

## D Alternatives Analysis and Development Concepts

**INTRODUCTION.** The purpose of this chapter is to present and evaluate the Development Plan alternatives for BFI in terms of both concept and reasoning that meet the needs of airport users, as well as the strategic vision established by King County. Therefore, several basic assumptions have been established, which are intended to direct the future development and maintenance of the Airport. These assumptions, which have been formulated from input provided by stakeholders, management, and the FAA, are supported by the aviation activity forecasts and include a commitment for continued airport development that supports the economic and sustainable planning objectives of the region.

Following a detailed review of these alternatives by Airport Staff, FAA, and the Airport Working Group, the purpose of which is to fulfill major facility requirements (basic runway and taxiway configuration), the selected airfield alternative components and recommendations for landside development have been consolidated and presented.

### Development Assumptions

**Assumption One.** The first assumption states that the existing non-standard dimensional criteria that were identified for Runway 14R/32L in the previous chapter will be evaluated separately for mitigation options and integrated into the airside alternatives formulated for this Master Plan Update (see additional information provided below in the Airside Development Alternatives section of this document).

**Assumption Two.** Assumption Two states the future development of the Airport will continue to safely accommodate the existing variety of aviation users and activities, ranging from air cargo, commercial service passenger operations, commercial service aircraft deliveries, all sectors of the existing general aviation users, and military training operations with facilities properly sized to accommodate the projected forecast demand.

**Assumption Three.** The third assumption is future land acquisition priorities (i.e., fee simple and/or easement, as necessary) will be identified that are related to airport safety, future airport development, and land use compatibility.

**Assumption Four.** The fourth assumption is to 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.

**Assumption Five.** Assumption Five is to provide effective direction for the future development of the Airport through the preparation of a rational plan and adherence to the adopted development program that incorporates the defined air transportation planning goals and objectives of King County.

## Development Goals

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Accompanying these basic assumptions are the County's Strategic Plan Goals and Objectives, as defined in the *King County Strategic Plan* and the *King County International Airport Strategic Plan 2014-2020*, that have been utilized to formulate the framework of the Master Plan Update alternatives and serve as an Airport Management business decision-making tool (i.e., the roadmap) for the selection of development recommendations, identification of capital projects, sustainability considerations, and customer service. These goals account for several categorical considerations relating to the needs of the facility, both in the short-term and long-term timeframes, including safety enhancement, 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 the Airport.

The following goals, which were also presented in the *Inventory of Existing Conditions* chapter are intended to guide the preparation of the Master Plan Update, and direct the future development of BFI:

- **Goal 1: Support Economic Vitality in the Region**
  - **Boeing Retention.** Continue to work with Boeing to ensure that their property and business needs are integrated into the airport's long-term property plans.
  - **Property Development and Redevelopment.** Conduct assessments of key strategic properties, both on and off the airport footprint to determine the uses that best align with KCIA's long-term vision.
  - **Decision Tools.** Develop decision tools that will provide the necessary information to support critical policy choices and clearly show how individual decisions relate to the dual mandates to maximize economic impact and financial capacity to invest.
  - **Economic Development.** Collaborate with other County departments to ensure that KCIA's efforts are appropriately aligned with broader County economic development goals and initiatives.

■ **Goal 2: Financial Performance**

- **Value Pricing.** Develop a comprehensive pricing structure that will appropriately reflect the value that customers and tenants are receiving. The pricing structure should bring into alignment all of KCIA's fees and charges to ensure that customers and tenants are paying in proportion to their use of facilities and the value they derive from that use.
- **Cost Containment.** Aggressively manage costs to support net operating income.
- **Cost recovery.** Identify opportunities for KCIA to allocate costs to tenants and customers, where such pass-throughs are authorized by County code and can be justified using appropriate cost allocation methods.
- **Financial Targets.** Develop specific financial performance targets that will support current investment plans and ensure that KCIA is generating an appropriate rate of return on its assets.

■ **Goal 3: Maintain a World-Class Facility**

- **Facility Investment.** Invest in capital replacement based on needs identified using appropriate asset management standards and based on life cycle costs of airport facilities.
- **Customer service.** Ensure that there is a customer-oriented focus throughout the organization and that customer and tenant needs are factored into operational and policy decisions.
- **Security and safety.** Provide for the security and safety needs of the airport, including customers, tenants, employees and the broader community.

■ **Goal 4: Organizational Development and Capacity**

- **Invest in Organizational Capacity.** Identify organizational capacity needs to support an enhanced focus on business development and strategic investment decisions.
- **Organizational Structure.** Align the organizational structure and core competencies to support implementation of the strategic plan and to maximize cost effectiveness of KCIA's operations.
- **Continuous Improvement.** Build the efficiency and core competencies of the organization through application of continuous improvement and application of Lean principles.

■ **Goal 5: Environmental Stewardship**

- **Noise Impacts and Mitigation.** Continue to implement and enhance the noise mitigation program.
- **Climate Change.** Align KCIA programs and services with County climate change goals.
- **Environmentally Sensitive Design.** To the maximum extent possible, incorporate environmentally sensitive design into KCIA capital projects.

▪ **Goal 6: Communications and Community Partnerships**

- **Transparency.** Operate in an open and transparent way to build trust with customers, tenants, stakeholders, decision makers, and the broader community.
- **Stakeholder engagement.** Ensure appropriate level of consultation with key stakeholders and work collaboratively to foster mutually beneficial solutions.
- **Industry leadership.** Increase KCIA's influence within the aviation industry through effective participation in select membership and trade organizations.
- **Neighborhood & community.** Act as a partner to neighboring residents, businesses, and organizations.

## **Airside Development Alternatives**

Because all airport functional elements relate to and revolve around the basic airfield layout, runway and taxiway (i.e., airside) development alternatives must be examined and evaluated first. Guiding elements of the alternatives evaluation process include alternative identification that address the facility requirements presented in the previous chapter, sufficient analysis to gain a thorough understanding of the strengths, weaknesses, and other implications of each alternative, and the improvement of the entire airport system in a comprehensive fashion that addresses operational, safety, environmental, fiscal, and sustainable objectives. The alternatives analysis has been prepared to provide King County and the Airport Working Group with a comprehensive outline of the key components of each alternative to assist with the identification of a preferred long-term development plan for BFI.

The runway alternative considerations at BFI that require evaluation include runway operational capabilities (e.g., runway length), instrument approach procedure protection/enhancement, and specific recommendations to improve or resolve the Airport's existing non-standard conditions related to the runway and taxiway dimensional criteria, hot spots, and airfield geometry. The primary objectives of the airside alternative analysis are to examine the options that will result in an improved/sustainable aircraft operating environment and to support forecasted use through the planning period.

The specific design components/features presented below are not necessarily exclusive to an individual alternative. Each of the alternative concepts is a collection of potential development recommendations, many of which can be transferred (i.e., mixed and matched) between alternatives.

### **Non-Standard Runway/Taxiway Design Conditions**

**Non-Standard Dimensional Criteria.** As documented in the previous chapter and noted above in the *Development Assumptions* section, the Airport's primary runway (i.e., Runway 14R/32L) has eight existing non-standard design conditions for the currently specified FAA RDC D-IV-4000 dimensional standards, two existing Flight Procedures waivers, and three existing non-standard design conditions for the Runway 14R/32L parallel taxiway system.

These include:

**Runway**

- 1) Parallel Runway Centerline Separation (Runways 14R/32L and 14L/32R)
- 2) Runway 32L Object Free Area (ROFA) Width
- 3) Runway 14R/32L Centerline to Parallel Taxiway A Centerline Separation
- 4) Runway 14R/32L Centerline to Parallel Taxiway B Centerline Separation
- 5) Runway 14R/32L Centerline to Aircraft Parking Area Separation
- 6) Runway 14R Approach RPZ Land Uses
- 7) Runway 14R Departure RPZ Land Uses
- 8) Runway 32L Approach RPZ Land Uses

**Runway 14R Flight Procedures Waivers**

- 1) Runways 14R ILS or Localizer Approach Threshold Crossing Height (TCH)<sup>1</sup>
- 2) Maximum altitude restriction at OCEZE waypoint for Runway 14R Missed Approach Procedure<sup>2</sup>

**Taxiway**

- 1) Taxiway A OFA (between Taxiways A1 and A3)
- 2) Taxiway A OFA (north of Taxiway A1)
- 3) Taxiway B OFA

It has been confirmed through this planning process that the previous review of these non-standard conditions, which were documented in previous planning documents (i.e., the 2004 *NEPA ENVIRONMENTAL ASSESSMENT/SEPA ENVIRONMENTAL IMPACT STATEMENT FOR PROPOSED MASTER PLAN IMPROVEMENTS AT BFI* and the 2006 *MODIFICATION OF STANDARDS ALTERNATIVE ANALYSIS* document for BFI) and recorded as Modification of Standards (MOS) on the approved 2007 Airport Layout Plan Drawing Set, were never “officially” approved by the FAA. In addition, copies of the signed 2002 and 2004 FAA ATC operational waiver to mitigate the existing non-standard parallel runway centerline separation was also included in the appendix of the 2006 *MODIFICATION OF STANDARDS ALTERNATIVE ANALYSIS* document.

A short description of each non-standard condition, the specified design standard, and the potential compliance/mitigation options available to resolve the specified non-standard condition is presented in the following text. A summary matrix for both the runway and taxiway non-standard conditions is also presented in **Tables D1** and **D2**. The tables provide a brief analysis of the available improvement options, along with the Sponsor’s preferred recommendation to be carried forward in the formulation of the airside runway and taxiway alternatives. As can be noted, it’s anticipated that some of the existing non-standard conditions can likely be resolved or mitigated in conjunction with future development projects identified in the Master Plan Update, while others will require the preparation of MOS requests for submittal to the FAA to seek a potential “Acceptable Level of Safety” determination.

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1 Existing waiver was to be maintained until Runway 14R glide slope (GS) antenna was modified to provide standard 50-foot TCH. However, subsequent to the completion of this draft chapter of the MP Update, the required GS antenna modifications could not be implemented.

2 Waiver is to be maintained to provide adequate air traffic operational separation between BFI and SEA.

To facilitate the MOS preparation effort, a supplemental planning study will be undertaken to further define the long-term improvement/resolution options (beyond the 20-year planning period of the Master Plan Update) for the Airport's existing non-standard airport design conditions. For those non-standard conditions that can be initially considered for mitigation with a MOS, applications will be prepared and submitted to FAA for review and determination (as an element of the supplemental planning effort) in accordance with the FAA Order 5300.1G.

### Non-Standard Runway Design Criteria

**1) Parallel Runway Centerline Separation (Runways 14R/32L and 14L/32R).** Current separation is mitigated by an existing ATC Operational Waiver that permits same direction simultaneous operations by Category II aircraft (i.e., twin-engine propeller driven aircraft weighing less than 12,500 lbs.) during VFR/daytime only conditions.

- **Existing Condition vs Standard:** 375' Existing vs. 700' Min. Standard (RDC D-IV-4000)/The minimum parallel runway centerline separation distance specified by ATC for Category II aircraft is 500 feet.
- **Potential Compliance/Mitigation Options:**
  - **Option 1** - Maintain parallel runways and pursue reauthorization of previous ATC Operational Waiver.
  - **Option 2** - Maintain parallel runways and cancel previous ATC Operational Waiver (eliminates option for simultaneous operations).
  - **Option 3** - Close Runway 14L/32R.

**2) Runway Object Free Area (ROFA) Width (Runway 14R/32L).**

- **Existing Condition vs Standard:** ROFA width at south end of runway tapers from 800' to 650' Existing vs. 800' Standard (RDC D-IV-4000)
- **Potential Compliance/Mitigation Options:**
  - **Option 1** - Reduce Runway 14R/32L available length by 880-feet (at south end).
  - **Option 2** - Realign segment of Airport Way and railroad corridor (at south end).
  - **Option 3** - Request FAA MOS.

**3) Runway Centerline to Parallel Taxiway A Centerline Separation - Between Taxiways A9 and A11 (Runway 14R/32L).**

- **Existing Condition vs Standard:** 335' - 350' Existing vs. 400' Standard (RDC D-IV-4000).
- **Potential Compliance/Mitigation Options:**
  - **Option 1** - Relocate/reconstruct segment of Taxiway A (between Taxiways A9 and A11) to 400-foot centerline separation.
  - **Option 2** - Request FAA MOS.

**4) Runway Centerline to Parallel Taxiway B Centerline Separation - Full Length (Runway 14R/32L).**

- **Existing Condition vs Standard:** 325' - 350' Existing vs. 400' Standard (RDC D-IV-4000).
- **Potential Compliance/Mitigation Options:**
  - **Option 1** - Relocate/reconstruct segment of Taxiway B (full length) to 400-foot centerline separation.
  - **Option 2** - Request FAA MOS.



**5) Runway Centerline to Aircraft Parking Area Separation (Runway 14R/32L).**

- **Existing Condition vs Standard:** Some marked aircraft parking positions are located within the required 500-foot setback from runway centerline - east of TW A and west of TW B (RDC D-IV-4000).
- **Potential Compliance/Mitigation Options:**
  - **Option 1** - Relocate or modify existing non-standard aircraft parking positions.

**6) Runway 14R Approach RPZ Land Uses.**

- **Existing Condition vs Standard:** Georgetown Steam Plant, located off-airport property, and Fuel Farm located on-airport are positioned within the existing boundary of the RPZ (RDC D-IV-4000).
- **Potential Compliance/Mitigation Options:**
  - **Option 1** - Relocate the fuel farm and undertake the required environmental documentation to address the location of the Georgetown Steam Plant within the Runway 14R approach RPZ.
  - **Option 2** - Relocate the fuel farm and increase the IAP visibility minimums to eliminate the RPZ impacts to the Georgetown Steam Plant.

**7) Runway 14R Departure RPZ Land Uses.**

- **Existing Condition vs Standard:** Existing roadways, railway, and industrial land uses are located off airport property, but within the boundary of the RPZ (RDC D-IV-4000).
- **Potential Compliance/Mitigation Options:**
  - **Option 1** - Relocate existing transportation facilities and Industrial buildings outside of RPZ boundary.
  - **Option 2** - Maintain location of existing transportation facilities, but purchase RPZ easement for industrial land uses.
  - **Option 3** - Maintain location of existing transportation facilities but modify existing declared distances to permit repositioning of the departure RPZ onto airport property.

**8) Runway 32L Approach RPZ Land Uses.**

- **Existing Condition vs Standard:** Existing roadway and railway are located off-airport property, but within the boundary of the RPZ (RDC D-IV-4000).
- **Potential Compliance/Mitigation Options:**
  - **Option 1** - Relocate existing transportation facilities outside of RPZ boundary.
  - **Option 2** - Maintain location of existing transportation facilities.

Table D1 RUNWAY 14R/32L NON-STANDARD CONDITIONS SUMMARY MATRIX

Non-Std. Conditions	Existing Condition vs. Standard <sup>1</sup>	Analysis of Potential Compliance/Mitigation Options	Sponsor Recommendation
<u>1) Parallel Runway Centerline Separation</u>	375' Existing vs. 700' Min. Standard. (RDC D-IV-4000)	Compliance with the standard parallel runway centerline separation would be cost prohibitive and closure of Runway 14L/32R would restrict the operational capabilities of the Airport.	Prepare update request for ATC Operational Waiver <sup>2</sup> (Option 1) to seek FAA confirmation that "Acceptable Level of Safety" can be provided.  <i>Pursuant to FAA Oder 5300.1G, a MOS for non-standard runway centerline separation is not applicable but may be required to support ATC waiver.</i>
<u>2) Runway Object Free Area (ROFA) Width</u>	ROFA width at south end of Runway tapers from 800' to 650' Existing vs. 800' Standard. (RDC D-IV-4000)	A runway length reduction could restrict the operational payload of some aircraft and the segment realignment of the roadway and railroad corridor would be cost prohibitive.	New MOS Request will be prepared <sup>2</sup> (Option 3) to seek FAA confirmation that "Acceptable Level of Safety" can be provided.  <i>Pursuant to FAA Oder 5300.1G, the FAA Region can approve a MOS for non-standard ROFA dimensions.</i>
<u>3) Runway Centerline to Parallel Taxiway A Centerline Separation (between Taxiways A9 and A11)</u>	335' - 350' Existing vs. 400' Standard. (RDC D-IV-4000)	The relocated taxiway, associated TOFA, and ASR would encroach upon the existing leaseholds for two of the Airport's FBOs (Clay Lacy and Kenmore Aero Services).	New MOS Request will be prepared <sup>2</sup> (Option 2) to seek FAA confirmation that "Acceptable Level of Safety" can be provided.  <i>Pursuant to FAA Oder 5300.1G, FAA HQ must approve a MOS for non-std. RW to parallel TW sep.</i>
<u>4) Runway Centerline to Parallel Taxiway B Centerline Separation (full length)</u>	325' - 350' Existing vs. 400' Standard. (RDC D-IV-4000)	The relocated taxiway, associated TOFA, and ASR would encroach upon several existing leaseholds along the west side of the Airport (significantly impacting Boeing ramp operations).	New MOS Request will be prepared <sup>2</sup> (Option 2) to seek FAA confirmation that "Acceptable Level of Safety" can be provided.  <i>Pursuant to FAA Oder 5300.1G, FAA HQ must approve a MOS for non-std. RW to parallel TW sep.</i>
<u>5) Runway Centerline to Aircraft Parking Area Separation</u>	Some marked aircraft parking positions are located within the required 500-foot setback from runway centerline (east of TW A and west of TW B). (RDC D-IV-4000)	Aircraft parking positions that encroach upon the 500-foot setback should be programmed for relocation.	Development alternatives will be evaluated (Option 1) to comply with aircraft parking area separation standards and facility demand.  <i>Pursuant to FAA Oder 5300.1G, a MOS for non-std. aircraft parking area separation is not applicable.</i>

Note: <sup>1</sup> As specified in FAA AC 150/5300-13A, Change 1, Airport Design.

<sup>2</sup> MOS and/or waiver submittal to be prepared in a supplemental study to the Master Plan Update.



Table D1 RUNWAY 14R/32L NON-STANDARD CONDITIONS SUMMARY MATRIX (CONTINUED)

Non-Std. Condition	Existing Condition vs. Standard <sup>1</sup>	Analysis of Potential Compliance/Mitigation Options	Sponsor Recommendation
6) Runway 14R Approach RPZ Land Uses	Georgetown Steam Plant, located off airport property, and Fuel Farm, located on-airport, are positioned within the existing boundary of the RPZ. (RDC D-IV-4000)	Airport has existing plans to relocate fuel farm outside of the RPZ boundary. However, application of FAA's <i>Interim Guidance on Land Uses within a Runway Protection Zone</i> could require additional environmental review and documentation to assess the land use compatibility of the Steam Plant.	Implement Option 2 to permit reduction in RPZ boundary dimensions that would provide compliance with RPZ land use compatibility standards. <sup>2</sup>  <i>Pursuant to FAA Order 5300.1G, a MOS for non-standard RPZ land uses is not applicable.</i>
7) Runway 14R Departure RPZ Land Uses	Existing roadways, railway, and industrial land uses are located off airport property, but within the boundary of the RPZ. (RDC D-IV-4000)	Location of existing transportation facilities and Industrial buildings within RPZ are grandfathered (per current FAA guidance) and relocation would be cost prohibitive.	The purchase of RPZ easement (Option 2) and the declared distances alternative (Option 3) to reposition the departure RPZ onto airport property will be evaluated to improve RPZ land use compatibility.  <i>Pursuant to FAA Order 5300.1G, a MOS for non-standard RPZ land uses is not applicable.</i>
8) Runway 32L Approach RPZ Land Uses	Existing roadway and railway are located off airport property, but within the boundary of the RPZ. (RDC D-IV-4000)	Location of existing transportation facilities within RPZ are grandfathered (per current FAA guidance) and relocation would be cost prohibitive.	Maintain location of existing transportation facilities (Option 2)  <i>Pursuant to FAA Order 5300.1G, a MOS for non-standard RPZ land uses is not applicable.</i>

Note: <sup>1</sup> As specified in FAA AC 150/5300-13A, Change 1, Airport Design.  
<sup>2</sup> Subsequent to the preparation of this draft chapter, the decision was made to retain the existing IAP visibility minimums and address the existing RPZ land use compatibility issues in a supplemental study to the Master Plan Update.

## Non-Standard Taxiway Design Criteria

### 1) Taxiway A Centerline Separation (between A1 and A3) to Fixed or Moveable Object.

- **Existing Condition vs Standard:** 80' Existing vs. 93' Standard (ADG III/TDG 3) - A portion of the Airport's east side airport service road (ASR) is located within the Taxiway A Object Free Area (OFA). Based on BFI Facility Directory, this existing non-standard condition is mitigated with "108-foot aircraft wingspan use restriction".
- **Potential Compliance/Mitigation Options:**
  - **Option 1** - Relocate segment of ASR to accommodate Taxiway A OFA.
  - **Option 2** - Relocate segment of Taxiway A.
  - **Option 3** - Request FAA MOS.

### 2) Taxiway A Centerline Separation (north of Taxiway A1) to Fixed or Moveable Object.

- **Existing Condition vs Standard:** 30' Existing vs. 44.5' Standard (ADG I/TDG 1A) - A portion of the Airport's east side ASR is located within the Taxiway A OFA.
- **Potential Compliance/Mitigation Options:**
  - **Option 1** - Relocate segment of ASR to accommodate Taxiway A.
  - **Option 2** - Relocate segment of Taxiway.
  - **Option 3** - Request FAA MOS.

### 3) Taxiway B Centerline Separation (full length) to Fixed or Moveable Object.

- **Existing Condition vs Standard:** 103' – 125' Existing vs. 129.5' Standard (ADG IV/TDG 5) – All or portion of the Airport's west side ASR is located within the Taxiway B OFA.
- **Potential Compliance/Mitigation Options:**
  - **Option 1** - Relocate segment of ASR to accommodate Taxiway B OFA.
  - **Option 2** - Request FAA MOS.

Table D2 TAXIWAY A & B NON-STANDARD CONDITIONS SUMMARY MATRIX

Non-Std. Condition	Existing Condition vs. Standard <sup>1</sup>	Analysis of Potential Compliance/Mitigation Options	Sponsor Recommendation
1) Taxiway A Centerline Separation (between A1 & A3) to Fixed or Moveable Object	80' Existing vs. 93' Standard (ADG III/TDG 3) A portion of the Airport's east side ASR is located within the Taxiway A Object Free Area (OFA). <sup>2</sup>	The expanded taxiway TOFA and relocated ASR would encroach upon existing leaseholds.	Recommended Option To Be Determined (TBD)  <i>Pursuant to FAA Oder 5300.1G, the FAA Region can approve a MOS for non-standard TOFA.</i>
2) Taxiway A Centerline Separation (north of Taxiway A1) to Fixed or Moveable Object	30' Existing vs. 44.5' Standard (ADG I/TDG 1A) Portion of the Airport's east side ASR is located within the Taxiway A OFA.	The expanded taxiway TOFA and relocated ASR would encroach upon existing leaseholds.	Recommended Option TBD  <i>Pursuant to FAA Oder 5300.1G, the FAA Region can approve a MOS for non-standard TOFA.</i>

Table D2 TAXIWAY A & B NON-STANDARD CONDITIONS SUMMARY MATRIX (CONTINUED)

Non-Std. Condition	Existing Condition vs. Standard <sup>1</sup>	Analysis of Potential Compliance/Mitigation Options	Sponsor Recommendation
3) Taxiway B Centerline Separation to Fixed or Moveable Object	103' - 125' Existing vs. 129.5' Standard (ADG IV/TDG 5). Portion of the Airport's west side ASR is located within the Taxiway B OFA.	Full relocation of the ASR to achieve compliance with the TOFA standards would encroach upon existing leaseholds and be cost prohibitive.	Project has been designed to narrow and reposition the ASR outside of the TOFA boundary.  <i>Pursuant to FAA Oder 5300.1G, the FAA Region can approve a MOS for non-standard TOFA.</i>

Note: <sup>1</sup> As specified in FAA AC 150/5300-13A, Change 1, Airport Design.

<sup>2</sup> Based on BFI Facility Directory, existing non-standard condition is mitigated with "108-foot aircraft wingspan use restriction".

<sup>3</sup> MOS submittal to be prepared in a supplemental study to Master Plan Update.

## Hot Spots

The previous chapters also documented the location of three hot spots at BFI that result in an increased risk for runway incursions or incidents during aircraft surface operations. The typical causes of hot spot-related runway incursions or incidents can be attributed to airfield layout, traffic flow, airport marking/signage/lighting, situational awareness, and training. A short description of each hot spot and the potential mitigation options available is presented in the following text. A summary matrix of the existing BFI hot spots is presented in the following table. The table provides a brief analysis of the available improvement options for each hot spot, along with the Sponsor's preferred recommendation to be carried forward in the formulation of the airside runway and taxiway alternatives.

### 1) Hot Spot #1 - Taxiway B/B1 Intersection.

- **Compliance Issue:** Occasional inadvertent access to the restricted Taxiway Z Prior Permission Required Pavement (PPRP).
- **Potential Mitigation/Resolution Options:**
  - **Option 1** - Eliminate PPRP designation and convert to full-use pavement with displaced threshold.
  - **Option 2** - Provide additional markings, lighting, and signage to better inform pilots of PPRP designation.

### 2) Hot Spot #2 - Taxiway A9 - Runway 14R/32L Intersection.

- **Compliance Issue:** Wrong runway departure risk and occasional encroachment of Taxiway A9 holdline due to alignment jog of Taxiway A.
- **Potential Mitigation/Resolution Options:**
  - **Option 1** - Realign segment of Taxiway A at Taxiway A9 intersection to increase radius of alignment jog and reduce width of Taxiway A9.
  - **Option 2** - Install Taxiway A centerline lights and reduce width of Taxiway A9.

3) Hot Spot #3 - Taxiway B5 Helicopter Training Activity.

- **Operational Issue:** Extensive helicopter training activity on Taxiway B that is concentrated in vicinity of Taxiway B5.
- **Potential Mitigation Options:**
  - **Option 1** – Continue on-going Airport Staff publications and ATC communications to better inform local and transient pilots of existing helicopter training activity.

Table D3 EXISTING BFI HOT SPOT SUMMARY MATRIX

Hot Spot/ Location <sup>1</sup>	Compliance/Operational Issue	Analysis of Potential Mitigation/Resolution Options	Sponsor Recommendation
<u>Hot Spot #1 - Taxiway B/B1 Intersection</u>	Occasional inadvertent access to the restricted Taxiway Z PPRP.	PPRP designation was established to mitigate potential noise and vibration impacts to nearby Georgetown Steam Plant and neighborhood, as a recommendation of the 2004 EA/SEPA EIS to provide runway safety area compliance. A new EA may be required to change the PPRP designation.	The FAA has identified a preference to eliminate the PPRP designation and convert back to full-use pavement (Option 1).  Recommendation TBD.
<u>Hot Spot #2 - Taxiway A9/Runway 14R/32L Intersection</u>	Wrong runway departure risk, and occasional encroachment of Taxiway A9 holdline due to alignment jog of Taxiway A.	Taxiway A segment realignment would encroach upon existing adjacent leasehold and Taxiway A9 width reduction would improve visibility of signage. Also, the addition of taxiway centerline lights would improve visibility of taxiways.	Recommendation TBD.
<u>Hot Spot #3 - Taxiway B5 Helicopter Training Activity</u>	Extensive helicopter training activity.	Increase pilot awareness of existing helicopter training activity with on-going Airport Staff publications and ATC communications.	Continue on-going Airport Staff publications and ATC communications to better inform pilots.

**Note:** <sup>1</sup> Information obtained from FAA's current Runway Safety Hot Spots List in the Airport/Facility Directory (A/FD).

### Airfield Geometry

In addition, the previous chapter documented several taxiway design methodologies from AC 150/5300-13A that should be employed to minimize the potential for runway incursions. A short description of each taxiway design issue at BFI and the potential mitigation options available is presented in the following text. A summary matrix of these existing design improvements applicable for BFI is presented in the following table. The table provides a brief analysis of the available improvement options for each taxiway under consideration, along with the Sponsor's preferred recommendation to be carried forward in the formulation of the airside runway and taxiway alternatives.

**1) Taxiway A9, A10, B5, and B10 connectors.**

- **Compliance Issue:** Wide expanses of taxiway pavement.
- **Potential Mitigation/Resolution Options:**
  - **Option 1** - Redesign taxiway connectors at next reconstruction interval to reduce pavement width and improve visibility of signs.

**2) Taxiway A4 and A5 connectors.**

- **Compliance Issue:** Increase taxiway intersection visibility.
- **Potential Mitigation/Resolution Options:**
  - **Option 1** - Realign segment of Taxiway A4 and remove Taxiway A5 to improve visibility at this defined runway crossing location.

**3) Taxiway B1 and B10 connectors.**

- **Compliance Issue:** Eliminate taxiway direct access.
- **Potential Mitigation/Resolution Options:**
  - **Option 1** - Relocate existing apron taxiway connectors at Taxiways B1 and B10.

Table D4 EXISTING TAXIWAY DESIGN IMPROVEMENTS SUMMARY MATRIX

Taxiway Improvement/ Location	Compliance Issue <sup>1</sup>	Analysis of Potential Mitigation/Resolution Options	Sponsor Recommendation
<u>1) Taxiway A9, A10, B5, and B10 connectors</u>	Wide Expanses of Taxiway Pavement.	The taxiway design improvements specified in Option 1 have the potential to improve pilot visibility of signage/markings and reduce the Airport's quantity of impervious pavement.	Implement taxiway design improvements as specified in Option 1 <sup>2</sup> .
<u>2) Taxiway A4 and A5 connectors</u>	Increase Taxiway Intersection Visibility.	Right angle taxiway intersections provide the best visibility to the left and right for pilot.	Implement taxiway design improvements as specified in Option 1.
<u>3) Taxiways B1 and B10</u>	Eliminate Taxiway Direct Access.	Relocation of existing taxiway connectors would require modifications to Boeing's aircraft parking positions.	Implement taxiway design improvements as specified in Option 1 at next pavement reconstruction interval.

Note: <sup>1</sup> Identified compliance issues are referenced from FAA guidance provided in AC 150/5300-13A, Change 1, Airport Design  
<sup>2</sup> Subsequent to the preparation of this draft chapter during of the MP Update, the FAA elected to maintain the width of these  
connector taxiways.

### Runway 14R/32L - Alternative One

Alternative One maintains the status quo of Runway 14R/32L; no changes to the existing design standards (i.e., RDC D-IV-4000), current airfield layout or operating conditions are proposed. However, several of the runway's existing non-standard conditions that were presented in **Table D1** and listed below have been identified for potential resolution with a future request for modification of standards and update of the existing ATC Operational Waiver.

- Parallel Runway Centerline Separation (Runways 14R/32L and 14L/32R)
- Runway Object Free Area (ROFA) Width (Runway 32L end)
- Runway Centerline to Parallel Taxiway A Centerline Separation (Between Taxiways A9 and A11)
- Runway Centerline to Parallel Taxiway B Centerline Separation (Full Length)

**Figure D1** depicts the overall airport planning considerations for this alternative.

**Figures D2** and **D3** both detail the close-in planning considerations associated with each runway end for Alternative One.

**Runway Width.** The existing Runway 14R/32L width of 200 feet exceeds the FAA design standard of 150 feet associated with RDC D-IV by 50 feet. Typically, the FAA will only provide Airport Improvement Program (AIP) funds for major runway pavement reconstruction projects based on appropriate dimensional standards. This alternative maintains the existing width of 200 feet but could transfer the future funding obligations for the reconstruction of the extra 50 feet of runway width to King County or other local funding sources exclusively.

**Runway Length.** This alternative maintains the runway's existing published declared distances, which are dictated by the 880-foot displaced landing threshold to Runway 32L and the specified Departure End of the Runway (DER) for Runway 14R. This alternative also maintains the existing PPRP<sup>3</sup> located at the north end of the runway. The PPRP runway is available to aircraft operators<sup>4</sup> for Runway 14R departures (with ATC permission) requiring an Accelerate Stop Distance Available (ASDA) runway length greater than 9,120 feet. According BFI records, aircraft operators have recorded on average less than 50 operations per year using the PPR pavement since its establishment in 2007.

The specified runway lengths for each runway end using declared distances is presented in **Table D5**.

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3 The PPRP runway was established in conjunction with the implementation of a runway safety area compliance project for the primary runway at BFI. The Environmental Assessment/SEPA Environmental Impact Statement for this project was completed in 2004.

4 These operations are typically associated with Boeing aircraft deliveries that require departures to long-haul international destinations.



Figure D1  
Runway 14R/32L Design Standards & Declared Distances - Alternative One

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Figure D2

Runway 14R Instrument Approach Procedure/Runway Protection Zone Detail - Alternative One

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Figure D3

Runway 32L Instrument Approach Procedure/Runway Protection Zone Detail - Alternative One

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Table D5 RUNWAY 14R/32L DECLARED DISTANCES - ALTERNATIVE ONE

Facility	TORA	TODA	ASDA	LDA
Runway 14R <sup>1</sup>	10,000'	10,000'	9,120'	9,120'
Runway 32L <sup>2</sup>	10,000'	10,000'	10,000'	9,120'

**SOURCE:** 2007 Airport Layout Plan & Mead & Hunt, Inc.

**Note:** The specified operational runway lengths reflect the existing condition.

TORA: Takeoff Run Available

TODA: Takeoff Distance Available

ASDA: Accelerate Stop Distance Available

LDA: Landing Distance Available

<sup>1</sup> The reduced ASDA and LDA lengths are dictated by RSA requirements at the departure end of runway (DER).

However, the PPRP runway is available to aircraft operators needing an ASDA of 10,000 feet.

<sup>2</sup> The reduced LDA length is dictated by the existing displaced landing threshold.

**Instrument Approach Procedures.** Currently, BFI is equipped with five published Instrument Approach Procedures (IAPs) that offer various ceiling and visibility minimums. Table C1, in the *Capacity and Facility Requirements* chapter presented the annual percentage of time the IAPs would be available at BFI given the local meteorological conditions. In addition, several of the IAPs were updated in August of 2017 due to criteria revisions in the various FAA Orders used by Flight Procedures to calculate the specified ceiling and visibility minimums. At present, the Runway 14R Instrument Landing System (ILS) offers the best IAP minimums, with a ceiling of 308 feet AGL and visibility of ¾-mile. Also, the recent update of the Runway 14R ILS visibility minimums from 1 mile to ¾-mile offers a potential IFR access improvement to BFI of approximately 0.1 percent annually, which equates to an additional 0.4 days or 8.8 hours. The single IAP available to Runway 32L (i.e. the ILS) provides ceiling and visibility minimums of 428 feet AGL and 1 ½-statute miles respectively. This alternative reflects maintenance of the IAPs to both runway ends, but may require additional environmental documentation and approvals to support and retain the ¾-mile visibility minimums offered by the Runway 14R IAPs (see additional information in section below).

**Approach and Departure Runway Protection Zones.** As detailed in the previous chapter and presented in **Figures D2 and D3**, the existing Runway Protection Zones (RPZs) for Runways 14R and 32L extend beyond the airport boundary, are not fully controlled by King County, and encompass land uses that are considered incompatible with RPZs, as defined in FAA Memorandum *Interim Guidance on Land Uses within a Runway Protection Zone*. On the north end of the runway, the larger size of the approach RPZ is dictated by the ¾-mile visibility minimums for the existing Runway 14R IAPs. On the south end of the runway, portions of both the approach and departure RPZs are not contained within the existing airport boundary. Following consultation with FAA representatives (i.e., from both the Airports District Office and Flight Procedures), it has been confirmed that additional environmental review and documentation would be required to address the location of the Georgetown Steam Plant within the existing Runway 14R approach RPZ<sup>5</sup>.

<sup>5</sup> Subsequent to the preparation of this draft chapter during of the MP Update, the FAA elected to address the land use compatibility guidance from the Interim Guidance on Land Uses within a Runway Protection Zone in a separate follow-up study to the MP Update.

The uncontrolled RPZ areas for Alternative One are defined as follows:

**Runway 14R**

- Airport Way S. and 15th Avenue S. Right-Of-Way (R.O.W.) @ 0.3 acres
- Georgetown Steam Plant property @ 1.9 acres
- Existing airport fuel storage area (facility is located on airport property, but is designated as an incompatible land use within the RPZ)

**Runway 32L**

- Airport Way S., BNSF/UP Railroad, I-5, and S. Norfolk St. R.O.W. @ 15.1 acres
- Prologis property @ 7.4 acres

**Property/RPZ Easement Acquisition.** As detailed above, this alternative identifies approximately 2.2 acres of uncontrolled property to the north within the Runway 14R RPZ, and approximately 22.5 acres of uncontrolled property to the south within the Runway 32L PRZs. Most of the off-airport uncontrolled property is within roadway or railroad R.O.W., but approximately 1.9 acres to the north and 7.4 acres to the south is recommended for future RPZ easement or property acquisition to provide King County with land use controls.

**Taxiway Improvements.** Maintain the existing taxiway design standards for the existing parallel taxiway facilities and associated connector taxiways:

- Taxiway A @ Taxiway Design Groups (TDG) 5, 3, 1, & 1A/Airplane Design Groups (ADG) IV, III, & I
- Taxiway B @ TDG 5/ADG IV

As presented on **Figure D4** and detailed on **Figures D5** through **D8**, the recommended taxiway improvements include:

- Upgrade existing angled exit taxiways with 90° exit taxiways (Realign Taxiway A4 with Taxiway B3)
- Modify segment of Taxiway A centerline alignment near Taxiway A9 intersection to mitigate Hot Spot #2 (would also require adjacent leasehold modification)
- Expand existing TOFA for segment of Taxiway A (adjacent to and north of Taxiway A1) for existing ADG III and I design standards
- Potential Taxiway connector width reduction projects @Taxiways B5, A10, & B10
- Taxiway modifications would include revisions to taxiway lighting & signage

Figure D4  
Runway 14R/32L Taxiway Improvements - Alternative One

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Figure D5  
Runway 14R/32L Taxiway Improvements - Alternative One - Detail A

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Figure D6  
Runway 14R/32L Taxiway Improvements - Alternative One - Detail B

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Figure D7  
Runway 14R/32L Taxiway Improvements - Alternative One - Detail C

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Figure D8  
Runway 14R/32L Taxiway Improvements - Alternative One - Detail D

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**Lighting and Navigational Aids.** As presented on **Figure D9**, this alternative will require some revisions to the existing High Intensity Runway Lights (HIRLs) and Medium Intensity Taxiway Lights (MITLs) due to the proposed relocation and narrowing of some of the connector taxiway facilities. However, since no major airfield improvements are proposed with this alternative, the majority of the existing HIRLs, the four-light Precision Approach Path Indicators (PAPIs), the Medium Intensity Approach Lighting System with Sequenced Flashers (MALSF), and the Glide Slope/localizer antennas would remain in place with no modifications required.

**Potential Environmental Impacts.** The encroachment of the Runway 14R approach RPZ onto adjacent property associated with the Georgetown Steam Plant (a structure listed on the National Register of Historic Properties), is a result of the existing  $\frac{3}{4}$ -mile visibility minimums for two of the Runway 14R instrument approach procedures (IAPs). Due to the fact the existing 2007 Airport Layout Plan (ALP) identifies only 1-mile visibility minimums for the existing and future Runway 14R IAPs, additional environmental coordination and documentation would be required (likely an Environmental Assessment) to consider the various environmental impact categories defined in FAA Order 1050.1F, as well as the U.S. department of Transportation's Section 106 regulation regarding historic structures to support the larger Runway 14R approach RPZ requirements. In addition, the future relocation of the existing fuel farm from within the existing boundary of the Runway 14R approach RPZ to a new development site is also required and may include a Phase I EDDA and clean up/remediation due to potential contamination at the existing storage facility.

The key development components of this alternative, along with the screening criteria for their assessment is presented in **Table D6**.

Figure D9  
Runway 14R/32L Lighting & Navigational Aids - Alternative One

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Table D6 RUNWAY 14R/32L SUMMARY MATRIX - ALTERNATIVE ONE

Component/Consideration	Alternative One	Screening Criteria
Runway Design Code (RDC)	RDC D-IV-4000 (No Change)	Existing Non-Std. Conditions to be mitigated with combination of future dev. projects, MOS, & ATC waiver).
Runway Width	200' (No Change)	Extra 50' of runway width may not be eligible for FAA funding
Runway 14R Length	TORA – 10,000'/10,880' (PPRP) TODA – 10,000'/10,880' (PPRP) ASDA – 9,120'/10,000' (PPRP) LDA – 9,120'/9,120' (PPRP) (No Change)	Existing runway declared distances, with PPRP option, satisfy operational requirements of current and projected aircraft fleet.
Runway 32L Length	TORA – 10,000' TODA – 10,000' ASDA – 10,000' LDA – 9,120' (No Change)	Existing runway declared distances satisfy operational requirements of current & forecast aircraft fleet.
Instrument Approach Procedure Visibility Minimums	RW 14R – ¾-mile vis. mins. RW 32L – >1-mile vis. mins. (No Change)	The existing RW 14R IAP ¾ mile vis. mins. offer an additional 8.8 hrs. of annual IFR capability over the 1-mile vis. mins.
Runway Protection Zones	RW 14R – 1,000' x 1,510' x 1,700' RW 32L – 500' x 1,010' x 1,700' (No Change)	RW 14R RPZ – ¾-mile vis. mins. RW 32L RPZ – ≥1-mile vis. mins.
Incompatible Land Uses within Runway Protection Zones	RW 14R – 2.2 acres. RW 32L – 22.5 acres. (No Change)	RW 14R Uncontrolled RPZ (Steam Plant & Roadway ROW). RW 32L Uncontrolled RPZ (Roadway R.O.W & Prologis Prop.).
RPZ Easement or Property Acquisition	RW 14R RPZ – 1.9 acres RW 32L RPZ – 7.4 acres (Significant Change)	RW 14R RPZ – Steam Plant Prop. RW 32L RPZ – Prologis Property
Taxiway System	Realigns Taxiway A centerline @ Taxiway A9 intersection, realigns Taxiway A4 with Taxiway B3 and reduces width of Taxiways B5, A10, & B10 (Moderate Change)	Standardizes taxiway design with 90° intersections, eliminates unnecessary taxiway connectors, reduces wide expanses of pavement at taxiway connectors, and mitigates Hot Spot #2.
Instrumentation/Lighting	Glide Slope & Localizer/HIRL, MITLs, Signs, PAPI, & MALSF (Minor Change)	Maintain existing navigational aids, with minor modification of lighting and signs.
Environmental Issues	RW 14R RPZ – (Encroachment on Steam Plant property) Existing Fuel Farm – (Location within RW 14R RPZ) (Moderate Change)	May require Environmental Assessment (EA) & Section 106 consultation. Requires Fuel Farm relocation & potential Phase I EDDA and clean up/remediation.

Note: <sup>1</sup> Existing PPRP provides aircraft operators with an ASDA of 10,000-feet on as-needed basis.

**Runway 14R/32L - Alternative One Advantages.**

- Maintains the runway's existing operational capabilities (i.e., both existing declared distances and PPRP) by retaining a minimum 10,000-foot length ASDA in each direction.
- Maintains the 200-foot runway width, providing an extra margin of safety for final testing of Boeing aircraft and operations during crosswind conditions.
- Provides opportunity to increase IFR access capability to the Airport by 8.8 hrs. annually if the existing Runway 14R ILS can receive environmental clearance for the  $\frac{3}{4}$ -mile visibility minimum approach procedures.

**Runway 14R/32L - Alternative One Disadvantages.**

- Retention of the 200-foot runway width increases long-term pavement maintenance costs for King County, and extra 50 feet of pavement width may not be eligible for future FAA AIP funding.
- Maintenance of the existing  $\frac{3}{4}$ -mile visibility minimums for the Runway 14R IAPs would require additional planning in consideration of the FAA Memorandum *Interim Guidance on Land Uses within a Runway Protection Zone*, as well as the preparation of an Environmental Assessment and a Section 106 consultation.
- Requires easement acquisition within existing Runway 14R approach and departure RPZs.

**Runway 14R/32L - Alternative Two**

Alternative Two would modify the runway's existing design standards from RDC D-IV-4000 to RDC D-IV-2400 by lowering the Instrument Flight Visibility Category from  $\frac{3}{4}$ -mile to  $\frac{1}{2}$ -mile. This alternative also reduces the existing Runway 14R/32L width from 200 to 150 feet to comply with specified FAA design standards. It maintains the existing Runway 14R PPRP but modifies the existing declared distances by reducing the Runway 14R TORA and TODA. As noted above, the IAP visibility minimums would be lowered to both runway ends, with visibility minimums of  $\frac{1}{2}$  and  $\frac{3}{4}$  statute mile proposed for Runways 14R and Runway 32L, respectively. As with Alternative One, several of the runway's existing non-standard conditions that were presented in **Table D1** have been identified for potential resolution with a future request for modification of standards and update of the existing ATC Operational Waiver.

**Figure D10** depicts the overall airport planning considerations for this alternative, while **Figures D11** and **D12** detail the close-in planning considerations associated with each runway end for Alternative Two.

**Runway Width.** This alternative reduces the existing runway width from 200 to 150 feet to comply with FAA design standards. This proposed runway width reduction would ensure the future reconstruction costs of the runway would be 100 percent eligible for Federal Airport Improvement Program (AIP) funding and not require supplemental financing from King County or other local funding sources for the additional 50 feet of runway width.

**Runway Length.** Alternative Two maintains the existing Runway 14R PPRP but modifies the declared distances by reducing the Runway 14R TORA and TODA to 9,120 feet. This results in the following runway lengths for each runway end using declared distances, as presented in **Table D7**.

Figure D10

Runway 14R/32L Design Standards & Declared Distances - Alternative Two

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Figure D11

Runway 14R Instrument Approach Procedure/Runway Protection Zone Detail - Alternative Two

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Figure D12

Runway 32L Instrument Approach Procedure/Runway Protection Zone Detail - Alternative Two

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Table D7 RUNWAY 14R/32L DECLARED DISTANCES - ALTERNATIVE TWO

Facility	TORA	TODA	ASDA	LDA
Runway 14R	9,120' <sup>1</sup>	9,120' <sup>1</sup>	9,120' <sup>2</sup>	9,120' <sup>2</sup>
Runway 32L <sup>3</sup>	10,000'	10,000'	10,000'	9,120'

**SOURCE:** 2007 Airport Layout Plan & Mead & Hunt, Inc.

**Note:** The specified operational runway lengths reflect the existing condition.

TORA: Takeoff Run Available

TODA: Takeoff Distance Available

ASDA: Accelerate Stop Distance Available

LDA: Landing Distance Available

<sup>1</sup> The reduced TORA and TODA lengths compared to Alternative One are dictated by the repositioning of the departure RPZ to the departure end of runway (DER). However, the PPRP runway is available to aircraft operators needing a TORA and TODA of 10,000 feet.

<sup>2</sup> The reduced ASDA and LDA lengths are dictated by RSA requirements at the departure end of runway (DER).

However, the PPRP runway is available to aircraft operators needing an ASDA of 10,000 feet.

<sup>3</sup> The reduced LDA length is dictated by the existing displaced landing threshold.

**Instrument Approach Procedures.** Pending a comprehensive evaluation of revised obstruction data for Runway 14R/32L at BFI by FAA Flight Procedures, this alternative identifies the potential improvement of the IAPs to both runway ends, with visibility minimums of ½-mile provided to Runway 14R and ¾-mile vs. ½-mile provided to Runway 32L. Runway 14R provides the best wind coverage during IFR weather conditions, thus this alternative affords the most benefit to BFI users. The potential improvement of the existing Runway 14R ILS to standard Category One ILS minimums (200' ceiling and ½-mile visibility) would improve IFR access by approximately 0.4 percent annually, which equates to an additional 1.8 days or 43.2 hours. In addition, improvement of the existing Runway 32L ILS visibility minimums would improve IFR access to BFI during north flow conditions. As with Alternative One, this alternative would require additional environmental documentation and approvals to support the proposed improved IAP visibility minimums, which would require larger RPZs (see additional information in section below).

**Approach and Departure Runway Protection Zones.** In conjunction with the potential Runway 14R IAP improvements, the associated approach RPZ increases in size from the existing 1,000' x 1,510' x 1,700' to 1,000' x 1,750' x 2,500'. For Runway 32L, IAP improvements would increase the size of the approach RPZ from the existing 500' x 1,010' x 1,700' to 1,000' x 1,510' x 1,700'. Also, because Alternative Two reduces the Runway 14R TORA and TODA, the departure RPZ at the south end of the runway would be repositioned to align with the Runway 32L approach RPZ and is fully encompassed by the larger Runway 32L approach RPZ. In addition, the larger size of the approach RPZs further extend beyond the airport boundary, increasing the amount of land not fully controlled by King County, and introducing other incompatible land uses within the RPZ.



The expanded uncontrolled RPZ areas for Alternative Two, compared to Alternative One are defined as follows:

**Runway 14R**

- Airport Way S., 15 Avenue S., S. Albro Place, S. Hardy Street, Ellis Avenue S., and Stanley Avenue S. R.O.W. @ 8.2 acres
- Georgetown Steam Plant property @ 1.9 acres
- Existing airport fuel storage area (facility is located on airport property, but is designated as an incompatible land use within the RPZ)
- Ruby Chow Park @ 1.7 acres
- Residential and commercial areas of Georgetown @ 9.2 acres

**Runway 32L**

- Airport Way S., BNSF/UP Railroad, I-5, and S. Norfolk St. R.O.W. @ 15.1 acres (29.7 acres if IAP with visibility minimums are reduced to ½ statute mile)
- Boeing property @ 4.0 acres
- Prologis property @ 0.6 acres (12.9 acres if IAP with visibility minimums are reduced to ½ statute mile)

**Property/RPZ Easement Acquisition.** Alternative Two identifies approximately 12.8 acres of uncontrolled property for fee or easement acquisition to the north within the enlarged Runway 14R RPZ. There is also approximately 4.6 acres of off-airport property for easement acquisition to the south contained within the Runway 32L RPZs, associated with a potential future IAP having ¾-mile visibility minimums. If an IAP with visibility minimums as low as ½-mile is implemented, then approximately 19.9 acres of off-airport property would be required for acquisition (i.e., easement and/or fee simple) to accommodate the larger RPZ. As presented in **Figures D11** and **D12**, most of the off-airport property within the RPZs is located within existing road or railroad R.O.W., but the proposed RPZ easement or property acquisition would provide King County with additional land use controls within these critical inner approach areas of the runway.

**Taxiway Improvements.** Maintain the existing Taxiway B design standards (i.e., TDG 5/ADG IV) and upgrade segment of Taxiway A from a wingspan restricted ADG III to an unrestricted ADG III standard.

As presented on **Figure D13** and detailed on **Figures D14 through D17**, the recommended taxiway improvements include:

- Upgrade existing angled exit taxiways with 90° exit taxiways (Realign Taxiway A4 with Taxiway B3)
- Install Taxiway A centerline lights to mitigate Hot Spot #2 near Taxiway A9 intersection
- Realign segment of Taxiway A at Taxiway A1 to accommodate unrestricted ADG III access
- Realign segment of Taxiway A north of Taxiway A1 to accommodate unrestricted ADG II access
- Extend Taxiway A and construct new access taxiway linking potential North GA hangar development area
- Potential Taxiway connector width reduction projects at Taxiways B5, B10, & A10

Figure D13  
Runway 14R/32L - Taxiway Improvements - Alternative Two

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Figure D14

Runway 14R/32L Taxiway Improvements - Alternative Two - Detail A

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Figure D15

Runway 14R/32L Taxiway Improvements - Alternative Two - Detail B

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Figure D16  
Runway 14R/32L Taxiway Improvements - Alternative Two - Detail C

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Figure D17

Runway 14R/32L Taxiway Improvements - Alternative Two - Detail D

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**Lighting and Navigational Aids.** As presented on **Figure D18**, the lower visibility minimums to Runway 14R associated with this alternative, would require a full Approach Lighting System (ALS), such as a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR), to replace the existing MALSF. For Runway 32L, an ALS is not required for the proposed lowering of the visibility minimums to  $\frac{3}{4}$ -mile according to *AC 150/5300-13A, Change 1*, but it is recommended. However, if the visibility minimums are lowered to  $\frac{1}{2}$ -mile, then a full ALS, such as a MALSR would be required. In addition, the existing HIRLs, runway signage, and PAPIs would require relocation in conjunction with the runway width reduction. There would also be several modifications to existing MITLs resulting from the relocation and narrowing of connector taxiway facilities, including the addition of taxiway centerline lights to Taxiway A. As with Alternative One, the existing Glide Slope/localizer antennas at each runway end would remain in place with no modifications required.

**Potential Environmental Impacts.** The implementation of Alternative Two would further expand the potential environmental impacts identified for Alternative One that are associated with the larger RPZs at each end of the runway. In addition, to impacts upon the Georgetown Steam Plant, this alternative would result in impacts to Ruby Chow Park (a potential Section 4(f) property), and compatible land uses related to the residential/commercial/industrial properties located north of S. Albro Place, west of Ellis Avenue S., and east of Stanley Avenue S. Additional easement and/or property acquisition within the expanded Runway 32L RPZ associated with improved IAP visibility minimums of  $\frac{3}{4}$  or  $\frac{1}{2}$ -mile would impact the adjacent Boeing aircraft parking apron and existing industrial properties located south of S. Norfolk Street. As noted for Alternative One, the future relocation of the existing fuel farm from within the existing boundary of the Runway 14R approach RPZ to a new development site is also required and may include a Phase I EDDA and clean up/remediation due to potential contamination of the existing facility. In addition, the potential land acquisition required to implement Alternative Two may also require a Phase I EDDA prior to acquisition to identify the likely presence of any environmental contamination.

The key development components of this alternative, along with the screening criteria for their assessment is presented in **Table D8**.

Figure D18

Runway 14R/32L – Lighting & Navigational Aids - Alternative Two

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Table D8 RUNWAY 14R/32L SUMMARY MATRIX - ALTERNATIVE TWO

Component/Consideration	Alternative Two	Screening Criteria
Runway Design Code (RDC)	RDC D-IV-2400 (Significant Change-More Restrictive)	Implement more restrictive design criteria (Existing Non-Std. Conditions to be mitigated with combination of future dev. Projects, MOS, & ATC waiver).
Runway Width	150' Reduce existing runway width by 50' (Moderate Change)	Reduced runway width would be 100% eligible for FAA funding/No supplemental funding sources would be required
Runway 14R Length	TORA – 9,120'/10,000' (PPRP) TODA – 9,120'/10,000' (PPRP) ASDA – 9,120'/10,000' (PPRP) LDA – 9,120'/9,120' (PPRP) (Moderate Change-Reduces published TORA & TODA 880')	Reduced TORA & TODA runway lengths could be mitigated with use of PPRP runway and still satisfy operational requirements of current and projected aircraft fleet.
Runway 32L Length	TORA – 10,000' TODA – 10,000' ASDA – 10,000' LDA – 9,120' (No Change)	Existing runway declared distances satisfy operational requirements of current and projected aircraft fleet.
Instrument Approach Procedure Visibility Minimums	RW 14R – ½ mile vis. mins. RW 32L – ¾ mile vis. mins. (Moderate Change-Lowers Visibility Minimums @ each runway end)	The potential RW 14R IAP ½ mile vis. mins. would offer an additional 43.2 hrs. of annual IFR capability over the ¾ mile vis. mins.
Runway Protection Zones	RW 14R – 1,000' x 1,750' x 2,500' RW 32L – 1,000' x 1,510' x 1,700' vs. 1,000' x 1,750' x 2,500' (Significant Change-Larger RPZs & repositions RW 14R departure RPZ)	RW 14R RPZ – ½ mile vis. mins. RW 32L RPZ – ¾ vs. ½ mile vis. mins.
Incompatible Land Uses within Runway Protection Zones	RW 14R – 21.03 acres RW 32L – 15.09/49.7 acres (Significant Change-Increase)	RW 14R Uncontrolled RPZ – Steam Plant, Roadway R.O.W., Private property, & expanded light lane) RW 32L Uncontrolled RPZ – Boeing property, Roadway R.O.W. & Prologis Property.
RPZ Easement/Property Acquisition	RW 14R RPZ Easement – 1.9 acres RW 14R RPZ Property – 9.2 acres RW 32L RPZ Property/Ease. – 4.6/12.9 acres (Significant Change-Increase)	RW 14R RPZ – Steam Plant Property & private property RW 32L RPZ – Boeing & Prologis property.
Taxiway System	Realigns & relocates segment of Taxiway A @ Taxiway A1, Installs Taxiway A centerline lights, realigns Taxiway A4 with Taxiway B3, includes width reduction of Taxiways B5, B10, & A10, and constructs access taxiway from Taxiway A (Moderate Change)	Standardizes taxiway design with 90° intersections, eliminates unnecessary taxiway connectors, reduces wide expanses of pavement at taxiway connectors, and mitigates Hot Spot #2.

Table D8 RUNWAY 14R/32L SUMMARY MATRIX - ALTERNATIVE TWO (CONTINUED)

Component/Consideration	Alternative Two	Screening Criteria
Instrumentation/Lighting	Maintain glide slope & localizer antennas. Relocate HIRLs, MITLs, Signage, and PAPIs Upgrade RW 14R MALSF to MALSR <i>(Significant Change)</i>	Facility relocations & upgrades are dictated by runway width reduction & RW 14R IAP improvements.
Environmental Issues	Larger RW 14R RPZ – (Encroachment on Steam Plant property, Ruby Chow Park, Roadway R.O.W., & Georgetown neighborhood) Larger RW 32L RPZ – (Encroachment on Boeing & Prologis property) Existing Fuel Farm – (Location within RW 14R RPZ) <i>(Significant Change)</i>	Would require EA or Environmental Impact Statement (EIS) with Section 4(f) issues, Section 106 Consultation, & potential property acquisition Phase I EDDA. Fuel farm relocation with potential Phase I EDDA and clean up/remediation.

Note: <sup>1</sup> Existing PPRP provides aircraft operators with a TORA, TODA, & ASDA of 10,000-feet on as-needed basis.

#### Runway 14R/32L - Alternative Two Advantages.

- Reduces the Runway 14R existing declared distances for TORA & TODA by 880 feet, but effectively maintains the runway's existing operational capabilities (retaining a minimum 10,000-foot ASDA runway length in each direction with operator access to the existing 880 feet of PPRP runway).
- The Runway 14R declared distances reduction of TORA & TODA permits the repositioning of the existing departure RPZ to reduce departure RPZ easement acquisition costs and mitigate existing non-compatible land uses.
- Runway width reduction to 150 feet reduces long-term pavement maintenance cost for King County.
- Runway width reduction reduces impervious pavement surface area and would minimize storm water runoff drainage volumes.
- Provides opportunity to increase IFR access capability to the Airport by 43.2 hours annually if the existing Runway 14R ILS can receive environmental clearance for the ½-mile visibility minimums and complete the RPZ property and easement acquisition requirements.

#### Runway 14R/32L - Alternative Two Disadvantages.

- Runway width reduction would require relocation of all runway edge lights, signage, and PAPIs.
- The published TORA and TODA declared distances for Runway 14R would be reduced from 10,000 feet to 9,120 feet.
- Implementation of future ½-mile visibility minimums for the Runway 14R IAPs would require additional planning in consideration of the FAA Memorandum *Interim Guidance on Land Uses within a Runway Protection Zone*, as well as the preparation of an Environmental Assessment with Section 4(f) issues & Section 106 Consultation.
- Implementation of future ¾- or ½-mile visibility minimums for the Runway 32L IAPs would require additional planning in consideration of the FAA Memorandum *Interim Guidance on Land Uses within a Runway Protection Zone*, as well as the preparation of an Environmental Assessment.
- Requires both easement and property acquisition within future Runway 14R approach RPZ.
- Requires easement and potential property acquisition within future Runway 32L approach RPZ.

### Runway 14R/32L - Alternative Three

Alternative Three would modify the runway's existing design standards from RDC D-IV-4000 to RDC D-IV-5000 by raising the Instrument Flight Visibility Category from  $\frac{3}{4}$ -mile to 1-mile. In addition, this alternative reduces the Runway 14R/32L width to 150 feet to meet existing FAA design standards. It converts the existing Runway 14R PPRP to full-time runway use pavement and updates the markings of the existing Runway 14R threshold as a "displaced threshold". It also updates the runway's published declared distances, repositions the Runway 14R departure RPZ, raises the existing Runway 14R IAP visibility minimums from  $\frac{3}{4}$  to 1-mile, and retains the existing Runway 32L IAP visibility minimums of greater than 1-mile. **Figure D19** depicts the overall airport planning considerations for this alternative. As with the previous two alternatives, several of the runway's existing non-standard conditions that were presented in **Table D1** have been identified for potential resolution with a future request for modification of standards and update of the existing ATC Operational Waiver.

**Figures D20 and D21**, respectively, detail the close-in planning considerations associated with each runway end for Alternative Three.

**Runway Width.** As with Alternative Two, this alternative reduces the existing runway width from 200 to 150 feet to comply with FAA design standards and ensure the future reconstruction costs of the runway would be 100 percent eligible for Federal AIP funding.

**Runway Length.** This alternative converts the existing Runway 14R PPRP to full-use runway and remarks the existing Runway 14R threshold as a "displaced". The modifications result in the following runway lengths for each runway end using declared distances, as presented in **Table D9**.

Table D9 RUNWAY 14R/32L DECLARED DISTANCES - ALTERNATIVE THREE

Facility	TORA	TODA	ASDA	LDA
Runway 14R	10,000'	10,000'	10,000'	9,120' <sup>1</sup>
Runway 32L	10,000'	10,000'	10,000'	9,120' <sup>1</sup>

**SOURCE:** 2007 Airport Layout Plan & Mead & Hunt, Inc.

**Note:** The specified operational runway lengths reflect the existing condition.

TORA: Takeoff Run Available

TODA: Takeoff Distance Available

ASDA: Accelerate Stop Distance Available

LDA: Landing Distance Available

<sup>1</sup> The reduced LDA length is dictated by the displaced landing threshold.

Figure D19

Runway 14R/32L Design Standards & Declared Distances - Alternative Three

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Figure D20

Runway 14R Instrument Approach Procedure/Runway Protection Zone Detail - Alternative Three

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Figure D21

Runway 32L Instrument Approach Procedure/Runway Protection Zone Detail - Alternative Three

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**Instrument Approach Procedures.** Based upon the existing IAP information presented in Alternative One, this alternative proposes raising the existing Runway 14R IAP visibility minimums from  $\frac{3}{4}$ -mile back to 1 mile (consistent with the existing ALP). This change would reduce the annual IFR access capability of the runway by as much as 8.8 hours. In addition, this alternative would maintain greater than 1-mile visibility minimums for the existing Runway 32L IAP.

**Approach and Departure Runway Protection Zones.** At the north end of the runway, the increased Runway 14R IAP visibility minimums from  $\frac{3}{4}$ -mile to 1 mile would reduce the required Runway 14R approach RPZ dimensions from the existing 1,000' x 1,510' x 1,700' to 500' x 1,010' x 1,700', and thus remove the Georgetown Steam Plant from within the RPZ boundary. In addition, the conversion of the Runway 14R PPRP to full-time runway use pavement and updating the declared distances permits the Runway 14R departure RPZ to be repositioned at the south end of the runway to align with the Runway 32L approach RPZ. The aligned approach and departure RPZs would decrease the existing RPZ area that extends beyond the airport boundary and thus minimize future controls through either easement or fee simple acquisitions.

The remaining uncontrolled RPZ areas for Alternative Three are defined as follows:

**Runway 14R**

- 15th Avenue S. R.O.W. @ 0.3 acres
- Existing airport fuel storage area (facility is located on airport property, but is designated as an incompatible land use within the RPZ)

**Runway 32L**

- Airport Way S., BNSF/UP Railroad, and I-5 R.O.W. @ 5.9 acres

**Property/RPZ Easement Acquisition.** Due to the reduced size of the Runway 14R approach RPZ and the repositioning of the Runway 14R departure RPZ, this alternative reflects the least amount of uncontrolled RPZ property extending beyond the existing property boundary to be considered for future acquisition. In addition, all the existing uncontrolled RPZ property overlays existing roadway and railroad R.O.W., which would likely not be required for purchase in either fee simple or easement.

**Taxiway Improvements.** Maintain the existing Taxiway B design standards (i.e., TDG 5/ADG IV) and upgrade segment of Taxiway A from a wingspan-restricted ADG III to an unrestricted ADG III standard.

As presented on **Figure D22** and detailed on **Figures D23** through **D26**, the recommended taxiway improvements include:

- Realign segment of Taxiway A at Taxiway A1 to accommodate unrestricted ADG III access
- Construct new segment of Taxiway A with ADG III criteria to serve converted PPRP runway
- Extend new segment of Taxiway A with ADG II criteria to serve existing northeast apron area
- Extend West Side Parallel Taxiway (Taxiway Z from Taxiway B) with ADG II design standards to serve potential North GA Development Area
- Extend West Side Parallel Taxiway (Taxiway B) with ADG-IV design standards to serve potential South Cargo/Aviation Industrial Development Area within adjacent Prologis property
- Install Taxiway A centerline lights to mitigate Hot Spot #2
- Upgrade existing angled exit taxiways with 90° exit taxiways (Realign Taxiway A4 with Taxiway B3)
- Potential Taxiway connector width reduction projects: Taxiways B5, A10, & B10

**Lighting and Navigational Aids.** As presented on **Figure D27**, the existing HIRL, four-light PAPI, and runway signage would require relocation in conjunction with the runway width reduction. Also, with the raised visibility minimums to the Runway 14R IAPs, the existing MALSF would no longer be required, but is recommended to be retained.

**Potential Environmental Impacts.** Unlike Alternatives One and Two, the reduced size of the Runway 14R approach RPZ would eliminate future environmental coordination and documentation related to the RPZ. Yet, a new Environmental Assessment would likely be required to address the conversion of the runway's existing PPRP to full-use runway. This pavement conversion could potentially increase the noise exposure to the Steam Plant, as well as other Georgetown neighborhood properties located north of BFI, resulting from the increased number of aircraft using the pavement for takeoffs (annual utilization of the PPRP has been less than 50 operations per year since 2007). In addition, the operational change associated with the PPRP conversion may also decrease the noise exposure for properties located south of the Airport. As with the previous alternatives, the future relocation of the existing fuel farm from within the existing Runway 14R approach RPZ to a separate site may require a Phase I EDDA and clean up/remediation due to potential contamination of the existing facility.

The key development components of this alternative, along with the screening criteria for their assessment is presented in **Table D10**.



Figure D22  
Runway 14R/32L - Taxiway Improvements - Alternative Three

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Figure D23

Runway 14R/32L Taxiway Improvements - Alternative Three - Detail A

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Figure D24  
Runway 14R/32L Taxiway Improvements - Alternative Three - Detail B

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Figure D25  
Runway 14R/32L Taxiway Improvements - Alternative Three - Detail C

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Figure D26  
Runway 14R/32L Taxiway Improvements - Alternative Three - Detail D

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Figure D27

Runway 14R/32L – Lighting & Navigational Aids - Alternative Three

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Table D10 RUNWAY 14R/32L SUMMARY MATRIX - ALTERNATIVE THREE

Component/Consideration	Alternative Three	Screening Criteria
Runway Design Code (RDC)	RDC D-IV-5000 (Minor Change-Less Restrictive)	Implement less restrictive design criteria (Existing Non-Std. Conditions to be mitigated with combination of future development projects, MOS, & ATC waiver).
Runway Width	150' Reduce existing runway width by 50' (Moderate Change)	Reduced runway width would be 100% eligible for FAA funding/No supplemental funding sources would be required.
Runway 14R Length	TORA – 10,000' TODA – 10,000' ASDA – 10,000' LDA – 9,120' (Moderate Change-Increases published ASDA by 880') <sup>1</sup>	Future runway declared distances satisfy operational requirements of current and projected aircraft fleet.
Runway 32L Length	TORA – 10,000' TODA – 10,000' ASDA – 10,000' LDA – 9,120' (No Change)	Existing runway declared distances satisfy operational requirements of current and projected aircraft fleet.
Instrument Approach Procedure Visibility Minimums	RW 14R – 1-mile vis. mins. RW 32L – >1-mile vis. mins. (Minor Change-Raises Visibility Minimums)	The future RW 14R IAP 1-mile vis. mins. would potentially reduce the annual IFR capability by 8.8 hrs.
Runway Protection Zones	RW 14R – 500' x 1,010' x 1,700' RW 32L – 500' x 1,010' x 1,700' (Significant Change-Smaller RPZ & repositions RW 14R departure RPZ)	RW 14R RPZ – 1-mile vis. mins. RW 32L RPZ – >1-mile vis. mins.
Incompatible Land Uses within Runway Protection Zones	RW 14R – 0.3 acres RW 32L – 5.9 acres (Significant Change-Reduction)	RW 14R Uncontrolled RPZ – Roadway R.O.W. RW 32L Uncontrolled RPZ – Roadway R.O.W.
RPZ Easement Acquisition	RW 14R RPZ – 0 acres RW 32L RPZ – 0 acres (Significant Change-Reduction)	RPZ easement acquisition of existing Roadway R.O.W. is not required.
Taxiway System	Realigns & relocates segment of Taxiway A @ Taxiway A1, Installs Taxiway A centerline lights, realigns Taxiway A4 with Taxiway B3, includes width reduction of Taxiways B5, A10, & B10, constructs new segment of Taxiway A to serve new Runway 14R end, and constructs north and south extensions to Taxiway B (Significant Change)	Standardizes taxiway design with 90° intersections, eliminates unnecessary taxiway connectors, reduces wide expanses of pavement at taxiway connectors, mitigates Hot Spots #1 & #2, and improves airside access to north & south ends of the Airport.

Table D10 RUNWAY 14R/32L SUMMARY MATRIX - ALTERNATIVE THREE (CONTINUED)

Component/Consideration	Alternative Three	Screening Criteria
Instrumentation/Lighting	Maintain glide slope & localizer antennas. Relocate HIRL, Signage, and PAPIs ( <i>Moderate Change</i> )	Facility relocations are dictated by runway width reduction.
Environmental Issues	RW 14R RPZ – Reduced RPZ size eliminates existing encroachment on Steam Plant property; PPRP runway conversion; Existing Fuel Farm – Location within RW 14R RPZ ( <i>Significant Change</i> )	Conversion of PPRP to actual runway may require EA. Fuel Farm relocation requires potential Phase I EDDA and clean up/remediation.

Note: <sup>1</sup> Existing PPRP is converted to full-time use runway pavement and marked as a displaced threshold.

#### Runway 14R/32L - Alternative Three Advantages.

- Maintains the runway's existing operational capabilities (retaining a minimum 10,000-foot ASDA runway length in each direction).
- Runway width reduction to 150 feet reduces long-term pavement maintenance cost for King County.
- The revised Runway 14R declared distances permits the repositioning of the existing departure RPZ to eliminate departure RPZ easement acquisition costs and mitigate existing incompatible land uses.
- Eliminates additional planning requirements in consideration of the FAA Memorandum *Interim Guidance on Land Uses within a Runway Protection Zone*, as well as the preparation of an EA & Section 106 Consultation related to the RPZ.
- Runway width reduction reduces impervious pavement surface area and would minimize storm water runoff drainage volumes.
- Removes the Georgetown Steam Plant from within the future Runway 14R approach RPZ.
- No easement and property acquisition would be required within future Runway 14R approach and departure RPZs.
- No easement and property acquisition would be required within the existing Runway 32L approach RPZ.
- Proposed runway declared distances satisfy operational requirements of current and projected aircraft fleet.
- Repositioned Runway 14R departure RPZ aligns with Runway 32L approach RPZ.
- Results in the least amount of land not fully controlled by King County and considered incompatible land uses within the RPZs.

#### Runway 14R/32L - Alternative Three Disadvantages.

- Runway width reduction would require relocation of all runway edge lights, signage, and PAPIs.
- Implementation of future ½-mile visibility minimums for the Runway 14R IAPs would potentially reduce the annual IFR capability by 8.8 hrs.
- Conversion of PPRP to full-use runway would require EA.
- Potential increase in noise impact to the Georgetown Steam Plant and other properties located north of the Airport.



### Runway 14R/32L - Alternatives Summary

The matrix presented in **Table D11** summarizes and compares the advantages, disadvantages, and impacts of the three Runway 14R/32L alternatives presented in the preceding narrative.

Table D11 RUNWAY 14R/32L ALTERNATIVES SUMMARY MATRIX

Component/Consideration	Alternative One	Alternative Two	Alternative Three
Runway Design Code (RDC)	RDC D-IV-4000 (No Change)	RDC D-IV-2400 (Significant Change-More Restrictive)	RDC D-IV-5000 (Minor Change-Less Restrictive)
Runway Width	200' (No Change)	150' (Moderate Change)	150' (Moderate Change)
Runway 14R Length	TORA - 10,000'/10,880' (PPRP) TODA - 10,000'/10,880' (PPRP) ASDA - 9,120'/10,000' (PPRP) LDA - 9,120'/9,120' (PPRP) (No Change)	TORA - 9,120' <sup>1</sup> /10,000' (PPRP) TODA - 9,120' <sup>1</sup> /10,000' (PPRP) ASDA - 9,120' <sup>1</sup> /10,000' (PPRP) LDA - 9,120'/9,120' (PPRP) (Moderate Change Reduces Published TORA & TODA)	TORA -10,000' TODA -10,000' ASDA -10,000' LDA -9,120' (Moderate Change-Increases Published ASDA)
Runway 32L Length	TORA -10,000' TODA -10,000' ASDA -10,000' LDA -9,120' (No Change)	TORA -10,000' TODA -10,000' ASDA -10,000' LDA -9,120' (No Change)	TORA -10,000' TODA -10,000' ASDA -10,000' LDA -9,120' (No Change)
Instrument Approach Procedure Visibility Minimums	RW 14R – ¾ statute mile RW 32L – >1 statute mile (No Change)	RW 14R – ½ statute mile RW 32L – ¾ statute mile or ½ statute mile (Moderate Change-Lowers Visibility Minimums)	RW 14R – 1 statute mile RW 32L – >1 statute mile (Minor Change-Raises Visibility Minimums)
Runway Protection Zones	RW 14R – 1,000' x 1,510' x 1,700' RW 32L – 500' x 1,010' x 1,700' (No Change)	RW 14R – 1,000' x 1,750' x 2,500' RW 32L – 1,000' x 1,510' x 1,700' or 1,000' x 1,750' x 2,500' (Significant Change-Larger RPZs & repositions RW 14R departure RPZ)	RW 14R – 500' x 1,010' x 1,700' RW 32L – 500' x 1,010' x 1,700' (Significant Change-Smaller RPZ & repositions departure RW 14R RPZ)
Incompatible Land Uses within Runway Protection Zones	RW 14R – 2.2 acres. RW 32L – 22.5 acres. (No Change)	RW 14R – 21.03 acres. RW 32L – 15.1/49.7 acres. (Significant Change-Increase)	RW 14R – 0.3 acres. RW 32L – 5.9 acres. (Significant Change-Reduction)

Table D11 RUNWAY 14R/32L ALTERNATIVES SUMMARY MATRIX (CONTINUED)

Component/Consideration	Alternative One	Alternative Two	Alternative Three
RPZ Easement/Property Acquisition	RW 14R RPZ – 1.9 acres RW 32L RPZ – 7.4 acre (Significant Change)	RW 14R RPZ – 12.83 acres RWW 32L RPZ – 4.6/19.9 acres (Significant Change-Increase)	RW 14R RPZ – 0 acres RW 32L RPZ – 0 acres (Significant Change-Reduction)
Taxiway System	Realigns TW A centerline @ TW A9 intersection, realigns TW A4 with TW B3 and reduces width of TWs B5, A10, & B10 (Moderate Change)	Realigns & relocates segment of Taxiway A @ Taxiway A1, Installs Taxiway A centerline lights, realigns TW A4 with TW B3, includes width reduction of TWs B5, A10, & B10, and constructs access taxiway from TW A (Moderate Change)	Realigns & relocates segment of Taxiway A @ Taxiway A1, Installs Taxiway A centerline lights, realigns TW A4 with TW B3, includes width reduction of TWs B5, A10, & B10, constructs new segment of TW A to serve new Runway 14R end, and constructs north and south extensions to TW B (Significant Change)
Instrumentation/Lighting	HIRLs, PAPIs, MALSF, glide slope antennas, and localizer antennas (Minor Change)	Relocate HIRLs, Signage, & PAPIs Install MALSR to RW 14R. (Significant Change)	Relocate HIRLs, Signage, & PAPIs. (Moderate Change)
Environmental Issues	Possible compatible land use/NRHP Property (Georgetown Steam Plant). Possible property acquisition & Phase I EDDA. Possible fuel farm Phase I EDDA and clean up/remediation. (Moderate Change)	Possible compatible land use/NRHP Property & Section 4(f) (Georgetown Steam Plant & Ruby Chow Park). Possible property acquisition Phase I EDDA. Possible fuel farm Phase I EDDA and clean up/remediation. (Significant Change)	Removes Georgetown Steam Plant from Runway 14R RPZ. Possible property acquisition Phase I EDDA. Possible increase in noise exposure to Georgetown Steam Plant and other north properties. Possible fuel farm Phase I EDDA and clean up/remediation. (Significant Change)

Note: <sup>1</sup> Existing PPRP provides aircraft operators with a TORA, TODA, & ASDA of 10,000-feet on as-needed basis.

### Additional Runway 14R/32L Development Option- Alternative Four

Subsequent to the preparation of the Alternatives Analysis and Development Concepts chapter and the selection of the Sponsors preferred development alternative for Runway 14R/32L, the FAA determined that an existing threshold crossing height (TCH) waiver for the current Runway 14R instrument approach procedures (IAPs) could no longer be approved and would have to be resolved. Initially, efforts to increase the TCH with an adjustment to the aiming angle of the glide slope antenna proved unsuccessful. It was later determined that a 300-foot shift/extension of the Runway 14R end, with maintenance of the existing glide slope angle would achieve the required TCH clearances. Other key features of this alternative include retention of the existing Runway 14R ¾-mile IAP visibility minimums with relocation of the existing MALSF, a 300-foot extension of the runway's parallel taxiway system (Taxiways A and B) with new connectors, and the installation of a high intensity Approach Light System with Sequenced Flashing lights (ASLF-1) to Runway 32L that includes the addition of runway Centerline Lights (CL) and Touchdown Zone Lights (TDZL) at both runway ends.

**Table D12** below summarizes the individual components of the alternative, which essentially results in a combination of Alternatives One and Three.

Table D12 RUNWAY 14R/32L SUMMARY MATRIX - ALTERNATIVE FOUR

Component/Consideration	Alternative Four	Screening Criteria
Runway Design Code (RDC)	RDC D-IV-4000 (No Change)	Existing Non-Std. Conditions to be mitigated with combination of future dev. projects, MOS, & ATC waiver).
Runway Width	200' (No Change)	FAA determined extra 50' of runway width is justified to support Boeing aircraft test flight operations and will be eligible for FAA funding.
Runway 14R Length	TORA – 10,300' TODA – 10,300' ASDA – 9,420' LDA – 9,420' (Moderate Change-Increases published lengths for each configuration by 300 feet) <sup>1</sup>	Future runway declared distances satisfy operational requirements of current and projected aircraft fleet.
Runway 32L Length	TORA – 10,300' TODA – 10,300' ASDA – 10,300' LDA – 9,420' (Moderate Change-Increases published lengths for each configuration by 300 feet)	Future runway declared distances satisfy operational requirements of current and projected aircraft fleet.
Instrument Approach Procedure Visibility Minimums	RW 14R – ¾-mile vis. mins. RW 32L – >1-mile vis. mins. (No Change)	The existing RW 14R IAP ¾ mile vis. mins. offer an additional 8.8 hrs. of annual IFR capability over the 1-mile vis. mins.
Runway Protection Zones	RW 14R – 1,000' x 1,510' x 1,700' RW 32L – 500' x 1,010' x 1,700' (No Change)	RW 14R RPZ – ¾-mile vis. mins. RW 32L RPZ – ≥1-mile vis. mins.
Incompatible Land Uses within Runway Protection Zones	RW 14R – 4.54 acres RW 32L – 22.35 acres (Moderate Change-Increase)	RW 14R Uncontrolled RPZ – Off-Airport property and Roadway R.O.W. RW 32L Uncontrolled RPZ – (Roadway R.O.W & Prologis Prop.).
RPZ Easement/Property Acquisition	RW 14R RPZ – 1.0 acre RW 32L RPZ – 7.4 acres (Moderate Change- Increase)	RW 14R RPZ – South of Elizabeth St. & North of S. Hardy St. RW 32L RPZ – Prologis Property

Table D12 RUNWAY 14R/32L SUMMARY MATRIX - ALTERNATIVE FOUR (CONTINUED)

Component/Consideration	Alternative Four	Screening Criteria
Taxiway System	Realigns north segment of Taxiway A, Installs Taxiway A centerline lights, realigns Taxiway A4 with Taxiway B3, &, constructs new segment of Taxiway A to serve new Runway 14R end, constructs north extension to Taxiway B and Installs Taxiway B centerline lights (Significant Change)	Standardizes taxiway design with 90° intersections, eliminates unnecessary taxiway connectors, mitigates Hot Spots #1 & #2, and improves airside access to northeast aviation development area.
Instrumentation/Lighting	Maintain glide slope & localizer antennas, HIRLs, Signage, and PAPIs. Relocate RW 14R MALSF, Install RW 32L ALSF-1, and Install RW CL & TDZ lights at each runway end. (Moderate Change)	Runway approach lighting system upgrades are proposed to enhance runway visibility.
Environmental Issues	Existing & future RW 14R RPZ encroachment on Steam Plant property; partial PPRP runway conversion and decommissioning. Existing Fuel Farm – Location within RW 14R RPZ (Significant Change)	RPZ land use compatibility and conversion of PPRP to full use runway may require EA & Section 106 consultation. Fuel Farm relocation requires potential Phase I EDDA and clean up/remediation.

Note: <sup>1</sup> 300-feet of existing PPRP to be converted to full-use runway pavement.

#### Runway 14R/32L - Alternative Four Advantages.

- Slightly enhances the runway's existing operational capabilities (providing a minimum 10,300-foot ASDA runway length for each direction.
- Maintains the 200-foot runway width, providing an extra margin of safety for final testing of Boeing aircraft and operations during crosswind conditions.
- Proposed runway declared distances satisfy operational requirements for current and projected aircraft fleet.
- Maintains the runway's existing IFR access capabilities with ¾-mile visibility minimum instrument approach procedures (IAPs).

#### Runway 14R/32L - Alternative Four Disadvantages.

- Partial conversion of PPRP to full-time use runway would require EA.
- Potential increase in noise impact to the Georgetown Steam Plant and other properties located north of the Airport.
- Repositioned Runway 14R approach RPZ increases the amount of land not fully controlled by King County and considered incompatible land uses within the RPZs.
- Requires property and/or easement acquisition within future Runway 14R approach and existing departure RPZs.
- Requires additional planning in consideration of the FAA Memorandum *Interim Guidance on Land Uses within a Runway Protection Zone*, as well as the preparation of an EA and Section 106 Consultation related to the Runway 14R RPZ.
- Potential increase in noise impact to the Georgetown Steam Plant and other properties located north of the Airport.

### Runway 14L/32R - Alternatives One & Two

Runway 14L/32R, the Airport's secondary runway, meets all facility requirements associated with its function at BFI except for runway width, in which case the existing width of 100 feet exceeds the FAA design standard of 60 feet associated with the specified dimensional criteria of RDC B-I (Small Aircraft)-Visual for this runway. Therefore, there are two alternatives for Runway 14L/32R identified for evaluation in the following text.

Alternative One maintains the status quo of Runway 14L/32R; no changes to the current runway layout or operating conditions are proposed. **Figure D28** depicts the overall airport planning considerations for these alternatives. **Figure D29** details the close-in planning considerations associated with each runway end.

**Runway Width.** The existing Runway 14L/32R width of 100 feet exceeds the FAA design standard of 60 feet associated with RDC B-I (Small Aircraft) by 40 feet. The FAA will only provide AIP funds for major runway pavement reconstruction projects based on appropriate dimensional standards. Alternative One maintains the existing width of 100 feet but would transfer the future funding obligations for the reconstruction of the extra 40 feet of runway width to King County or other local funding sources exclusively. Alternative Two would reduce the runway width to 60 feet associated with RDC B-I (Small Aircraft) design standards. One additional option for consideration would be to re-designate the runway to RDC B-II (Small Aircraft) design standards, which specify a runway width of 75 feet.

**Runway Length.** Alternatives One and Two maintain the runway's existing published declared distances, which specify the full runway length of 3,710 feet for TORA, TODA, and ASDA for each operating direction. Also, the LDA to each runway end are reduced due to existing displaced thresholds (the Runway 14L landing threshold is displaced 250 feet, while the Runway 32R landing threshold is displaced 375 feet). However, based upon the runway length requirements presented in the previous chapter, the existing runway length of 3,710 feet generally accommodates the grouping of smaller aircraft (aircraft weighing up to 12,500 pounds) that utilize this runway for takeoffs and landings, in consideration of the reduced landing length available.

The specified runway lengths for each runway end using declared distances is presented in **Table D13**.

Figure D28

Runway 14L/32R Dimensions/Declared Distances - Alternatives One & Two

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Figure D29

Runway 14L & 32R Visual Approach/Runway Protection Zone Detail - Alternatives One & Two

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Table D13 RUNWAY 14L/32R DECLARED DISTANCES - ALTERNATIVE ONE & TWO

Facility	TORA	TODA	ASDA	LDA
Runway 14L <sup>1</sup>	3,710'	3,710'	3,710'	3,460'
Runway 32R <sup>1</sup>	3,710'	3,710'	3,710'	3,335'

**SOURCE:** 2007 Airport Layout Plan & Mead & Hunt, Inc.

**Note:** The specified operational runway lengths reflect the existing condition.

TORA: Takeoff Run Available

TODA: Takeoff Distance Available

ASDA: Accelerate Stop Distance Available

LDA: Landing Distance Available

<sup>1</sup> The reduced LDA length is dictated by the existing displaced landing threshold.

**Instrument Approach Procedures.** As noted previously, the primary runway at BFI (Runway 14R/32L) is equipped with five published Instrument Approach Procedures (IAPs) that offer various ceiling and visibility minimums. Runway 14L/32R is a visual approach runway and there are no plans to provide instrument approach capabilities to this facility.

**Approach and Departure Runway Protection Zones.** As presented in **Figure D29**, the existing Runway Protection Zones (RPZs) for Runways 14L and 32R are to be maintained. They are fully contained on existing airport property and controlled by King County.

**Property/RPZ Easement Acquisition.** As noted above, both the approach and departure RPZs with this alternative are contained on existing airport property. Therefore, no RPZ property or easement acquisition would be required with this alternative.

**Taxiway Improvements.** Maintain the existing taxiway design standards for the existing parallel taxiway facilities and associated connector taxiways:

- Taxiway A @ Taxiway Design Groups (TDG) 5, 3, 1, & 1A/Airplane Design Groups (ADG) IV, III, & I.
- Taxiway B @ TDG 5/ADG IV.

As presented on **Figure D30**, the recommended taxiway improvements include:

- Upgrade existing angled exit taxiways with 90° exit taxiways (Realign Taxiway A4 with Taxiway B3).
- Remove connector Taxiways A3 & A5.
- Upgrade taxiway lights and signs in conjunction with specified taxiway improvement projects.

**Lighting and Navigational Aids.** As presented on **Figure D31**, Alternative One would require some revisions to the existing Medium Intensity Runway Lights (MIRL) due to the proposed relocation and removal of some of the connector taxiway facilities. However, the existing two-light PAPI and Runway End Identifier Lights, (REILs) would remain in place with no modifications necessary. For Alternative Two, all MIRLs, signage, PAPIs, and REILs would have to be relocated due to the runway width reduction from 100 feet to either 60 or 75 feet.



Figure D30

Runway 14L/32R Taxiway Improvements - Alternatives One & Two

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Figure D31

Runway 14L/32R – Lighting & Navigational Aids- Alternatives One & Two

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**Potential Environmental Impacts.** Based upon the limited number of recommended development improvements associated with runway, there are no significant environmental impacts identified with the implementation of this alternative.

The key development components of this alternative, along with the screening criteria for their assessment is presented in **Table D14**.

Table D14 RUNWAY 14L/32R ALTERNATIVES SUMMARY MATRIX

Component/Consideration	Alternative One	Alternative Two <sup>1</sup>	Screening Criteria
Runway Design Code (RDC)	RDC B-I (Small Aircraft)-Visual (No Change)	RDC B-II (Small Aircraft)-Visual (Minor Change)	Sponsor's preferred <i>Small Aircraft</i> RDC designation to be confirmed.
Runway Width	100' (No Change)	60' vs. 75' (Moderate Change)	Maintain existing runway width vs. Reduce width to meet design standard.
Runway 14L Length	TORA – 3,710' TODA – 3,710' ASDA – 3,710' LDA – 3,460' (No Change)	Same as Alternative One. (No Change)	Maintain existing published Declared Distances. Displaced threshold required to achieve TSS clearances at Taxiway A1.
Runway 32R Length	TORA – 3,710' TODA – 3,710' ASDA – 3,710' LDA – 3,335' (No Change)	Same as Alternative One. (No Change)	Maintain existing published Declared Distances. Displaced threshold required to achieve TSS clearances at Taxiway A9.
Instrument Approach Procedures	RW 14L – Visual Approach RW 32R – Visual Approach (No Change)	Same as Alternative One. (No Change)	Existing visual approach to each runway end is to be maintained.
Runway Protection Zones	RW 14L – 250' x 450' x 1,000' RW 32R – 250' x 450' x 1,000' Approach & Departure RPZs (No Change)	Same as Alternative One. (No Change)	RW 14L RPZ – Meets Criteria RW 32R RPZ – Meets Criteria
Runway Protection Zones Incompatible Land Uses	RW 14L – None RW 32R – None (No change)	Same as Alternative One. (No change)	RW 14L RPZ – Meets Criteria RW 32R RPZ – Meets Criteria
Property/RPZ Easement Acquisition	RW 14L – None RW 32R – None (No Change)	Same as Alternative One. (No Change)	RW 14L RPZ – Meets Criteria RW 32R RPZ – Meets Criteria
Taxiway System	Realigns Taxiway A4 connector & removes Taxiway "A-3" & "A-5" connectors (Moderate Change)	Same as Alternative One. (Moderate Change)	Standardizes taxiway design with 90° intersections & eliminates unnecessary taxiway connectors.

Table D14 RUNWAY 14L/32R ALTERNATIVES SUMMARY MATRIX (CONTINUED)

Component/Consideration	Alternative One	Alternative Two <sup>1</sup>	Screening Criteria
Instrumentation/Lighting & Navigational Aids	Modify segment of MIRLs & Signage. Maintain PAPIs & REILs (Minor change)	Relocate MIRLs, Signage, PAPIs, & REILs. (Significant Change)	Facility relocations are dictated by runway width reduction.
Environmental Issues	No Significant Impacts (No Change)	Same as Alternative One. (No Change)	None

Note: <sup>1</sup>The proposed RDC designation, runway width reduction, and associated lighting & NAVAID relocations are the differences between Alternatives One & Two.

#### Runway 14L/32R - Alternative One & Two Advantages.

- Maintains the runway's existing operational capabilities (i.e., the existing published declared distances would remain unchanged).
- Alternative One maintains the 100-foot runway width, providing an extra margin of safety for small aircraft operations during crosswind conditions.
- The reduced runway width for Alternative Two would reduce the quantity of impervious pavement on the runway.
- The reduced runway width for Alternative Two would reduce the ongoing maintenance costs of the runway pavement.

#### Runway 14L/32R - Alternative One & Two Disadvantages.

- Retention of the 100-foot runway width for Alternative One increases long-term pavement maintenance costs for King County, and extra 40 feet of pavement width may not be eligible for future FAA AIP funding.
- The reduced runway width for Alternative Two would require the relocation of all MIRLs, PAPIs, REILs, & signage.

### Recommended Airside Conceptual Development Plan

The proposed airside development alternatives presented in the above text for BFI provided King County Airport Staff with a variety of options for future facility maintenance and development. Following a detailed assessment of the potential impacts of each alternative, and input provided by the Airport Working Group and FAA, the draft components of the Airside Conceptual Development Plan (CDP) are identified and presented in **Tables D15, D16, and Figure D32**. It should be noted that the Airside CDP is represented by a combination of potential improvement projects for each runway and taxiway facility that will be further reviewed in the *Environmental Documentation & Environs Land Use Planning* chapter, then confirmed and presented in the *Airport Plans* chapter to represent the ultimate airport configuration.

Table D15 RUNWAY 14R/32L AIRSIDE CDP SUMMARY

Component/Consideration	Existing	Conceptual Development Plan (CDP)
Runway Design Code (RDC)	RDC D-IV-4000	Same/Maintain
Runway Width	200'	Same/Maintain
Runway 14R Length	TORA – 10,000'/10,880' (PPRP) TODA – 10,000'/10,880' (PPRP) ASDA – 9,120'/10,000' (PPRP) LDA – 9,120'/9,120' (PPRP)	TORA – 10,300' TODA – 10,300' ASDA – 9,420' <sup>1</sup> LDA – 9,420'
Runway 32L Length	TORA – 10,000' TODA – 10,000' ASDA – 10,000' LDA – 9,120'	TORA – 10,300' TODA – 10,300' ASDA – 10,300' LDA – 9,420'
Instrument Approach Procedures (IAPs)	(6) IAPs – ILS, LOC, RNAV (GPS), RNAV (RNP 0.15), RNAV (RNP 0.30), ILS	Same/Maintain
IAP Visibility Minimums	RW 14R – ¾ statute mile RW 32L – >1 statute mile	Same/Maintain
Runway Protection Zones	RW 14R – 1,000' x 1,510' x 1,700' RW 32L – 500' x 1,010' x 1,700'	Same/Maintain
RPZ Property Acquisition	RW 14R RPZ – 4.54 acres RW 32L RPZ – 22.35 acres	RW 14R RPZ – 1.0 acre (To be Acquired) RW 32L RPZ – 7.4 acres (To be Acquired)
Taxiway System	Taxiway A & (11) connectors Taxiway B & (10) connectors	Taxiway A & B to Be Extended with Taxiway Connector Upgrades
Lighting & Navigational Aids	HIRLs, PAPIs, MALSF, glide slope antennas, and localizer antennas	Relocate RW 14R MALSF, Install RW 32 ALSF-1, and Install CL & TDZ light to each runway end
Environmental Issues	Existing potential non- compatible land use/NRHP Property (Georgetown Steam Plant). Possible property acquisition & Phase I EDDA. Possible fuel farm Phase I EDDA and clean up/remediation.	Future runway extension, MALSF relocation, and ALSF-1 upgrade may require mitigation for land use compatibility. Others TBD.

**SOURCE:** King County summary of selected airside development projects from airside alternative analysis.

Table D16 RUNWAY 14L/32R AIRSIDE CDP SUMMARY

Component/Consideration	Existing	Conceptual Development Plan (CDP)
Runway Design Code (RDC)	RDC B-I (Small Aircraft)-Visual	Same/Maintain
Dimensions (Width)	100'	Same/Maintain
Runway 14L Length	TORA – 3,710' TODA – 3,710' ASDA – 3,710' <sup>1</sup> LDA – 3,460'	Same/Maintain
Runway 32R Length	TORA – 3,710' TODA – 3,710' ASDA – 3,710' LDA – 3,335'	Same/Maintain
Instrument Approach Procedures (IAPs)	RW 14L – Visual Approach RW 32R – Visual Approach	Same/Maintain
IAP Visibility Minimums	None/Visual Approaches	Same/Maintain
Runway Protection Zones	RW 14L – 250' x 450' x 1,000' RW 32R – 250' x 450' x 1,000' <i>Approach &amp; Departure RPZs</i>	Same/Maintain
Property/RPZ Easement Acquisition	RW 14L – None RW 32R – None	Same/Maintain
Taxiway System	Taxiway A & six connectors.	Realigns Taxiway A4 & A5 connectors & removes the Taxiway A3 connector.
Instrumentation/Lighting & NAVAIDS	MIRLS, PAPIs, and REILs	Same/Maintain
Environmental Issues	No Significant Impacts.	Same/Maintain

**SOURCE:** King County summary of selected airside development projects from airside alternative analysis.

As described in previous sections, many of the projects will be implemented on a demand dictated basis; therefore, the projected phasing of the projects will continue to be updated from year to year throughout the 20-year planning period of this study. A listing of the major airside projects associated with the *Conceptual Development Plan (CDP)* are presented in the following text.

**Airside Projects:**

- 1) Design and construct new Taxiway A4 to align with Taxiway B3 with signage and edge/centerline lighting modifications in accordance with ADG IV design standards.
- 2) Modify alignment and reconstruct existing west side Airport Service Road (ASR), including the relocation of the Boeing Pump Station, to mitigate existing non-standard Taxiway B Object Free Area (OFA)
- 3) Prepare request and submittal for update of existing ATC Operational Waiver to address non-standard centerline separation distance between existing parallel runway configuration.
- 4) Prepare request and submittal for modification of standards to address multiple existing non-standard conditions: 1) Runway 14R/32L OFA, 2) Runway 14R/32L to Taxiway A centerline separation, and 3) Runway 14R/32L to Taxiway B centerline separation.
- 5) Design and construct Large Aircraft Parking Apron adjacent to Passenger Terminal Building. (In Progress).

- 6) Design and remove existing Taxiway A3 and A4 connectors with signage and lighting modifications.
- 7) Design and realign segment of Taxiway A (between Taxiways A1 and A2) with signage and edge/centerline lighting modifications in accordance with ADG III design standards.
- 8) Design, engineer, and reconstruct Taxiway A5 to 90° connector with signage and lighting modifications, including install of in-pavement runway guard lights.
- 9) Acquire property for Runway 14 RPZ: 1.0 acre (fee simple).
- 10) Design and Implement Runway 14R/32L pavement reconstruction project, including 300-foot extension north onto existing PPRP, extension/expansion of existing runway shoulder from 25' to 40', relocation of RW 14R threshold lights, relocate Runway 14R MALSF, REILs, airfield signs, and replacement of High Intensity Runway Lights (HIRLs). Project to include converting portion of existing PPRP to new blast pad, removing balance of runway and TW Z PPRP, and install of runway centerline & touchdown zone lights.
- 11) Design and implement Taxiway B extension/rehabilitation project with signage and edge/centerline lighting modifications to serve extended runway. Project to include construction of new TW B1 connector with install of in-pavement runway guard lights and removal of existing TW B1.
- 12) Realign/reconstruct north segment of Taxiway A (800 feet north of Taxiway A1) with signage and edge lighting modifications, including centerline lights, in accordance with ADG III design standards, including realignment of ASR. Project to include construction of new TW A1 connector with install of in-pavement runway guard lights to serve extended runway and removal of existing TW A1.
- 13) Design and install Taxiway A centerline lights and in-pavement runway guard lights at each connector taxiway.
- 14) Design and install Taxiway B centerline lights and in-pavement runway guard lights at each connector taxiway.
- 15) Design and implement Runway 14L/32R pavement maintenance and reconstruction projects with lighting and signage modifications/upgrades.
- 16) Design and implement Taxiway A pavement maintenance and reconstruction projects (Phase I, II, & III placeholder).
- 17) Design and implement Taxiway B pavement maintenance and reconstruction projects (Phase I, II, & III placeholder).
- 18) Design and implement apron pavement maintenance and reconstruction projects (Phase I, II, & III placeholder).
- 19) Acquire portion of existing Runway 14R Departure RPZ that extends off Airport property: 7.4 acres (fee simple).
- 20) Design and install Runway 32L ALSF-1. Project will also include some obstruction removal to clear future light lane boundary.

Figure D32  
Recommended Airside Conceptual Development Plan (CDP)

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## **Landside Development Alternatives**

With the framework of the Airport's ultimate airside development identified, placement of needed landside facilities can now be analyzed. The overall objectives of the landside plan are the provision of conceptual development locations for facilities that are conveniently located and accessible to the community, and that accommodate the specific requirements of Airport users.

BFI is uniquely located near both the Duwamish Industrial Corridor and the Seattle central business district, as well as the adjacent network of supporting regional transportation facilities (i.e., ground, rail, and waterway). These key locational factors combine to make BFI a prime location for Industrial Aviation facilities, air cargo operations, and the basing of corporate general aviation aircraft. However, the existing airport footprint, consisting of less than 600 acres, is extremely site-constrained (currently reserved for airfield development such as runways, taxiways, aprons, and/or safety-object setbacks), with limited property available for new or expanded landside development. Given these existing site restrictions, there are some land parcels located along the perimeter and adjacent to the Airport, and some existing airport parcels that can be evaluated for potential landside development expansion and/or redevelopment.

Landside facilities are typically grouped into two generalized categories: aeronautical and non-aeronautical uses. To designate areas for aeronautical use facilities, two factors must be considered. First, they must be located outside of the airfield operational areas (i.e., property that is protected for runways, taxiways, and approach clearance requirements, building restriction lines, RPZs, runway visibility zones, etc.). Second, development sites that support aeronautical use facilities must have physical attributes that make economic airside access possible. In contrast, development sites for non-aeronautical use facilities are best located in areas that cannot be developed for aviation uses because of physical constraints such as topography, floodplains/drainages, roadways, or because the provision of airside access would be cost prohibitive.

For the purposes of this Master Plan Update, aeronautical use facilities include the passenger terminal area, air cargo, aviation industrial/maintenance facilities, general aviation, and airport support facilities (i.e., air traffic control tower, fuel storage, aircraft rescue and firefighting facility, and airport maintenance). Non-aeronautical use facilities include commercial/office/industrial development that can co-exist with the operation of the Airport and surrounding land uses, as well as provide financial support through revenue generation to the Airport. It also includes non-terminal area roadways and utility right-of-way boundaries.

### **Existing Passenger Terminal Area**

As noted in the previous chapters, all passenger-related activities are accommodated in the lower level of the passenger terminal building, which consist of over 15,000 square feet, is occupied by various tenants: two commuter airline operators - Kenmore Air and JSX, one of the air cargo carriers-AIRPAC Airlines, U.S. Customs and Immigration facilities, and a small coffee shop/deli. Based on the updated passenger enplanement forecasts, in consideration of "industry standard" terminal space planning requirements, it is projected that the existing passenger terminal area (e.g., terminal building, curb, and auto parking) can accommodate all forecast commercial aircraft operations and enplanements throughout the 20-year planning period of this Master Plan Update.

Additionally, since Kenmore Air provides commercial passenger service with aircraft that do not exceed the 12,500-pound weight classification or loadings in excess of 30 passengers and JSX operates 30-seat configured Embraer Regional Jet (EMB) 135 aircraft under the current Twelve-Five Standard Security Program (TFSSP), the airlines and airport are not required to provide a security program that is administered by the Transportation Security Administration (TSA). The existing baseline configuration of the passenger terminal area is presented on **Figure D33**. Potential improvements to the Passenger Terminal Area that have been identified include reconfiguration of the Terminal Entrance to include two-way traffic/signalization improvements, realignment of the terminal access roadway with reduced auto parking counts, and removal of the adjacent Terminal Arrivals building to accommodate future aircraft apron expansion requirements. Variations of these alternatives are presented in the following alternatives for consideration.

### **Passenger Terminal Area - Alternative One**

Alternative One maintains the existing passenger terminal building, access roadway configuration, and auto parking area that is internal to the looped access road. However, Othello Street is to be relocated to align with the outbound segment of the Terminal looped roadway, which will require the removal of the former King County Agencies building located adjacent to Airport Way South. The remainder of the former building area and Othello Street area would be converted to new auto parking facilities. The existing traffic light at the Othello Street/Airport Way South intersection would be relocated to the existing Orchard St. intersection to better serve the Terminal Building entrance roadway. This alternative also proposes the removal of the Terminal/South Arrivals building and adjacent auto parking facility, including modification of the existing air cargo lease area to accommodate the development of a new Terminal Area Courtyard Apron, consisting of approximately 4.7 acres. This new and expanded apron area would serve the parking of larger passenger charter aircraft and provide flex space for additional cargo aircraft parking when needed from the adjacent cargo development area located to the south. This alternative is illustrated in **Figure D34**.

#### **Passenger Terminal Area - Alternative One Advantages.**

- Improves landside vehicular access to the passenger terminal area with the relocation of Othello St. and the relocation of the existing signalized intersection from Othello St. to Orchard St.
- Converts the underutilized area of the Terminal South Arrivals Building and adjacent auto parking to needed terminal apron area.
- Converts the former King County Agencies Building to needed auto parking facilities to better serve the adjacent air cargo development area.

#### **Passenger Terminal Area - Alternative One Disadvantages.**

- Reduces the number of auto parking spaces in the Passenger Terminal Area by 36.

### **Passenger Terminal Area - Alternative Two**

Passenger Terminal Area Alternative Two, as illustrated in **Figure D35**, also maintains the existing passenger terminal building, but further modifies the access roadway configuration and auto parking area to maximize the size of the new Terminal Area Courtyard Apron area. For this alternative, the outbound segment of the Terminal looped roadway is relocated to align with Othello Street.

Figure D33  
*PASSENGER TERMINAL AREA – EXISTING LAYOUT*

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Figure D34  
*PASSENGER TERMINAL AREA – ALTERNATIVE ONE*

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Figure D35  
*PASSENGER TERMINAL AREA – ALTERNATIVE TWO*

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As with Alternative One, Alternative Two proposes the removal of the Terminal/South Arrivals building and the adjacent auto parking facility to accommodate the development of a new Terminal Area Courtyard Apron (consisting of approximately 5.3 acres), which is slightly larger than the Alternative One configuration due to the partial relocation of the Terminal Roadway. This new and expanded apron area would serve the parking of larger passenger charter aircraft and provide flex space for additional cargo aircraft parking when needed from the adjacent cargo development area located to the south. This alternative would also propose the removal of the former King County Agencies building to accommodate new auto parking facilities, as well as relocate the existing traffic light at the Othello Street/Airport Way South intersection to the existing Orchard Street, as presented in Alternative One.

**Passenger Terminal Area - Alternative Two Advantages.**

- Improves landside vehicular access to the passenger terminal area with the relocation of the existing signalized intersection from Othello St. to Orchard St.
- Converts the underutilized area of the Terminal South Arrivals Building and adjacent auto parking to needed terminal apron area.
- Converts the former King County Agencies Building to needed auto parking facilities to better serve the adjacent air cargo development area.

**Passenger Terminal Area - Alternative Two Disadvantages.**

- Requires significant modification of the terminal access road and reduces the number of auto parking spaces in the Passenger Terminal Area by 94.

**Passenger Terminal Area Alternatives Summary**

The key development components of the two Passenger Terminal Area alternatives, along with a comparison to the existing facility, is presented in **Table D17**. Following a detailed assessment of the potential impacts of each alternative, and input provided by the Airport Working Group and FAA, Alternative Two has been selected as the recommended Passenger Terminal Area alternative in the following table and is presented in the Airport Plans chapter of this document to represent the ultimate airport configuration.

Table D17 PASSENGER TERMINAL AREA ALTERNATIVES SUMMARY MATRIX

Component/Consideration	Existing	Alternative One	Alternative Two <sup>1</sup>
Passenger Terminal Building, Terminal/South Arrivals Building, and former King County Agencies Building	---	Maintain Passenger Terminal Building, Remove Terminal/South Arrivals Building & King County Agencies Building (Moderate Change)	Maintain Passenger Terminal Building, Remove Terminal/South Arrivals Building & King County Agencies Building (Moderate Change)
Terminal Access Roadway & Auto Parking	One-way Looped Access Road, 243 Auto Parking Spaces, & Signalized Intersection @ Othello Street/Airport Way S. Intersection	Maintain Looped Access Road, Reduce Auto Parking by 36 Spaces, Relocate Othello St., & Relocate Traffic Signal to Orchard Street/Airport Way S. Intersection (Moderate Change)	Modify Looped Access Road, Reduce Auto Parking by 94 Spaces, & Relocate Traffic Signal to Orchard Street/Airport Way S. Intersection (Significant Change)
Passenger Terminal Apron	Commuter Passenger Apron @ 0.7 acres Flex Use Air Carrier Apron @ 1.3 acres	Maintain Commuter Passenger Apron @ 0.7 acres Increase Flex Use Air Carrier Apron @ 4.7 acres (Moderate Change)	Maintain Commuter Passenger Apron @ 0.7 acres Increase Flex Use Air Carrier Apron @ 5.3 acres (Moderate Change)
Environmental Issues	---	No Significant Impacts (No Change)	No Significant Impacts (No Change)

Source: King County summary of selected landside development alternatives.

Note: <sup>1</sup> Selected development alternative.

### Existing Air Cargo Development Areas

The existing air cargo facilities at BFI are represented by two development areas located on the east side of airport property. The first apron area, consisting of 0.35 acres, is located near the north end of the passenger terminal building and utilized by AIRPAC Airlines. The second much larger area is located south of the passenger terminal and Terminal/South Arrivals buildings and includes both airside and landside facilities operated by UPS that consist of about 18.0 acres. As the dominant air cargo carrier on the Airport, UPS operates as an Integrated Express carrier, moving customer goods door to door, shipment collection, air and truck shipment, and package delivery. UPS is also supported by contracted Regional Air Cargo Carriers (e.g., Ameriflight) that operate as “feeder” airlines between origin and destination (O&D) stations and/or smaller or remote markets. This existing air cargo development area is illustrated in **Figure D36**.

### Air Cargo Area East - Alternative One

UPS is currently evaluating options to modify their existing development footprint at BFI and this alternative proposes a consolidation of their apron area to accommodate the designation of a new ‘courtyard’ ramp area that can serve as multi-use apron area for commercial passenger charters and overflow parking positions for cargo during peak-use periods. The revised air cargo area would consist of approximately 5.6 acres of airside development for aircraft parking and approximately 10.4 acres of landside development area for cargo processing, storage, and auto parking.

Figure D36  
*AIR CARGO AREA EAST—EXISTING LAYOUT*

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This alternative also proposes the closure of a segment of Perimeter Road South to public access, installs a new traffic signal at the intersection of Airport Way S. and Portland Street, and the removal of the former King County Agencies building to accommodate new cargo-related auto parking facilities. This alternative is illustrated in **Figure D37**.

**Air Cargo Area East - Alternative One Advantages.**

- Boundary of existing air cargo area can be modified to better accommodate both the requirements of the cargo operator and the projected apron requirements of the passenger terminal area
- The functionality of the air cargo landside facilities would be improved with the proposed expanded auto parking facilities, segment closure of Perimeter Road South to public access, and installation of a new traffic signal at the intersection of Airport Way S. and Portland Street

**Air Cargo Area East - Alternative One Disadvantages.**

- Segment closure of Perimeter Road South would eliminate full length public access to the east side of the Airport via the existing internal roadway

**Air Cargo Area East Alternatives Summary**

The key development components of this alternative, along with a comparison to the existing Air Cargo Development Area is presented in **Table D18**.

Table D18 AIR CARGO AREA EAST ALTERNATIVES SUMMARY MATRIX

Component/Consideration	Existing	Alternative One <sup>1</sup>
Air Cargo Area (Airside)	6 acres	5.6 acres (Minor Change)
Air Cargo Area (Landside)	12.3 acres	10.4 acres (Moderate Change)
Air Cargo Access Roadway/Auto Parking & Storage	Public-Use perimeter road separates auto parking area and provides vehicular access to Airport Way via Portland St. & S. Othello St., with signalized Intersection.	Closes segment of perimeter road to public access, expands auto parking, and installs traffic signal at Portland St./Airport Way intersection. (Significant Change)
Property Acquisition/Facility Relocation	None	Existing development area footprint would be modified to accommodate expansion of Passenger Terminal Area Apron. (Minor Change)
Environmental Issues	None	No significant impacts. (No Change)

**SOURCE:** King County summary of selected landside development alternatives.

**Note:** <sup>1</sup> Selected development alternative.

Figure D37  
*AIR CARGO AREA EAST—ALTERNATIVE ONE*

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### Potential Air Cargo Area Southwest - Alternative One

The potential Air Cargo Area Southwest option proposes to redevelop the existing Southwest T-hangar area, in conjunction with the future acquisition of the adjacent Woods Meadows property (i.e., approximately 3.6 acres) to accommodate a future “west side” air cargo facility. This alternative would provide just over 10.0 acres to accommodate both air cargo airside and landside facilities consisting of cargo building/processing areas, auto parking, and aircraft parking for as many as five Boeing 767-300 size aircraft adjacent to Taxiway B. This alternative is illustrated in **Figure D38**.

#### Potential Air Cargo Area Southwest - Alternative One Advantages.

- Potential development area, with the acquisition of the adjacent Woods Meadows property, is of sufficient size to accommodate an additional air cargo development area at the Airport, within the existing airport boundary.

#### Potential Air Cargo Area Southwest - Alternative One Disadvantages.

- Redevelopment of the area to accommodate air cargo facilities would require relocation of existing general aviation T-hangars and aircraft tiedown facilities.
- A new general aviation development area would need to be identified on airport property to accommodate the potential relocation of existing general aviation aircraft storage facilities (i.e., hangar storage for 32 aircraft and 30 aircraft tiedowns).

### Potential Air Cargo Area Southwest Alternatives Summary

The key development components of this alternative, along with a comparison to the existing landside aviation facilities in this area is presented in **Table D19**.

Figure D38

POTENTIAL AIR CARGO AREA SOUTHWEST—ALTERNATIVE ONE

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Table D19 POTENTIAL AIR CARGO AREA SOUTHWEST ALTERNATIVE SUMMARY MATRIX

Component/Consideration	Existing	Alternative One <sup>1</sup>
Air Cargo Area (Airside)	None/Existing GA T-hangar & Tiedown Storage Area would require relocation.	5.8 acres (Significant Change)
Air Cargo Area (Landside)	None/Existing GA T-hangar & Tiedown Storage Area would require relocation.	4.5 acres (Significant Change)
Air Cargo Access Roadway/Auto Parking & Storage	Existing direct vehicular access to East Marginal Way, with existing auto parking located along western boundary of the development area.	Maintain existing vehicular access to East Marginal Way & modify existing auto parking. (Minor Change)
Property Acquisition/Facility Relocation	None	Acquire Woods Meadows Property (3.7 acres) & relocate existing GA T-hangar & tiedown storage area. (Significant Change)
Environmental Issues	None	No Significant Impacts. (No Change)

**SOURCE:** King County summary of selected landside development alternatives.

**Note:** <sup>1</sup> Selected development alternative.

### Potential Air Cargo Area South – Alternatives One & Two

The potential Air Cargo Area South option proposes that King County either establish a “through-the-fence” access agreement or purchase property to accommodate development of a new south side air cargo facility located south of Norfolk Street, on property recently acquired by Prologis (the former Sabey property). It is recognized that Prologis has preliminary development plans for the overall 62-acre site that includes mixed-use warehouse and/or manufacturing facilities with office/retail support and a large automobile parking structure. The exact amount of property that could be designated to accommodate a potential air cargo development facility has not been defined, but there is sufficient area to accommodate as many as five Boeing 767-300 size aircraft parking spaces within the northwest quadrant of the site.

Airfield access could be provided by an extension of Taxiway B to the south and would require the closure of a segment of S. Norfolk Street. This alternative is illustrated in **Figure D39** and a variation of the alternative, which is illustrated in **Figure D40**, would substitute the potential extension of Taxiway B with a realigned segment of the west side airport perimeter roadway. A new signalized intersection on S. Norfolk Street with controlled access to Airport property would also be required for cargo to be trailered via ground vehicles between the off-airport cargo processing site and the Airport’s potential Southwest Air Cargo Development Area, described previously.

Figure D39  
*POTENTIAL AIR CARGO AREA SOUTH – ALTERNATIVE ONE*

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Figure D40  
*POTENTIAL AIR CARGO AREA SOUTH – ALTERNATIVE TWO*

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**Potential Air Cargo Area South - Alternative One & Two Advantages.**

- Identifies long-term development options to accommodate additional demand for air cargo facilities at BFI.
- Establishment of a “through-the-fence” access agreement (via taxiway or roadway) that is supported by the FAA could significantly reduce the project development costs to King County.

**Potential Air Cargo Area South - Alternative One & Two Disadvantages.**

- FAA approval of “through-the-fence” access agreements can be challenging due to existing Airport Sponsor grant assurance compliance requirements.
- Potential property acquisition costs of existing Prologis property would be significant.
- Extension of Taxiway B to provide airside access (as identified in Alternative One) would likely require the closure of a segment of S. Norfolk Street.

**Potential Air Cargo Area South Alternatives Summary**

The key development components of the two alternatives, are presented in **Table D20**.

Table D20 **POTENTIAL AIR CARGO AREA SOUTH ALTERNATIVES SUMMARY MATRIX**

Component/Consideration	Existing	Alternative One	Alternative Two
Air Cargo Area (Airside)	None/Proposed 62-acre Prologis development site has no existing taxiway access to Airport.	Airport airside access to be provided by extension of Taxiway B. (Significant Change)	No Airport airside access to be provided. (No Change)
Air Cargo Area (Landside)	None/Proposed 62-acre Prologis development site has no existing roadway access to Airport.	No Airport landside access to be provided. (No Change)	Airport landside access to be provided by realigned segment of the west side airport perimeter roadway & signalized intersection @ S. Norfolk Street. (Significant Change)
Air Cargo Access Roadway/Auto Parking & Storage	Proposed 62-acre Prologis development site has existing vehicular access to East Marginal Way, S. Norfolk Street, and Airport Way S., with existing auto parking facilities.	Vehicular access from East Marginal Way would be modified and segment of S. Norfolk Street would be closed, including reconfiguration of existing auto parking, to serve future Air Cargo development area (Significant Change)	Vehicular access from East Marginal Way and S. Norfolk Street would be modified, including existing auto parking, to serve future Air Cargo development area. (Moderate Change)
Property Acquisition/Facility Relocation	Current Prologis re-development site consists of 62-acres.	Establish “through-the-fence” access agreement or acquire +/- 15 acres to develop air cargo facility (Significant Change)	Similar to Alternative One. (Significant Change)
Environmental Issues	Aircraft noise and land use compatibility.	Changes in aircraft noise and land use compatibility impacts TBD.	Changes in aircraft noise and land use compatibility impacts TBD.

**SOURCE:** King County summary of selected landside development alternatives.



### **Air Cargo Area Alternatives Summary**

The key development components of the various Air Cargo Area alternatives (the existing East Area and potential Southwest and South Areas), were presented in the summary matrix **Tables D18, D19, and D20**. Following a detailed assessment of the potential impacts of each alternative, and input provided by the Airport Working Group and FAA, the Alternative One development was selected for the existing East Area and the proposed Southwest Area, with their layouts presented in the Airport Plans chapter of this document. At present there are no plans to recommend development the off-airport South Area for future Air Cargo facilities.

### **Existing Aviation Industrial/Maintenance Development Areas**

Aviation Industrial/Maintenance facilities typically require large acreage sites for initial development, which should also consider future expansion capability. Most often, these sites must provide runway/taxiway access, as well as include convenient landside access and adequate automobile parking areas. Due to the existing site constraints and limited remaining development area within the current airport boundary, the existing Aviation Industrial/Maintenance facilities at BFI are located on properties both on and off the Airport. A description of these existing facilities, along with alternatives to accommodate future expansion is presented in the following text.

### **On-Airport Aviation Industrial/Maintenance Development Areas**

The existing on-airport aviation industrial/maintenance areas at BFI are currently represented by Boeing facilities (i.e., the Boeing 737 Flight Test Facility and Delivery Center). Their existing leasehold consists of 106 acres located in the northwest quadrant of the Airport (represented by combination of apron aircraft parking positions, hangars, and office facilities). Boeing recently completed the expansion of existing aircraft parking positions adjacent to Taxiway B3, within their existing airport leasehold boundary, in response to projected monthly production rate increases of their Boeing 737 aircraft.

The existing layout of the on-airport aviation industrial maintenance areas, as well as potential expansion areas for consideration, are presented on **Figure D41**. These potential facility expansion areas that are contained within the existing airport boundary include the current WANG property leasehold, which expires in 2023 (i.e., 7.6 acres located within the northwest corner of the Airport), and just under 3 acres of currently vacant/unleased property located south of the ATCT facility that could potentially accommodate two additional B-737 aircraft parking positions.

**On-Airport Aviation Industrial/Maintenance Development Area Advantages.**

- As a major leaseholder of Airport property, the existing on-airport aviation industrial maintenance facilities operated by Boeing are a significant revenue generator for BFI and an economic engine for both the local and regional economy.

**On-Airport Aviation Industrial/Maintenance Development Area Disadvantages.**

- There is limited remaining property available on the Airport to accommodate future expansion of existing on-airport aviation industrial maintenance facilities.
- The existing industrial property in the vicinity of the Airport is of high value, with limited availability for future acquisition (e.g., the 62-acre tract of property located directly south of the Airport was purchased by Prologis in late 2016 for \$136 million).

**On-Airport Aviation Industrial/Maintenance Development Area Alternatives Summary**

The key development components of the existing facilities, along with potential expansion areas are presented in **Table D21**.

Figure D41

*EXISTING & POTENTIAL ON-AIRPORT AVIATION INDUSTRIAL/MAINTENANCE DEVELOPMENT AREAS*

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Table D21 EXISTING/POTENTIAL ON-AIRPORT AVIATION INDUSTRIAL/MAINTENANCE DEVELOPMENT AREAS SUMMARY MATRIX

Component/Consideration	Existing	Potential Expansion North	Potential Expansion South <sup>1</sup>
Aviation Industrial Area (Airside)	Aircraft Parking Apron & Taxilane @ +/-70 acres.	None (No Change)	2.9 acres (Vacant Leasehold south of ATCT) (Minor Change)
Aviation Industrial Area (Landside)	Hangars, Office/Support Facilities, Access Roadways & Auto Parking @ +/-36 acres.	7.6 acres (Existing WANG Leasehold) (Moderate Change)	None (No Change)
Aviation Industrial Access Roadway/Auto Parking & Storage	Vehicular access provided by East Marginal Way, with internal roadways & auto parking located along western boundary of the development.	Vehicular access provided by Ellis Avenue South, with auto parking requirements TBD. (Minor Change)	Vehicular access provided by East Marginal Way via 86 <sup>th</sup> St. South, with auto parking requirements TBD. (Minor Change)
Property Acquisition/Facility Relocation	None	No property acquisition required/Existing facilities would be reconfigured. (Moderate Change)	No property acquisition or facility relocation required/Infrastructure upgrades would be required. (Moderate Change)
Environmental Issues	None	No Significant Impacts anticipated. (No Change)	No Significant Impacts anticipated. (No Change)

SOURCE: King County summary of selected landside development alternatives.

Note: <sup>1</sup> Selected development alternative.

### Off-Airport Aviation Industrial/Maintenance Development Areas

The existing off-airport aviation industrial maintenance areas adjacent to BFI that are also currently represented by Boeing include support facilities related to the Boeing 737 Flight Test Facility and Delivery Center and the Boeing Military Flight Center and Test Facility). Four of these existing off-airport development areas are supported by “through-the-fence” access agreements with the Airport, with two of these requiring taxiway transit corridors across East Marginal Way South that permit the movement of aircraft to and from Boeing property/facilities located west of the Airport. The existing location/layout of these development areas, as well as potential expansion areas for consideration, are presented on **Figure D42**. Additional improvements to the existing taxiway transit corridors for consideration include roadway infrastructure/signalization improvements at the East Marginal Way South intersection locations to improve aircraft accessibility.

Figure D42

*EXISTING & POTENTIAL OFF-AIRPORT AVIATION INDUSTRIAL/MAINTENANCE DEVELOPMENT AREAS*

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**Off-Airport Aviation Industrial/Maintenance Development Area Advantages.**

- King County can generate revenue for the Airport from properly negotiated/FAA approved “through-the-fence” airport access agreements without the significant costs of land acquisition (if available) adjacent to the Airport. As a major leaseholder of Airport property, the existing on-airport aviation industrial maintenance facilities operated by Boeing are a major revenue generator for BFI and an economic engine for both the local and regional economy.

**Off-Airport Aviation Industrial/Maintenance Development Area Disadvantages.**

- The approval of “through-the-fence” airport access agreements by the FAA can be difficult due to the Airport Sponsor’s compliance requirements with existing Airport Improvement Program (AIP) Grant Assurances.

**Off-Airport Aviation Industrial/Maintenance Development Area Alternatives Summary**

The key development components of the existing facilities, along with potential expansion areas in this area are presented in **Table D22**.

**Table D22 EXISTING/POTENTIAL OFF-AIRPORT AVIATION INDUSTRIAL/MAINTENANCE DEVELOPMENT AREAS SUMMARY MATRIX**

Component/Consideration	Existing	Potential Expansion South
Aviation Industrial Area (Airside)	Aircraft parking apron and taxilane: B-737 Deliv. Cntr. @ 16 acres Mil. Flight Center @ 25.3 acres	Aircraft parking apron and taxilane/acreage TBD. (Significant Change)
Aviation Industrial Area (Landside)	B-737 Deliv. Cntr. Hangar, Office/Support Facilities, access roadways and auto parking @ +/- 184 acres.	Support facilities, access roadways and auto parking TBD. (Moderate Change)
Aviation Industrial Access Roadway/Auto Parking & Storage	Vehicular access provided by East Marginal Way South, with internal roadways & auto parking.	Vehicular access provided by East Marginal Way South, with auto parking requirements TBD. (Minor Change)
Property Acquisition/Facility Relocation	None	No property acquisition with Through-the-Fence Agreement/ Facility relocation & Infrastructure upgrades would likely be required (Moderate Change)
Environmental Issues	None	Changes in aircraft noise and land use compatibility impacts TBD.

**SOURCE:** King County summary of selected landside development alternatives.

### Aviation Industrial/Maintenance Area Alternatives Summary

The key development components of the various Aviation Industrial/Maintenance Area alternatives (both On-Airport and Off-Airport Areas), were presented in the summary matrix **Tables D21** and **D22**. Following a detailed assessment of the potential impacts of each alternative, and input provided by the Airport Working Group and FAA, the Expansion Area South was selected for the On-Airport facilities and is presented in the Airport Plans chapter of this document. At present there are no plans to identify potential off-airport development of any additional Aviation Industrial/Maintenance facilities.

### General Aviation Development Areas

General aviation is typically categorized as all activity that is not related to commercial passenger operations, large transport air cargo operations, or military operations. It includes private aviation related to pleasure flying, training, business transportation and storage; commercial aviation related to Fixed Base Operators (FBOs), aircraft maintenance, flight training, aircraft charter/rental, and aircraft storage; corporate aviation related to employee transportation and aircraft storage; and, industrial activity related to aircraft manufacturing and refurbishment. Thus, general aviation is a very diverse category considering various aircraft sizes, aircraft technology/sophistication, the mission of the organization operating the aircraft, and both airside and landside access requirements.

All the diverse considerations mentioned above will impact the appropriateness of a given location for a specific general aviation use. However, as in many cases, a variety of general aviation facilities can be accommodated on any given site. The recommendations in this Master Plan Update attempt to identify the best types of general aviation facilities for a specific developable site. Ultimately, King County must evaluate each development proposal and make land use determinations based on the proposed site usage efficiencies (i.e., striving to maximize the utilization of the available property in the most efficient and effective manner), and best business practices.

The majority of existing general aviation aircraft storage facilities at BFI are located on the east side of the Airport and provided with direct access to the east side partial parallel taxiway system (i.e., Taxiway A). However, additional general aviation property is located within the southwest quadrant of the Airport and is provided with direct access to the west side parallel taxiway system (i.e., Taxiway B). Based aircraft at BFI are stored in a variety of large commercial hangars (i.e., Fixed Base Operator and charter hangar storage facilities), large private corporate hangars, and smaller aircraft T-hangars or tiedown apron, with limited remaining undeveloped or redevelopment property available to accommodate new general aviation facilities.

In recent years, there have been a number of commercial and corporate general aviation redevelopment projects completed on the east side of the Airport. These include new FBO redevelopments by Signature Flight Support and Modern Aviation, including the expansion of the Kenmore Aero Services leasehold and the redevelopment of a previous air cargo facility to accommodate a new large corporate hangar facility. As noted in the Potential Air Cargo Area Southwest section of this chapter, the T-hangar facilities and apron tiedowns located just north of the Museum of Flight facility have been identified for removal to accommodate a future air cargo redevelopment area (there are currently 32 T-hangar units and 53 aircraft tiedowns in this area). The future displacement of based aircraft from these T-hangars were to be relocated to a new general aviation aircraft hangar development area located at the north end of airfield.

However, subsequent to the completion of this draft chapter of the MP Update, it was determined that a proposed 300-foot shift/extension of the Runway 14R end would be required to resolve the existing TCH waiver for the current Runway 14R IAPs, and thus eliminate the option of developing a new north general aviation aircraft storage area at BFI. In addition, the proposed Runway 14R shift/extension and retention of the existing  $\frac{3}{4}$ -mile IAP visibility minimums will require the decommissioning of the existing northeast tiedown apron area (there are currently 55 aircraft tiedowns in this area).

### Airport Support Facilities

Support facilities provide those services and functions that are necessary for an airport to operate safely and efficiently but are not part of the runway/taxiway system and are not related to the passenger terminal building, air cargo facilities, aircraft storage, or aircraft maintenance. In 2016, BFI completed reconstruction of the existing ARFF facility in its present location, at mid-field on the west side of the Airport, adjacent to the ATCT. As presented in the previous chapter, based on the anticipated level of passenger service, the existing ARFF facilities and equipment provided at the Airport are projected to be sufficient throughout the timeframe of this Master Plan Update.

Additionally, King County has selected proposed relocation sites for the Airport's existing ATCT and fuel storage facility, and the MP Update also includes a project to design a proposed Snow Removal Equipment (SRE) building within the northwest development area of the Airport. A brief description of these proposed facilities, along with illustrations of their recommended layout is presented below.

### Airport Maintenance Facility Development Area

The Airport's existing maintenance facility development area is located at the northwest corner of the airfield (northwest of the Steam Plant and southwest of the Runway 14R localizer antenna). Existing vehicular access is provided via South Warsaw Street, which extends east from Ellis Avenue South. Due to the proposed runway extension and RPZ development restrictions, future plans for the site include renovation of the existing FAA Flight Service Station for Airport Offices, including relocation of the Airport's Maintenance Building and construction of a Snow Removal Equipment (SRE) Building to a new Airport Maintenance Development Area located west of the Steam Plant. In addition, construction of a new access road is planned to serve the existing Steam Plant facility. The proposed layout for the redevelopment of this area is illustrated in **Figure D43**.

### Fuel Storage Facility

As presented in the airside alternatives, BFI's existing fuel storage facility is partially located within the existing Runway 14R RPZ, which is considered an incompatible land use within RPZs. Additionally, based upon the generalized planning standard of a two-week storage capacity, the fuel storage and distribution rate analysis presented in the previous chapter indicates that BFI's existing Jet A fuel storage facility is potentially undersized. The selected redevelopment site for the fuel storage facility is to be located west of East Marginal Way South, on the former Jorgensen Forge property that is to be acquired for Airport facility expansion (see **Figure D44** for site location). The future fuel storage facility will require a development footprint of approximately two acres.



Figure D43

*PROPOSED AIRPORT MAINTENANCE REDEVELOPMENT AREA*

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### **Airport Traffic Control Tower (ATCT)**

The Airport's existing ATCT is located at midfield, on the west side of the Airport, adjacent to the ARFF facility. Based upon the *ATCT Line of Sight Shadow Study* prepared for BFI in 2006, it was determined that all areas of the airfield within the Airport Operations Area (AOA) defined "visibility zone" maintain a clear line of sight for the ATCT controllers. However, the age and condition of the ATCT facilities indicate that a facility upgrade might be necessary during the timeframe of this Master Plan Update. Given the existing site constraints of airport property, Airport Staff have identified a potential new development site, also located west of East Marginal Way South, on the former Jorgensen Forge property (see **Figure D44**). King County would have the option to construct a new ATCT at the new location with conventional facilities or evaluate an upgrade/replacement of existing ATC facilities with new remote/virtual Air Traffic Control (ATC) technology.

The remote/virtual ATC technology utilizes a tower mounted system of cameras and equipment that broadcast 360 degrees of live airfield images to a remotely located/manned simulated ATCT cab workstation. This technology has been installed at several locations outside the United States, and a current test site evaluation is being conducted at Leesburg Executive Airport, which is a designated reliever airport for Washington-Dulles International Airport. Additionally, the FAA is has installed a Remote Tower System that will be tested and certified at Northern Colorado Regional Airport located in Fort Collins/Loveland, Colorado. This ATC technology will be the first in the world to integrate both video and track-based surveillance (radar) to provide a comprehensive view of the airport surface and surrounding Class D airspace to controllers working in a remote facility. It is recommended King County closely monitor this emerging technology to determine if these or other potential cost saving methods of providing ATC services should be pursued in lieu of replacing the existing ATCT facility with conventional infrastructure.

### **Recommended Landside Conceptual Development Plan**

The proposed landside development alternatives presented in the above text for BFI provided King County Airport Staff with a variety of options for future facility maintenance and development. Following a detailed assessment of the potential impacts of each alternative, and input provided by the Airport Working Group and FAA, the draft components of the Landside CDP are identified and presented in the following project list and illustration (see **Figure D44**). It should be noted that the Landside CDP is represented by a combination of potential improvement projects that were presented for the various aeronautical use facilities (e.g., passenger terminal area, air cargo, aviation industrial/maintenance facilities, and airport support facilities), which will be further reviewed in the *Environmental Documentation & Environs Land Use Planning* chapter, then confirmed and presented in the *Airport Plans* chapter to represent the ultimate airport configuration.

As described in previous sections, many of the projects will be implemented on a demand dictated basis; therefore, the projected phasing of the projects will continue to be updated from year to year throughout the planning period of this study. A listing of the major landside projects associated with the *Conceptual Development Plan* are presented in the following text.

**Landside Projects:**

- 1) Design and construct Passenger Terminal Area roadway and parking modifications, including removal of the South Arrivals Building related to new large Aircraft Parking Apron. (In Progress)
- 2) Design and construct Modern Aviation redevelopment improvements. (In Progress)
- 3) Design and construct Kenmore Aero redevelopment improvements. (In Progress)
- 4) Design and construct UPS redevelopment improvements. (In Progress)
- 5) Acquire Jorgensen Forge property: 20.58 acres (fee simple).
- 6) Design and construct new Fuel Storage Facility on Jorgensen Forge property
- 7) Construct Steam Plant Access Road
- 8) Design and construct Perimeter Intrusion Detection System.
- 9) Design Snow Removal Equipment (SRE) building.
- 10) Demo Existing Southwest GA Development Area and Woods Meadows buildings to accommodate new Southwest Cargo Development Area.
- 11) Modify existing National Guard leasehold property to accommodate relocation of existing Airport Maintenance Facilities and Airport Administrative Offices.
- 12) Acquire property north of Airport Maintenance Building and vacate roadway (Elizabeth St): 0.6 acres (fee simple).
- 13) Acquire Woods Meadows property: 3.6 acres (fee simple).
- 14) Renovate existing FAA Flight Service Building for Airport Admin. use.
- 15) Design and construct Phase 3 stormwater system rehabilitation.
- 16) Design and construct Phase 4 stormwater system rehabilitation.
- 17) Prepare ATCT Siting Study for relocation of existing ATCT.

Figure D44  
Landside Conceptual Development Plan (CDP)

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