed-Span Configuration (Profile View)



[2] See Chapter 2, Description of Alternatives, for more information on the girder, extradosed, and finback bridge types.

Figure 3.22-4. Locations for Low-Profile Signs and Lights on Modified LPA with Double-Deck Fixed-Span Configuration (Plan View)

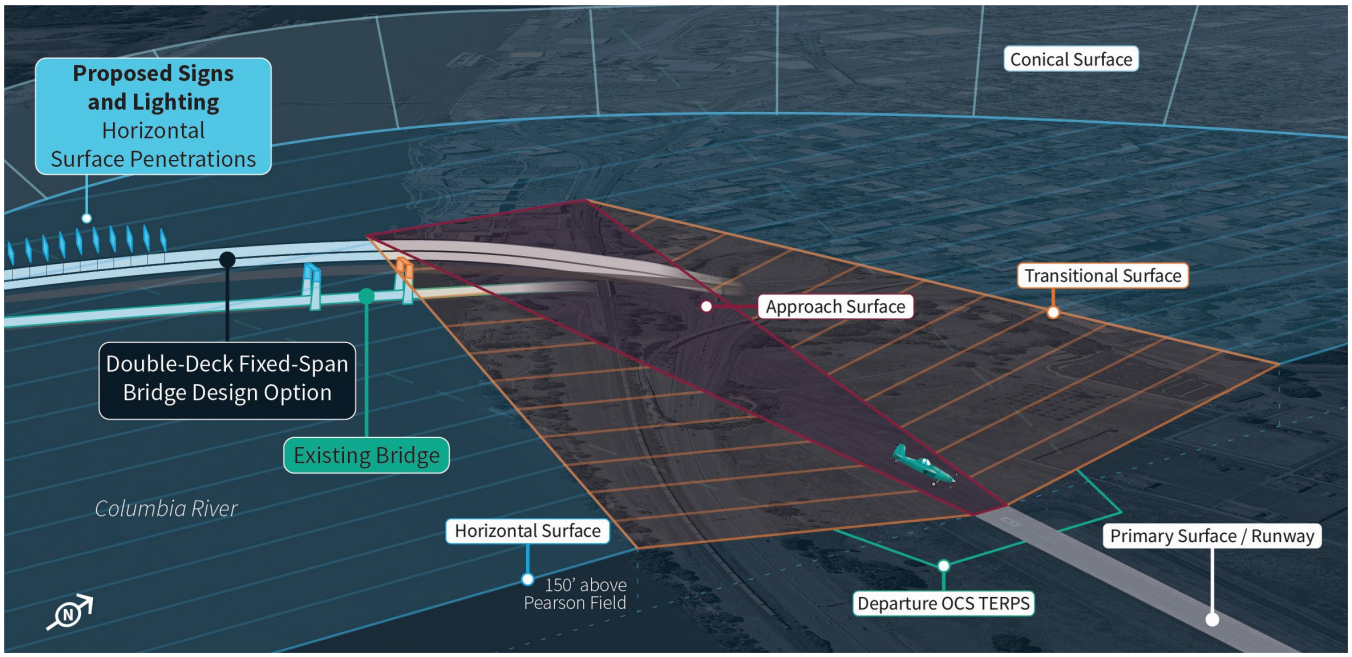
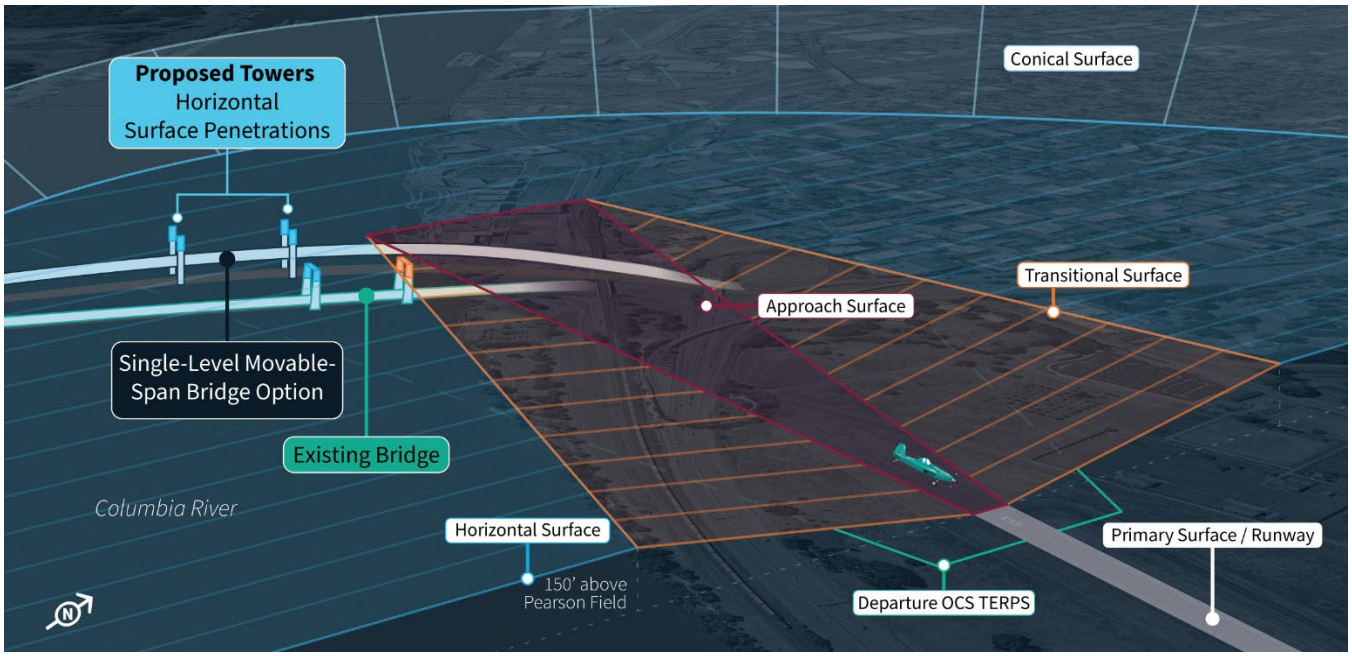


Figure 3.22-5. Pearson Field Protected Airspace – Modified LPA with Single-Level Movable-Span Configuration Intrusion



The goal of the new Columbia River bridges configuration and alignment is to minimize effects on both Columbia River marine navigation and Pearson Field air navigation. However, the vertical navigation clearance for marine vessels/cargo and the westbound departure OCS for Pearson Field overlap. Therefore, obstruction of the westbound departure OCS is unavoidable by any configuration or alignment. Under all the design options and configurations for the Modified LPA, westbound departure procedures would be required,

though these departure procedures would be to a lesser degree than the No-Build Alternative (Table 3.22-2). The effects of the Modified LPA on westbound departure procedures include:

- The Modified LPA with either the double-deck fixed-span configuration or the single-level fixed-span configuration (all bridge type options), including with the C Street ramps design option, would decrease the No-Build Alternative westbound departure procedures climb gradient from 650 feet per nautical mile (ft/NM) to approximately 427 ft/NM (double-deck) and 474 ft/NM (single-level), as the existing lift towers would no longer be an obstacle.
- The single-level fixed-span configuration (all bridge type options) without the C Street ramps at the SR 14 interchange would further reduce the westbound departure procedures climb gradient to approximately 401 ft/NM (double-deck) and 357 ft/NM (single-level).
- The Modified LPA with the single-level movable-span configuration would decrease the westbound departure procedures climb gradient from 650 feet per nautical mile (ft/NM) to approximately 544 ft/NM and 612 ft/NM respectively. There is no difference associated with or without C Street ramps, as the movable-span configuration would constrain the climb gradient.

The Modified LPA would be designed with consolidated structural elements that reduce the areas on which birds can land, roost, and potentially nest. Fewer birds would be attracted to the new Columbia River bridges as a result, and continued incorporation of bird deterrent measures into the bridge maintenance program would further reduce the potential for wildlife strike hazards at Pearson Field. Stormwater ponds constructed as part of the Modified LPA would include deterrent features commonly used at other airports, such as nets, to discourage birds from using the ponds.

No long-term effects on aviation activities at PDX would result from the Modified LPA because the new Columbia River bridges would remain outside its protected airspace. Protected airspace for PDX in the vicinity of the Interstate Bridge lift-span towers is approximately 130 feet above the top of the existing lift-span towers. Because the current preliminary movable-span configuration design proposes new lift towers at an elevation similar to the existing lift towers, the single-level movable-span configuration would not penetrate or create a hazard for aircraft navigation at PDX.

Table 3.22-2. Long-Term Effects on Pearson Field Aviation Surfaces and Departure Procedures

Aviation Component	No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration	Modified LPA with Single-Level Fixed-Span Configuration [a]	Modified LPA with Single-Level Movable-Span Configuration
Horizontal Surface	98 vertical feet penetration by south lift tower, illuminated to increase visibility.	Up to 12.5 vertical feet penetration by signs and lighting, illuminated to increase visibility.	No penetration.	64 vertical feet penetration by lift towers; illuminate to increase visibility
Approach Surface	No penetration.	Use low-profile signs and lighting on north ends of upper decks to avoid penetration.	No penetration.	No penetration.
Transitional Surfaces	Penetration by existing Interstate Bridge north lift tower; illuminated.	Use low-profile signs and lighting on north ends of upper decks to avoid penetration.	No penetration.	No penetration.

Aviation Component	No-Build Alternative	Modified LPA with Double-Deck Fixed-Span Configuration	Modified LPA with Single-Level Fixed-Span Configuration [a]	Modified LPA with Single-Level Movable-Span Configuration
Westbound Departure OCS	Obstacle departure procedures required to avoid existing Interstate Bridge lift towers; climb gradient is 650 ft/NM.	Obstacle departure procedures required to avoid new bridges; climb gradient reduced to 427 ft/NM. Without C Street ramps, climb gradient further reduced to 401 ft/NM.	Obstacle departure procedures required to avoid new bridges; climb gradient reduced to 474 ft/NM. [b] Without C Street ramps, climb gradient further reduced to 357 ft/NM.	Obstacle departure procedures required to avoid new bridges; climb gradient reduced to 544ft/NM for vertical lift span, with and without C Street ramps.
Wildlife strike risk	Existing open-truss framing continues to provide bird roosting and nesting areas, existing ODOT deterrence measures continue; aircraft wildlife strike risk continues at existing level.	Design bridge features to reduce potential for bird nesting and roosting combined with continued deterrence measures would reduce potential for aircraft wildlife strikes from existing level.	Design bridge features to reduce potential for bird nesting and roosting combined with continued deterrence measures would reduce potential for aircraft wildlife strikes from existing level.	Design bridge features to reduce potential for bird nesting and roosting combined with continued deterrence measures would reduce potential for aircraft wildlife strikes from existing level.

a The long-term effects associated with the single-level fixed-span configuration would be the same for all bridge type options, unless otherwise specified.

b The climb gradient is steeper for the single-level fixed-span configuration with C Street ramps compared to the double-deck fixed-span configuration because of the single-level fixed-span configuration's increased width and the reduced distance between the C Street off-ramp and the Pearson Field runway.

ft/NM = feet per nautical mile; LPA = Locally Preferred Alternative; NB = northbound; OCS = Obstacle Clearance Surface; ODOT = Oregon Department of Transportation; Part 77 = CFR Part 77; TERPS = Terminal Instrument Procedures

3.22.4 Temporary Effects

No-Build Alternative

No Program-related construction activities would take place under the No-Build Alternative that would have temporary benefits or effects to aviation.

Modified LPA

Tall cranes used during construction of the Columbia River bridges and the SR 14 interchange and demolition of the Interstate Bridge may be hazards to aviation at Pearson Field. Equipment used to remove the existing lift-span towers would likely be the tallest construction equipment on site and therefore the most likely to present a hazard to aviation. The degree to which aviation would be affected depends on the construction methods employed. FAA would review construction plans to determine potential effects and associated mitigation before construction could begin.

Construction activities are not anticipated to affect aircraft navigation to and from PDX because construction equipment is not anticipated to exceed a height of 375 feet, the point at which it would begin to penetrate the PDX protected airspace.

Construction of the SR 14 interchange would penetrate the restricted airspace for Pearson Field. Temporary storage of fill, cranes, or other construction-related materials and equipment could also temporarily intrude into the aviation surfaces. As with the construction of the Columbia River bridges, the actual intensity of effects would depend on the equipment and construction methods proposed by the contractor. Following FAA's review of the equipment locations and heights proposed by the contractor, the FAA may issue temporary flight procedures during construction to aircraft operating at Pearson Field.

Construction dust or emissions from construction equipment in the SR 14 area could pose a short-term hazard to aviation from Pearson Field by reducing visibility. Wind could cause dust by disturbing uncovered fill or open excavations. Trucks and equipment traveling on unimproved construction roads could also stir up dust, impairing visibility.

Activities at the staging and casting yards would not be expected to have temporary effects on aviation.

Temporary aviation effects under the single-level movable-span configuration would be similar in character to those described above but would be longer in duration than for fixed-span configurations—potentially up to an additional two years. Effects would be prolonged because tall cranes would be required to construct the new lift towers associated with the movable-span configuration.

3.22.5 Indirect Effects

No anticipated indirect effects to aviation have been identified for the Modified LPA, including all design options.

3.22.6 Potential Avoidance, Minimization, and Mitigation Measures

Long-Term Effects

Regulatory Requirements

Standards and regulatory measures to avoid or minimize long-term effects on aviation have been evaluated and screened. These measures have been incorporated during the development of the Modified LPA to the extent possible and will continue to be refined as the design progresses.

During final design, the IBR Program would comply with the FAA's findings in response to the Program's Form 7460-1. The FAA would issue a finding of "hazard to aviation" or "no hazard to aviation" upon completion of the aeronautical review. In addition, the FAA would have requirements for marking obstacles; this would likely include marking according to FAA AC 70/7460-1M "Obstruction Marking and Lighting" using equipment specified in AC 150/5345-43J "Specification for Obstruction Lighting Equipment."

Program-Specific Mitigation

In addition to regulatory requirements, potential Program-specific mitigation measures have been identified and will be developed with the Modified LPA design.

Specific mitigation for aviation includes:

- Provide obstruction marking and lighting to make the river crossing structures visible to aircraft. Design roadway or accent lighting on the bridges and surrounding interchanges to limit light or glare that could affect aviation at Pearson Field or PDX.
- Place wire mesh or other deterrents over the top of stormwater detention ponds to conceal open water when they are full to prevent birds from landing or using selective plantings within ponds.

- Incorporate designs of proposed structures and features of the Program that minimize locations for birds to roost or nest.

Temporary Effects

Regulatory Requirements

To protect and minimize temporary effects on aviation during construction, standard and regulatory mitigation measures such as best management practices (BMPs) would be implemented. Construction BMPs applicable to the Modified LPA are discussed in Section 3.14, Water Quality and Hydrology.

Standard and regulatory mitigation measures for aviation include:

- In the area of demolition of the Interstate Bridge and construction activities for the Columbia River bridges and the SR 14 interchange, FAA would review and approve the location and height of tall construction equipment proposed by the contractor. Equipment would be marked following the FAA's Obstruction Marking and Lighting Standards described in Advisory Circular 70/460-1M.
- Apply dust control measures, such as watering exposed soil and using gravel surfacing on temporary construction roads, to mitigate potential reduction in visibility to aviation from construction activities in the SR 14 area. Section 3.10.6, Air Quality, lists dust control requirements in both Oregon and Washington. Manage construction materials and activities to minimize glare and smoke.

Program-Specific Mitigation

- Construction specifications for contractors working near Pearson Field would include a condition that any electronic devices used for communication or other purposes cannot interfere with equipment required for air navigation and communication.
- Place wire mesh or other deterrents over the top of temporary stormwater ponds to prevent birds from landing on open water.
- Provide public involvement throughout construction to provide information to pilots and the public.