

Birchwood Airport Master Plan Update

Public Review Draft

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Prepared for:

Alaska Department of Transportation & Public Facilities
Central Region

4111 Aviation Avenue
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How to comment: <https://dot.alaska.gov/creg/birchwoodamp/>

5.0 ALTERNATIVES

5.1 Preliminary Alternatives

Alternatives were developed to address safety, standards, and the needs of the airport for the 20-year planning horizon. The primary needs identified at the Birchwood Airport that are represented in the alternatives outlined below include:

- Bring the airport facilities up to DOT&PF and FAA design standards
- Increase apron space to accommodate additional tie-down spaces
- Acquire property to accommodate the addition of lease areas
- Provide a safe operating environment

Based on discussions with airport users, the public, DOT&PF officials, and DOT&PF staff, four alternatives were considered to address these needs: one no build alternative and three action alternatives. Each action alternative was developed to bring the airport into compliance with FAA standards and increase safety by improving the operative environment. Each alternative presented aims to address the facility requirements and support the current and anticipated fleet mix and critical aircraft identified in the Aviation Activity Forecast for Birchwood Airport.

The alternatives are as follow:

- Alternative 1 – No Build
- Alternative 2 – Maintain Existing Gravel Runway
- Alternative 3 – Relocate Gravel Runway to Shoulder of Main Runway
- Alternative 4 – Construct New Gravel Runway

Each of the alternatives is described in detail below.

5.1.1 Alternative 1 – No Build

Alternative 1 is the ‘no build’ option. This alternative will include no changes to the current layout of the airport (Figure 18). The no build option would not mitigate any compliance issues with the FAA standards or meet the conditions and needs of the airport. Non-compliance with FAA standards adversely impacts AIP funding eligibility for future projects at the airport. Although DOT&PF can apply for modifications to standards, FAA approval may not be granted.

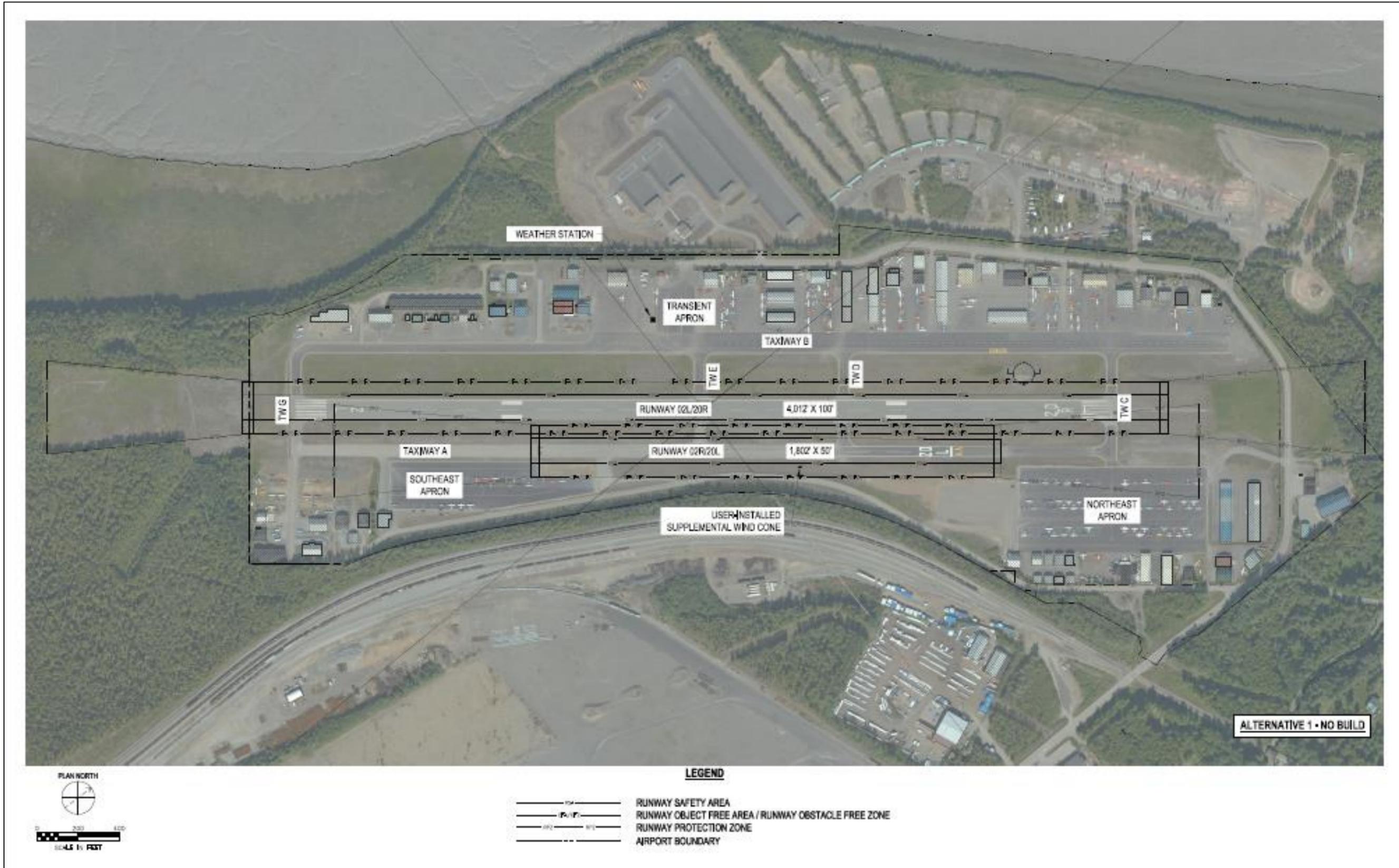


Figure 18: Alternative 1 – No Build

5.1.2 Alternative 2 – Maintain Existing Gravel Runway

Alternative 2 maintains current runway operational procedures, prioritizes removing portions of aligned Taxiway A, and maintains the gravel/ski Runway 03G/21G in its current location (Figure 19). This alternative recommends meeting the needs for additional hangar lease area and aircraft tie-downs. Property south of the airport would need to be acquired to meet those needs.

Alternative 2 consists of the following elements, which are detailed on Figure 19:

5.1.2.1 Rehabilitate Runway 03/21

Rehabilitate the runway in its current location to meet DOT&PF and FAA design standards and maintain the current dimensions preferred by existing users.

5.1.2.2 Install New PAPIs on Runway 03/21

Replace the DOT&PF-owned VASI on Runway 21 with a new four-box PAPI. VASIs are older technology, and it is increasingly difficult to maintain and find replacement parts for VASI units. VASIs are gradually being phased out of operation in airports across Alaska and are being replaced with PAPIs. The proposed PAPI would be constructed to the right of Runway 21 to allow the left side of the runway to remain free of obstructions for emergency glider operations. Per requests made by multiple users, PAPIs would also be constructed at the threshold for Runway 03.

5.1.2.3 Reconstruct Runway 03G/21G

Rehabilitate existing Runway 03G/21G in its current location to meet DOT&PF and FAA design standards. The runway would be reconstructed in its existing location with a gravel surface for the entire 1,802-foot length. The width of the reconstructed runway would be 60 feet to meet FAA standards. In addition, new runway edge and threshold markers would be installed to replace existing markers that are old and faded.

5.1.2.4 Remove Existing Parallel Taxiway A

Remove portions of Taxiway A that are in line with Runway 03G/21G to mitigate the safety hazard present between the taxiway's alignment with the 03G and 21G thresholds.

5.1.2.5 Construct Taxiway A Extension

Construct approximately 700 feet of new Taxiway A to provide airside access to the Southeast Apron to Taxiway G and from Taxiway G to new apron and lease areas.

5.1.2.6 Reconfigure Existing Connecting Taxiways

Reconfiguration of the existing connecting taxiways would require the following:

- i. Remove existing Taxiway D and construct new Taxiway D: Required to provide access to Runway 21G threshold from Taxiway B and the Northeast Apron.
- ii. Remove existing Taxiway E: Approximate mid-point taxiway is no longer needed due to the relocation of Taxiway D and the construction of new Taxiway F.
- iii. Construct new Taxiway F: Required to provide access to Runway 03G threshold and access from the Southeast Apron to Runway 03/21, Runway 03G/21G, and Taxiway B. This taxiway is shown in the ultimate configuration of the 2016 ALP.

- iv. Reconstruct Taxiway G: Required to intersect new Taxiway A location on the southeast side of Runway 03/21 and new glider plane staging/aircraft run-up area on the southwest side of Runway 03/21.

5.1.2.7 Pave Apron Area between Taxiway B and Lease Lots

Pave a 50-foot-wide section of the existing gravel area between the southern portion of Taxiway B and the lease areas directly to the west to reduce the potential of foreign object debris from aircraft moving from the lease areas onto the paved taxiway.

5.1.2.8 Construct Glider Staging / Aircraft Run-Up Area

Construct a 75-foot-wide staging/run-up area south of the intersection between Taxiway B and Taxiway G. Currently, glider staging and aircraft run-ups on Taxiway G can prevent landing aircraft from departing the runway on this taxiway. A staging/run-up area is needed at this location to allow gliders and aircraft to prepare for take-off without blocking the connecting taxiways.

5.1.2.9 Land Acquisition

To meet the needs for additional hangar lease space and tie-downs, acquire approximately 47 acres to the south and approximately 1.2 acres north of the airport boundary. The total amount of land that should be acquired is approximately 48.2 acres.

Newly acquired land south of the airport would encompass the Runway 03 RPZ, new GA Apron and access roads, and future lease lot areas (approximately 16 acres). An aviation easement currently exists for the land within the Runway 03 RPZ. Acquisition of this land is needed for airport expansion and permanent control of the land within the RPZ. Approximately 11 acres of the newly acquired property that are currently zoned as “Rural Residential,” and zoning would need to be changed to “Light Industrial” to allow for airport development in this area.

The newly acquired land to the north is within Runway 21 RPZ. An aviation easement currently exists for obstruction removal within this area. Acquisition of this land is preferred for permanent control of the land within the RPZ.

Also, acquisition of approximately 11.1 acres of new aviation easements beyond the Runway 03 RPZ and approximately 15.1 acres of new aviation easement beyond the Runway 21 RPZ would be needed to remove obstructions identified in the aeronautical survey.

If DOT&PF is unable to acquire the recommended property, some improvements recommended under this alternative will not be possible.

5.1.2.10 Expand Northeast Apron and Install Electric Outlets

Expand the Northeast Apron south to include approximately 119,000 square feet of additional paved apron area and provide 13 new tie-down spaces: six small and seven large tie-downs. Electric outlets would be installed for all tie-downs on the proposed Northeast Apron expansion area. The outlets would be individually metered, and the permit holder would be responsible for the utility costs.

5.1.2.11 Construct Summer Aircraft Tie-Down Area / Winter Snow Storage Area

Construct approximately 33,000 square feet of additional apron space south of the Northeast Apron. This new apron area would be surfaced with gravel. During the summer months, eight additional small aircraft tie-down spaces would be provided to accommodate seasonal demand for tundra tire-equipped aircraft parking. During the winter, this area would be used for snow storage by DOT&PF Maintenance.

5.1.2.12 Construct New General Aviation Apron and Install Electric Outlets

Construct an approximately 940-foot by 330-foot GA Apron that includes up to 52 small tie-downs, 10 of which would be used for transient parking. New apron development is required to meet the demand for additional tie-down spaces needed for airport-based and transient aircraft. Electric outlets would be installed for all tie downs on the proposed GA Apron. The outlets would be individually metered, and the permit holder would be responsible for the utility costs.

5.1.2.13 Develop Access to New Hangar Lease Lot Area

Access to new hangar lease lot area would include construction of taxilanes, driveways, and utility access in the new lease lot area to provide airside and landside access and extend utilities to 16 acres of land southeast of the new GA Apron for private development of aviation-related buildings and businesses.

5.1.2.14 Develop New Vehicle Parking Area with Portable Restroom Facilities

Develop vehicle parking areas by the Northeast, Southeast, and GA Aprons; install portable restroom facilities and designated parking areas to reduce the potential for conflict between aircraft and vehicles on the aprons and reduce maintenance of snow surfaces on aprons prepared for ski-equipped aircraft.

This alternative provides the following parking available at each new and existing GA Apron:

- i. Northeast Apron: a combination of 20 parallel parking spaces and 18 perpendicular parking spaces adjacent to the Southeast Apron Access Road.
- ii. South East Apron: 19 perpendicular parking spaces accessed from the Southeast Apron Access Road.
- iii. New GA Apron: 44 perpendicular parking spaces accessed from the Southeast Apron Access Road Extension.

5.1.2.15 Remove Existing Fence

Remove approximately 700 feet of perimeter fence along the south end of the existing airport property that is no longer required due to land acquisition. Fence removal includes the 5-foot-tall fence located within the Runway 03 RPZ that is currently an obstruction.

5.1.2.16 New Perimeter Fencing

Install approximately 7,500 feet of new perimeter fencing around the newly acquired airport property. New fencing is necessary to provide an enclosed perimeter to reduce wildlife incursions.

5.1.2.17 Access Road Improvements

Extend Southeast Apron Access Road to new GA Apron and lease lot area, and realign a portion of the existing access road to remain outside the Runway 03G/21G OFA/Object Free Zone (OFZ). Continue the road around the south end of Runway 03 RPZ and connect to Birchwood Spur Road on the northwest side of the airport.

Extension of the access road will provide 1.1 miles of new road for apron access and vehicle-pedestrian circulation from the southeast side to the northeast side of the airport. Users and visitors would be able to access around the south end of the airport without crossing the runways, which would mitigate runway incursions.

5.1.2.18 Relocate Weather Station

Relocate the existing weather station from its current location to a new location southwest of Taxiway G. Construct an access trail to the new weather station location. Relocate the existing weather station to the newly acquired land. The weather station would be removed from its existing location within a congested apron area and installed in a location that meets FAA citing criteria.

5.1.2.19 Install Supplemental Wind Cone

Install a supplemental wind cone on the eastern side of Runway 03G/21G that meets FAA standards and provides accurate wind information to pilots operating on the Runway 03G threshold. Remove the existing non-standard, privately owned and maintained supplemental wind cone.

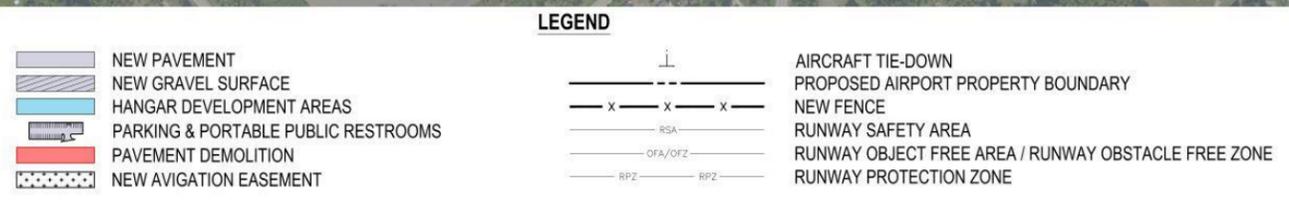
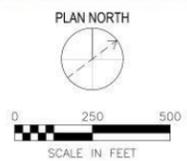
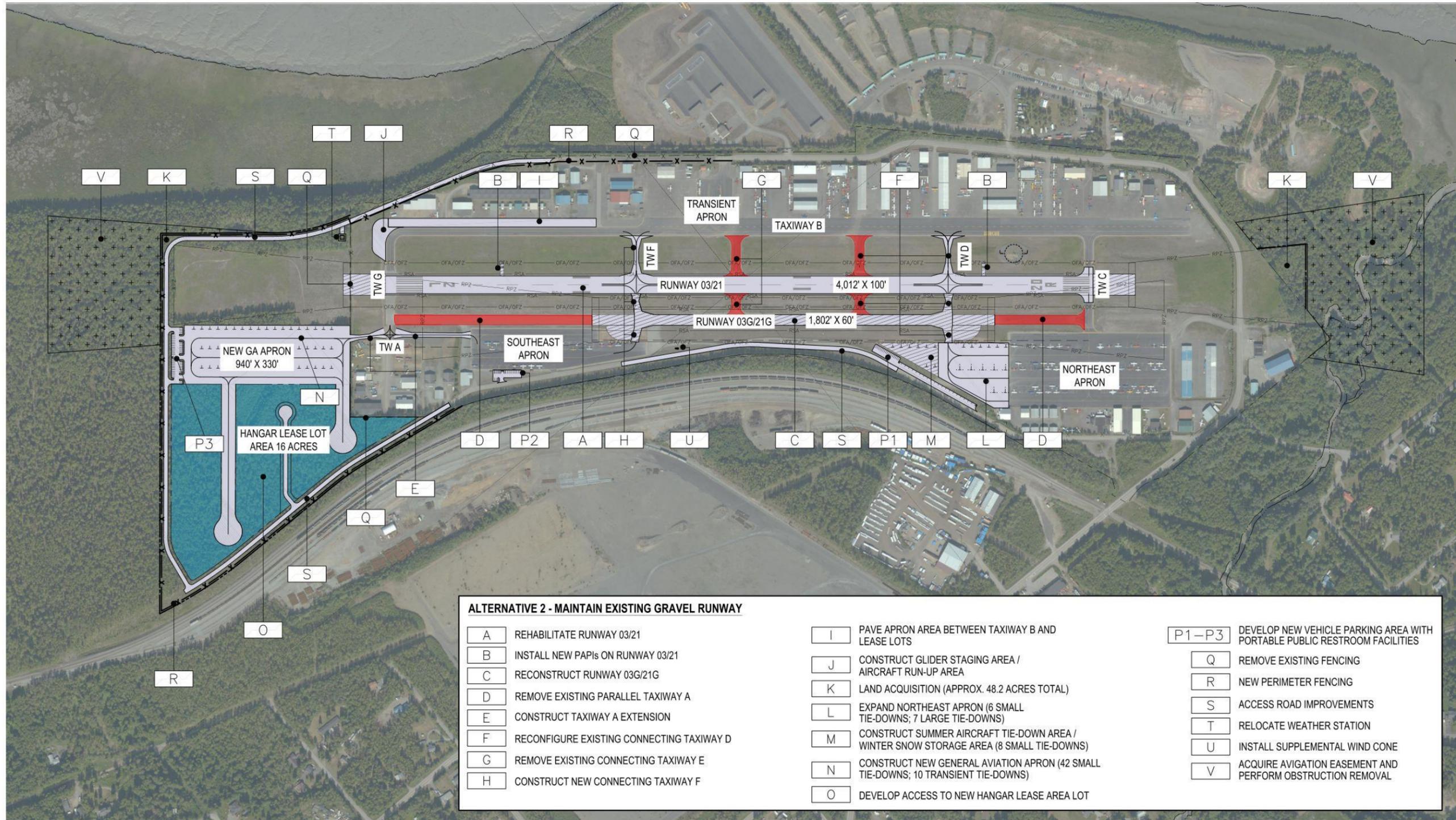


Figure 19: Alternative 2 – Maintain Existing Gravel Runway

5.1.3 Alternative 3 – Relocate Gravel Runway to Shoulder of Main Runway

Alternative 3 prioritizes establishing a parallel taxiway (Taxiway A) on the east side of Runway 03/21 to meet FAA separation requirements for runways and parallel taxiways (Figure 20). This would be accomplished by relocating the gravel/ski Runway 03G/21G to the east shoulder of Runway 03/21 and relocating Taxiway A further to the south to provide 150 feet between the gravel runway centerline and the centerline of Taxiway A. Additionally, under Alternative 3, the Southeast and Northeast Aprons would be expanded to provide additional tie-down spaces without encroaching on the Runway 03G/21G OFZ; property to the south of the airport would be acquired to meet the needs for additional hangar lease area and aircraft tie-downs.

Alternative 3 consists of the following elements, which are detailed in Figure 20:

5.1.3.1 Rehabilitate Runway 03/21

Rehabilitate the runway in its current location to meet DOT&PF and FAA design standards and maintain the current dimensions preferred by existing users, as described under Alternative 2.

5.1.3.2 Install New PAPIs on Runway 03/21

Replace the DOT&PF-owned VASI on Runway 21 with a new four-box PAPI and construct a new four-box PAPI at the threshold for Runway 03, as described in Alternative 2.

5.1.3.3 Land Acquisition

Acquire approximately 47 acres to the south and approximately 1.2 acres north of the airport boundary, for a total of approximately 48.2 acres. Also, acquire approximately 11.1 acres of new aviation easements beyond the Runway 03 RPZ and approximately 15.1 acres of new aviation easement beyond the Runway 21 RPZ. The land and easements to be acquired are the same as described in Alternative 2.

If DOT&PF is unable to acquire the recommended property, some improvements recommended under this alternative will not be possible.

5.1.3.4 Pave Apron Area between Taxiway B and Lease Lots

Pave a 50-foot-wide section of the existing gravel area between the southern portion of Taxiway B and the lease areas directly to the west, as described in Alternative 2.

5.1.3.5 Construct Glider Staging / Aircraft Run-Up Area

Construct a 75-foot-wide staging/run-up area south of the intersection between Taxiway B and Taxiway G, as described in Alternative 2.

5.1.3.6 Remove Existing Fence

Remove approximately 700 feet of perimeter fence along the south end of the existing airport property, including the 5-foot-tall fence located within the Runway 03 RPZ, as described in Alternative 2.

5.1.3.7 Access Road Improvements

Extend Southeast Apron Access Road to new GA Apron and lease lot area, and realign a portion of the existing access road to remain outside the Runway 03G/21G OFA/Object Free Zone (OFZ).

Continue the road around the south end of Runway 03 RPZ and connect to Birchwood Spur Road on the northwest side of the airport. These road improvements are the same as described in Alternative 2.

5.1.3.8 Relocate Weather Station

Relocate the existing weather station from its current location to a new location southwest of Taxiway G, as described in Alternative 2.

5.1.3.9 New Perimeter Fencing

Install approximately 7,500 feet of new perimeter fencing around the newly acquired airport property, as described in Alternative 2.

5.1.3.10 Runway 03G/21G Relocation

Relocate Runway 03G/21G to the shoulder/RSA of Runway 03/21. Construct a new 1,710-foot-long and 60-foot-wide gravel/ski runway on the east side of Runway 03/21. This does not meet FAA's requirements for separation between runways during concurrent operations. However, concurrent operations are prohibited at Birchwood Airport, and this change is expected to improve safety by making it obvious that concurrent operations are not possible.

5.1.3.11 Taxiway A Relocation

Relocate Taxiway A approximately 45 feet southeast away from its existing location to provide a full-length parallel taxiway that meets the FAA-required separation distance of 150 feet between the new location of Runway 03G/21G and Taxiway A. While this reduces the separation between Taxiway A and the Southeast and Northeast Aprons, this relocation would not result in a loss of parking at either location.

5.1.3.12 Construct Taxiway A Extension

Construct approximately 240 feet of new Taxiway from existing Taxiway G south to the new Runway 03G/21G to connect airside access from Runway 03/21 and aprons on existing airport property to new apron/lease areas constructed on new airport property.

5.1.3.13 Reconfigure Existing Connecting Taxiways

Reconfiguration of the existing connecting taxiways would require the following:

- i. Reconstruct the southeastern segment of Taxiway C: Reconstruct Taxiway C to tie into new Taxiway A and provide access from Northeast Apron to the Runway 21 threshold.
- ii. Remove the southeastern segment of Taxiway D: Remove the southeastern section of existing Taxiway D that falls within the Runway 21G RPZ such that taxiing aircraft do not create an obstruction to aircraft landing on Runway 21G or departing on Runway 03G.
- iii. Reconstruct Taxiway E: Reconstruct and extend the southeastern segment of Taxiway E to provide access to the Runway 21G threshold and intersect relocated Taxiway A. The reconstructed taxiway segment is anticipated to be primarily used by aircraft accessing and departing Runway 03G/21G and will be surfaced with gravel.
- iv. Construct a new northwest segment of Taxiway F: Required to provide access to Runway 03/21 from Taxiway B. This taxiway is shown in the ultimate configuration of the 2016 ALP.

- v. Reconstruct Taxiway G: Required to intersect the new Taxiway A location on the southeast side of Runway 03/21 and the new glider plane staging/aircraft run-up area on the northwest side of Runway 03/21.

5.1.3.14 Expand Northeast Apron

Expand the Northeast Apron to the south. Electric outlets would be installed for all tie-downs on the proposed Northeast Apron expansion area. The outlets would be individually metered, and the permit holder would be responsible for the utility costs.

The apron expansion would include approximately 128,500 square feet of additional paved apron area and would provide 15 new tie-down spaces: five small tie-downs and ten large tie-downs. The expansion under Alternative 3 also includes constructing a connecting taxiway from the proposed Taxiway A to the northwest corner of the proposed apron.

5.1.3.15 Construct Summer Aircraft Tie-Down Area / Winter Snow Storage Area

Construct approximately 30,000 square feet of additional apron space south of the Northeast Apron. This new apron area would be used for summer aircraft parking and winter snow storage, as described in Alternative 2. During the summer months, an additional five small aircraft tie-down spaces would be provided to accommodate seasonal demand for tundra tire-equipped aircraft parking.

5.1.3.16 Construct New GA Apron

The proposed GA Apron dimensions for Alternative 3 would remain similar to Alternative 2 (940 feet by 330 feet) with the exception of a 260-foot by 30-foot portion along the western edge of the apron that lies within the proposed Runway 02G RPZ. Electric outlets would be installed for all tie-downs on the proposed GA Apron. The outlets would be individually metered, and the permit holder would be responsible for the utility costs.

The area within the RPZ is not available for aircraft taxing or parking. This reduces the number of small tie-downs to 46, 10 of which would be used for transient parking.

5.1.3.17 Develop Access to New Hangar Lease Lot Area

Construct taxilanes, driveways, and utility access in the new lease lot area to provide airside and landside access and extend utilities to 15 acres southeast of the new GA Apron for private development of aviation-related buildings and businesses. The lease lot space available is reduced to 15 acres in this alternative compared to 16 acres in Alternative 2 due to the need to shift the new GA Apron to the southeast to avoid the Runway 03G/21G RPZ.

5.1.3.18 New Vehicle Parking with Portable Restroom Facilities

Develop vehicle parking areas by the Northeast, Southeast, and GA Aprons; install portable restroom facilities next to each parking area. This alternative provides the following parking available at each new and existing GA Apron:

- i. Northeast Apron: 31 parallel parking spaces adjacent to the Northeast Apron Access Road.
- ii. Southeast Apron: 19 perpendicular parking spaces accessed from the Southeast Apron Access Road.

- iii. New GA Apron: 44 perpendicular parking spaces accessed from the Southeast Access Road Extension.

5.1.3.19 Install Supplemental Wind Cone

Install supplemental wind cone on the south side of relocated Runway 03G/21G that meets FAA standards and provides accurate wind information to pilots operating on the Runway 03G threshold. Remove existing nonstandard, privately owned and maintained supplemental wind cone.

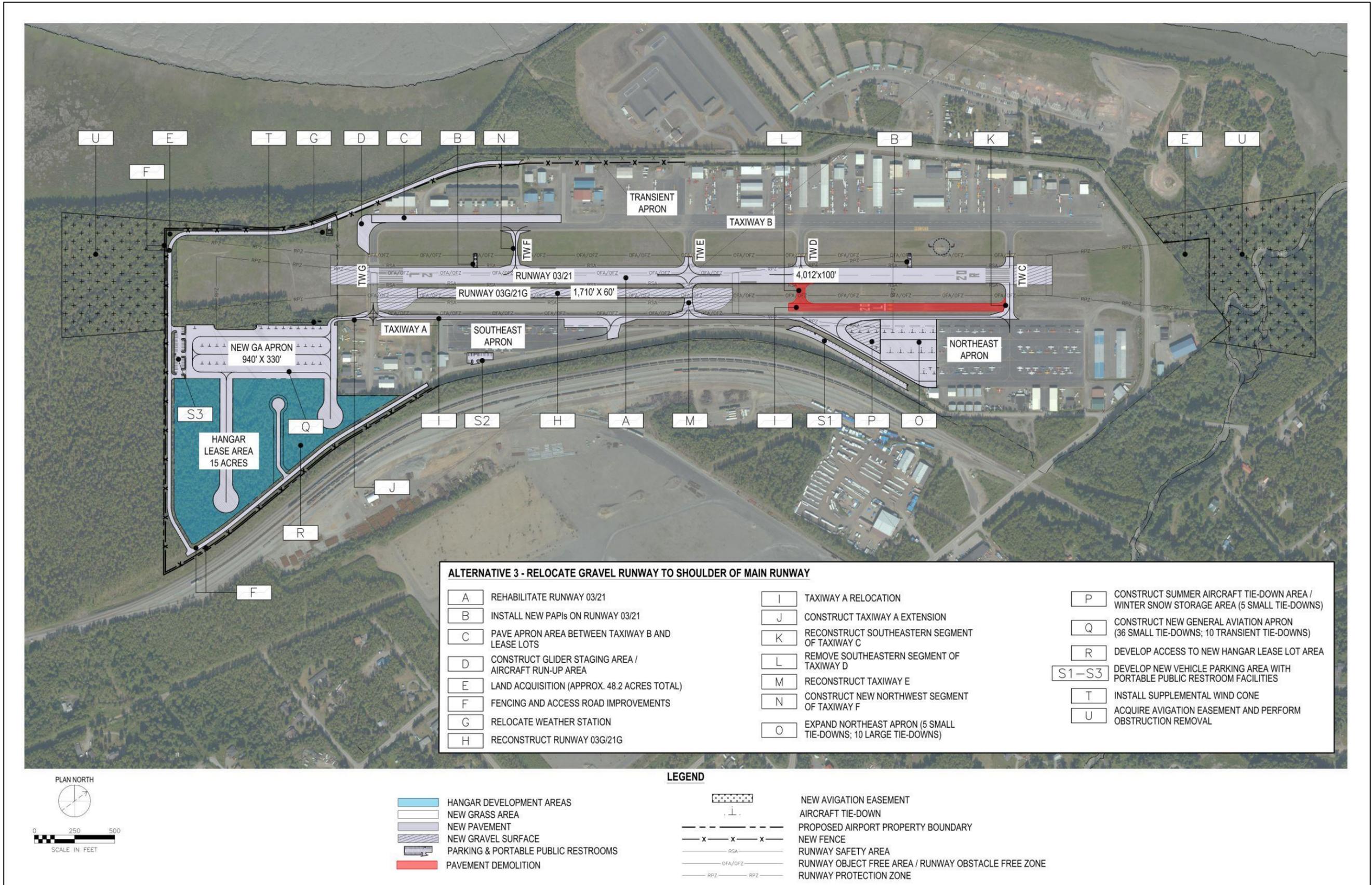


Figure 20: Alternative 3 – Relocated Gravel Runway to Shoulder of Main Runway

5.1.4 Alternative 4 – Construct New Gravel Runway

Alternative 4 relocates gravel/ski Runway 03G/21G to meet FAA’s runway separation requirements for safe and concurrent operations between two parallel runways (Figure 21). Land acquisition of additional property to the south and east would be necessary to construct this alternative and to provide proper runway separation and new RPZs for Runway 03G/21G. The acquisition of land for relocation of Runway 03G/21G would also provide the opportunity to acquire additional land in the same area for apron development and new lease areas.

Alternative 4 consists of the following elements, which are detailed in Figure 21:

5.1.4.1 Rehabilitate Runway 03/21

Rehabilitate the runway in its current location to meet DOT&PF and FAA design standards and maintain the current dimensions preferred by existing users, as described in Alternatives 2 and 3.

5.1.4.2 Install New PAPIs on Runway 03/21

Replace the DOT&PF-owned VASI on Runway 21 with a new four-box PAPI and construct a new four-box PAPI at the threshold for Runway 03, as described in Alternatives 2 and 3.

5.1.4.3 Pave Apron Area between Taxiway B and Lease Lots

Pave a 50-foot-wide section of the existing gravel area between the southern portion of Taxiway B and the lease areas directly to the west, as described in Alternatives 2 and 3.

5.1.4.4 Construct Glider Staging / Aircraft Run-Up Area

Construct a 75-foot-wide staging/run-up area south of the intersection between Taxiway B and Taxiway G, as described in Alternatives 2 and 3.

5.1.4.5 Remove Existing Fence

Remove approximately 700 feet of perimeter fence along the south end of the existing airport property, including the 5-foot-tall fence located within the Runway 03 RPZ, as described in Alternatives 2 and 3.

5.1.4.6 Relocate Weather Station

Relocate the existing weather station from its current location to a new location southwest of Taxiway G, as described in Alternatives 2 and 3.

5.1.4.7 Relocate Runway 03G/21G

Relocate Runway 03G/21G to newly acquired airport property south of the existing airport boundary to meet FAA runway separation requirements.

Construct a new 1,800-foot-long and 60-foot-wide gravel-surfaced runway for ski plane operations in the winter and tundra tire-equipped aircraft in the summer. The relocated Runway 03G/21G would be constructed to the south and east of Runway 03/21 in a location that meets FAA minimum runway separation distance requirements for parallel runways. This would allow for distinct traffic patterns and simultaneous operations on both runways.

5.1.4.8 Reconstruct Taxiway A

Reconstruct Taxiway A in its current location to provide a paved full-length parallel taxiway that meets FAA design requirements and install taxiway edge lighting.

5.1.4.9 Construct Taxiway A Extension

Construct an approximately 1,700-foot-long extension of new Taxiway A from existing Taxiway G south to the new Runway 03G/21G to connect airside access from Runway 03/21 and aprons on existing airport property to new Runway 03G/21G and apron/lease areas constructed on new airport property.

5.1.4.10 Reconfigure Existing Connecting Taxiways

Construct the following new taxiway improvements:

- i. Reconstruct southern portions of Taxiways C, D, and E: Reconstruct and pave the southeastern segment of Taxiways to provide access to Runway 03/21 from Taxiway A.
- ii. Construct new Taxiway F: Required to provide access to Runway 03/21 from Taxiway A and Taxiway B. This taxiway is shown in the ultimate configuration of the 2016 ALP.
- iii. Reconstruct Taxiway G: Required to intersect new Taxiway A location on the southeast side of Runway 03/21 and new glider plane staging/aircraft run-up area on the northwest side of Runway 03/21.

5.1.4.11 Construct New Taxiway H

Construct a new 2,060-foot long by 25-foot-wide parallel taxiway for new Runway 03G/21G on newly acquired airport property. Designate the new taxiway as “H.”

5.1.4.12 Land Acquisition

To allow for distinct traffic patterns and simultaneous operations on both runways approximately 150 acres to the south and approximately 1.2 acres north of the airport boundary would need to be acquired. The total amount of land that would need to be acquired is approximately 151.2 acres.

Newly acquired land south of the airport would encompass the Runway 03 RPZ, new Runway 03G/21G and associated RPZs, new GA Apron and access roads, and future lease lot areas (approximately 35.7 acres). Approximately 109 acres of the newly acquired property are currently zoned as “Rural Residential.” Zoning would need to be changed to “Light Industrial” to allow for airport development in this area.

As described in previous alternatives, the newly acquired land to the north is within the existing Runway 21 RPZ. Also, acquisition of approximately 11.1 acres of new aviation easements beyond the Runway 03 RPZ and approximately 12.8 acres of new aviation easement beyond the Runway 21 RPZ is recommended for obstruction removal in these areas.

If DOT&PF is unable to acquire the recommended property, some improvements recommended under this alternative will not be possible.

5.1.4.13 Expand Northeast Apron

Expand the Northeast Apron to include approximately 85,300 square feet of additional paved apron area and will provide 20 new tie-down spaces: 10 small tie-downs and 10 large tie-downs.

The expansion under Alternative 4 also includes constructing a connecting taxiway from the proposed Taxiway A to the northwest corner of the proposed apron.

Electric outlets would be installed for all tie downs on the proposed Northeast Apron expansion area. The outlets would be individually metered, and the permit holder would be responsible for the utility costs.

5.1.4.14 Construct Summer Aircraft Tie-Down Area / Winter Snow Storage Area

Construct approximately 23,500 square feet of additional apron space south of the Northeast Apron to be used for summer aircraft parking and winter snow storage, as described in Alternative 3. During the summer months, an additional four small aircraft tie-down spaces will be provided to accommodate seasonal demand for tundra tire-equipped aircraft parking.

5.1.4.15 Construct New GA Apron

Construct a 2,070-foot by 230-foot GA Apron that includes up to 72 new small aircraft tie-down spaces, 10 of which would be used for transient parking. Electric outlets would be installed for all tie-downs on the proposed GA Apron. New apron development is required to meet the demand for tie-down spaces for based and transient aircraft. The outlets would be individually metered, and the permit holder would be responsible for the utility costs.

5.1.4.16 Develop Access to New Hangar Lease Lot Area

Construct taxilanes, driveways, and utility access in the new lease lot area to provide airside and landside access and extend utilities to 34.7 acres of land southeast of the new GA Apron and 1 acre of land immediately northeast of the proposed 21G RPZ for private development of aviation-related buildings and businesses. The lease lot space available in this alternative is increased to meet the anticipated demand for aviation-related businesses.

5.1.4.17 New Vehicle Parking with Portable Restroom Facilities

Develop vehicle parking areas by the Northeast, Southeast, and new GA Aprons; install portable restroom facilities next to each parking area.

This alternative provides the following parking available at each new and existing GA Apron:

- i. Northeast Apron: a combination of 31 parallel parking spaces adjacent to the Southeast Apron Access Road.
- ii. Southeast Apron: 19 perpendicular parking spaces accessed from the Southeast Apron Access Road.
- iii. New GA Apron: 64 perpendicular parking spaces accessible from the Southeast Apron Access Road Extension.

5.1.4.18 New Perimeter Fencing

Install approximately 10,000 feet of new perimeter fencing around the newly acquired airport property to provide an enclosed perimeter to reduce wildlife incursions.

5.1.4.19 Access Road Improvements

Extend Southeast Apron Access Road to new GA Apron and lease lot area and around the southern perimeter of the Runway 03 RPZ to provide vehicle-pedestrian circulation from the southeast side to the northeast side of the airport without crossing the runways and mitigate runway incursions.

Road construction consists of 1.75 miles of new road, providing access to the new GA Apron access road and continuing around the south end of Runway 03 RPZ and connecting to Birchwood Spur Road on the northwest side of the airport.

5.1.4.20 Install Supplemental Wind Cone

Install supplemental wind cone on the northwest side of relocated Runway 03G/21G that meets FAA standards and provides accurate wind information to pilots operating on the Runway 03G threshold. Remove the existing non-standard, privately owned and maintained supplemental wind cone.

5.1.5 Summary of Alternatives

The attributes for the ‘no build’ and each of the action alternatives are presented in Table 27.

Table 27: Alternatives Summary Matrix

Airport Components	Alternative 1 No Build	Alternative 2 Maintain Existing Gravel Runway	Alternative 3 Relocate Gravel Runway to Shoulder of Main Runway	Alternative 4 Construct New Gravel Runway
Basic Description	No changes to the current layout of the airport	Maintain current runway layout and remove existing in-line taxiways to increase safety	Relocate gravel runway to shoulder of the main runway and construct full-length parallel Taxiway A on southeast side of the airport	Relocate gravel runway to newly acquired land south of the airport to achieve parallel runway separation requirements and construct full-length Taxiway A on southeast side of main runway
Runway 03/21 Improvements	None	Rehabilitate full length and width	Rehabilitate full length and width	Rehabilitate full length and width
Runway 03G/21G Improvements	None	Reconstruct 1,802-foot by 60-foot runway in existing location	Decommission existing runway and construct new 1,710-foot by 60-foot runway on shoulder of Runway 03/21	Decommission existing runway and construct new 1,800-foot by 60-foot gravel runway on newly acquired land south of the existing airport
Taxiway A Improvements	None	Decommission existing Taxiway A to remove in-line taxiways. Reconstruct southeastern portion of Taxiway A farther to the south to maintain access from Southeast Apron to Taxiway G and extend 700 feet to southeast to provide access to new GA Apron. New sections of Taxiway A will be 25 feet wide.	Decommission existing Taxiway A. Construct new 25-foot wide, full-length, parallel Taxiway A south of existing location to meet runway taxiway separation requirements. Extend Taxiway A 700 feet to the southeast to provide access to new GA Apron.	Remove gravel runway from taxiway and reconstruct Taxiway A to provide 25-foot wide, full-length, parallel taxiway in its existing location. Extend Taxiway A 1,700 feet to the southeast to provide access to new GA Apron
Other Taxiway Improvements	None	Relocate existing connecting Taxiway D to access Runway 21G threshold; Remove existing connecting Taxiway E; Construct new connecting Taxiway F; Reconstruct segment of Taxiway G	Reconstruct southeastern segments of Taxiway C; Remove southern portion of connecting Taxiway D; Reconstruct southern segment of Taxiway E; Construct new connecting Taxiway F; Reconstruct Taxiway G	Reconstruct southern portions of Taxiways C, D, and E; Construct new connecting Taxiway F; Reconstruct connecting Taxiway G; Construct new Taxiway H

Airport Components	Alternative 1 No Build	Alternative 2 Maintain Existing Gravel Runway	Alternative 3 Relocate Gravel Runway to Shoulder of Main Runway	Alternative 4 Construct New Gravel Runway
Pave Shoulder of Taxiway B and Construct Run-Up/Glider Staging Area		Reconstruct 59,000 square feet of existing gravel apron north of Taxiway B and construct 18,500 square feet of new aircraft runway/glider staging area	Reconstruct 59,000 square feet of existing gravel apron north of Taxiway B and construct 18,500 square feet of new aircraft runway/glider staging area	Reconstruct 59,000 square feet of existing gravel apron north of Taxiway B and construct 18,500 square feet of new aircraft runway/glider staging area
Land Acquisition Required (approximate)	None	48.2 Acres & 26.2 Acres of Avigation Easement	48.2 Acres & 26.2 Acres of Avigation Easement	151.2 Acres & 23.9 Acres of Avigation Easement
Land Clearing / Obstruction Removal Areas (approximate)		2 Acres	4 Acres	34 Acres
Northeast Apron Expansion	No	Construct 119,000 square feet of apron expansion including 6 new small tie-downs and 7 new large tie-downs	Construct 128,500 square feet of apron expansion including 5 small tie-downs and 10 large tie-downs	Construct 122,800 square feet of apron expansion including 10 small tie-downs and 10 large tie-downs
Northeast Apron Summer Aircraft Parking / Winter Snow Storage Area		Construct 33,000 square feet of gravel area for snow storage in the winter, including 8 new small tie-downs for summer aircraft parking	Construct 30,000 square feet of gravel area for snow storage in the winter, including 5 new small tie-downs for summer aircraft parking	Construct 23,500 square feet of gravel area for snow storage in the winter, including 4 new small tie-downs for summer aircraft parking
New GA Apron	No	Construct 310,200 square feet of new apron including 52 new small tie-downs with electric outlets.	Construct 302,400 square feet of new apron including 46 new small tie-downs with electric outlets.	Construct 476,100 square feet of new apron including 72 new small tie-downs with electric outlets.
New Lease Lot Area Available		16 Acres	15 Acres	36 Acres
Airport User Vehicle Parking Improvements	None	<ul style="list-style-type: none"> Northeast Apron: 24,950 square feet, 38 new parking stalls Southeast Apron: 8,350 square feet, 19 new parking stalls New GA Apron: 20,050 square feet, 44 new parking stalls Total 53,350 square feet and 101 new parking stalls available with portable public restroom facilities	<ul style="list-style-type: none"> Northeast Apron: 27,600 square feet, 31 new parking stalls Southeast Apron: 8,350 square feet, 19 new parking stalls New GA Apron: 20,050 square feet, 44 new parking stalls Total 56,000 square feet and 94 new parking stalls available with portable public restroom facilities	<ul style="list-style-type: none"> Northeast Apron: 27,600 square feet, 31 new parking stalls Southeast Apron: 8,350 square feet, 19 new parking stalls New GA Apron: 20,900 square feet, 64 new parking stalls Total 56,850 square feet and 114 new parking stalls available with portable public restroom facilities

Airport Components	Alternative 1 No Build	Alternative 2 Maintain Existing Gravel Runway	Alternative 3 Relocate Gravel Runway to Shoulder of Main Runway	Alternative 4 Construct New Gravel Runway
Fencing Improvements	No	Remove 700 feet of existing fence within Runway 03 RSA and construct 7,500 feet of new perimeter fence around newly acquired southeastern property; provide unrestricted access to nearby trails. Remove brush from existing fence line that remains.	Remove 700 feet of existing fence within Runway 03 RSA and construct 7,500 feet of new perimeter fence around newly acquired southeastern property; provide unrestricted access to nearby trails. Remove brush from existing fence line that remains.	Remove 700 feet of existing fence within RW 03 RSA and construct 10,000 feet of new perimeter fence around newly acquired southeastern property; provide unrestricted access to nearby trails. Remove brush from existing fence line that remains.
Airport Access Road Improvements	No	Expand SE Apron Rd to add 1.1 miles of new roadway and provide access around perimeter of newly acquired southeastern property	Expand SE Apron Rd to add 1.1 miles of new roadway and provide access around perimeter of newly acquired southeastern property	Expand SE Apron Rd to add 1.75 miles of new roadway and provide access through newly acquired southeastern property
Impacts on NAVAIDs	None	New 4-box PAPIs for RW 03/21 approaches; new supplemental wind cone; relocate weather station	New 4-box PAPIs for RW 03/21 approaches; new supplemental wind cone; relocate weather station	New 4-box PAPIs for RW 03/21 approaches; new supplemental wind cone; relocate weather station

5.2 Other Alternatives Considered

5.2.1 Relocate Airport

The option of decommissioning the existing airport and constructing a new airport in an area with more developable land and clearer approaches was considered. However, this alternative was not deemed feasible due to the anticipated construction and right-of-way costs and because a better-suited area for airport development is unlikely to be found between Anchorage and Palmer. The Birchwood Airport is well positioned to serve the current users, has relatively few obstructions to GA operations, and has favorable wind and weather conditions.

5.2.2 Remove Gravel Runway and Reduce Main Runway Dimensions

The DOT&PF investigated an alternative that did not require land acquisition or a modification to standards to be eligible for FAA AIP funding. The alternative generally consisted of the following details:

- Reduce the length and width of the main runway to 60 feet wide by 3,350 feet long, the minimum dimension required by the ultimate critical aircraft
- Displace Runway 03 Threshold to provide standard 240-foot-long RSA and OFA prior to the runway
- Install new PAPIs on Runway 03/21
- Relocate connecting Taxiway C to match new Runway 21 threshold location (5.d)
- Remove the gravel runway to eliminate the non-standard runway separation condition and in-line taxiways (not shown for clarity)
- Reconstruct Taxiway A to provide a full-length taxiway on the southeast side of the main runway
- Reconfigure existing Taxiways D, E, and G
- Expand Southeast Apron parking to the maximum extent to provide additional tie-down spaces (5.h)
- Pave the apron area between Taxiway B and lease lots
- Construct a glider staging area/aircraft run-up area
- Expand Northeast Apron (10 small tie-downs and 10 large tie-downs)
- Construct summer aircraft tie-down area/winter snow storage area (4 tie-downs)
- Develop new parking areas with portable restroom facilities

This alternative was deemed contrary to the desires of leaseholders, tie-down holders, airport users, airport businesses, and other stakeholders. They feel strongly that the existing dimensions of the main runway and the availability of the gravel runway need to be preserved in alternatives moving forward. Preliminary alternatives that proposed reducing the length and width of the existing runway were met with strong resistance from these parties. This alternative also did not satisfy the demand for additional lease space and was determined to be contrary to the airport's development goals.

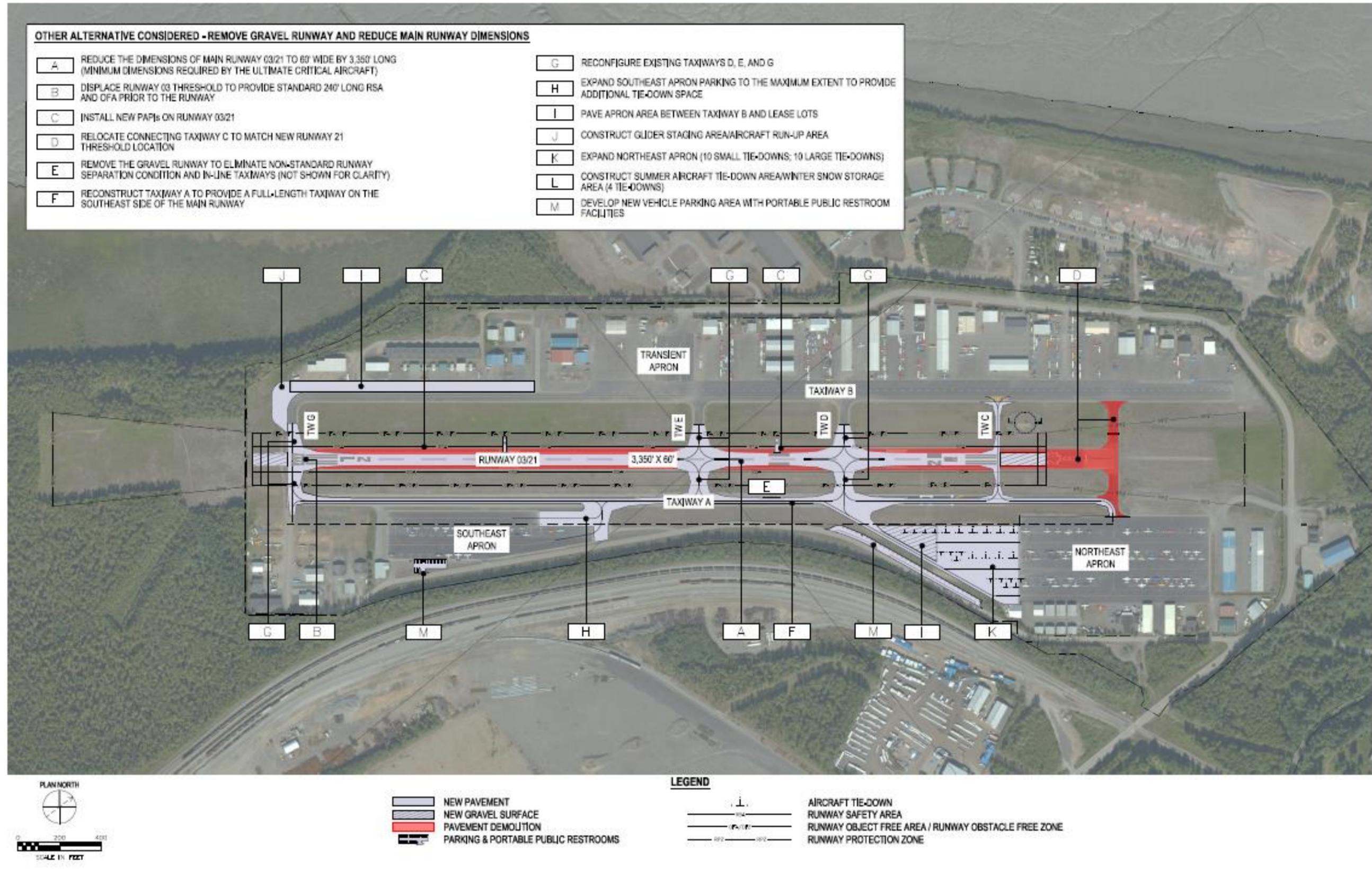


Figure 22: Other Alternatives Considered – Remove Gravel Runway and Reduce Main Runway Dimensions

5.3 Evaluation of Alternatives

Alternatives 1 through 4 were developed to address facility deficiencies and airport needs as identified by airport sponsors, maintenance staff, stakeholders, and other airport users. Each alternative was compared and evaluated against established criteria, including environmental impacts, construction costs, maintenance costs, airspace obstructions, land uses within the RPZs, meeting demand for additional lease lots, Next Generation Air Transportation System (NextGen) design and operating parameters, safety, and revenue generation.

Airport improvement projects that involve FAA funding are required to undergo the NEPA process per FAA's guidance as outlined in FAA Orders 1050.1F and 5050.4B, as well as in the FAA's Environmental Desk Reference.

While potential impacts for each alternative are described below, additional field studies will be necessary to fully understand and quantify the impacts associated with each alternative.

The FAA requires analysis of the following resources for a master plan: Historic Properties, Archeological, and Cultural Resources; Section 4(f) and 6(f) Resources; Threatened and Endangered Species; Air Quality; Anadromous Fish Streams and Essential Fish Habitat; Floodplain and Regulatory Floodway; National Marine Sanctuaries; Wilderness Areas; Farmland; State Parks, National Forests, and Wild and Scenic Rivers; Hazardous Waste; Migratory Birds and Eagles' Nests; Navigable Waters; Noise; State Refuges, National Wildlife Refuges, Critical Habitat Areas and Sanctuaries, and; Wetlands and Other Waters of the United States.

Note that the following resources are not discussed for each alternative as they are not present at the airport, nor are they in the vicinity of the airport. The vicinity is defined as the area within the airport property boundary as well as the Birchwood Community Council boundary.

- Section 4(f) and Section 6(f) resources
- Threatened and endangered species
- National marine sanctuaries
- Wilderness areas
- Farmland
- State parks, national parks, national forests, and wild and scenic rivers
- Navigable waters
- State refuges, national wildlife refuges, critical habitat areas, and sanctuaries

5.3.1 Alternative 1 Impact Analysis

Alternative 1 is the 'no build' alternative. Existing infrastructure will be maintained in its current layout, and no new improvements will be made to remove non-standard conditions or provide additional apron or lease space to meet the current demand.

Environmental Impacts

Alternative 1 does not include changes to the existing airport layout. Therefore, impacts on environmental resource categories are not anticipated.

Construction Costs

Not applicable. Alternative 1 does not include the construction of new improvements, and the proposed construction costs associated with this alternative are zero.

Maintenance Costs

Continued maintenance of existing infrastructure will be required under this alternative. Maintenance costs are anticipated to remain at or near the level of historical maintenance costs summarized in the May 2021 Financial Assessment and Maintenance Cost Generation Report for Birchwood Airport.

Revenue Generation

No new tie-down and lease areas are proposed under this alternative to increase airport revenue. Revenue is anticipated to remain at or near the level of historical revenues summarized in the May 2021 Financial Assessment and Maintenance Cost Generation Report for Birchwood Airport.

Airspace Obstructions

The DOT&PF should perform tree removal within the aviation easements on each runway end to remove obstructions identified in the RPZ and runway approaches.

Land Uses within the Runway RPZs

The configuration of existing Runway 02L/20R requires both RPZs to extend beyond the airport's property line. Approximately 8 acres of the RPZ for the approach to Runway 02L lies within land owned by Eklutna, Inc. Approximately 1.1 acres of the RPZ for the approach to Runway 20R lies within land privately owned by the Isaac Walton League.

Aviation and Hazard easements from both Eklutna, Inc. and the private owner are in place to perform air hazard mitigation within the RPZs. Under the terms of the easements, trees may be cleared from the RPZs if they present obstructions to the airspace. Under this alternative, these easements will remain, and the land use for the Runway 02L/20R RPZs will not change.

The RPZs of existing Runway 02R/20L fall in their entirety on airport property. However, approximately 78,690 square feet of the Southeast Apron, 47,750 square feet of Taxiway A, and 27,030 square feet of Runway 02L/20R lie within the Runway 02R RPZ. Similarly, 91,900 square feet of the Northeast Apron, 26,400 square feet of Taxiway A, 12,610 square feet of Taxiway C, and 5,450 square feet of Runway 02L/20R lie within the Runway 20L RPZ. The presence of aprons and taxiways within an RPZ is incompatible with the FAA RPZ land use requirements. However, the FAA has stated that since these land uses are existing, they may not require a modification to standards or removal in the ultimate configuration. Therefore, the existing land uses in the RPZ will remain under this alternative, and no changes are proposed.

Safety Analysis

This alternative does not correct the non-standard conditions that currently present safety risks at Birchwood Airport, including:

- Segments of Taxiway A in-line with Runway 02R/20L
- Substandard width of existing Runway 02R/20L
- Presence of a fence within the existing Runway 02L RSA
- Substandard length of existing Runway 02L OFA

Meeting Demand for Additional Lease Lots

Alternative 1 does not provide additional apron or lease lot space to meet the existing demand.

NextGen and Operating Parameters

The FAA has been working to modernize the National Airspace System (NAS) through the implementation of NextGen. The goals of NextGen include the use of new technologies and aircraft procedures to increase the safety, efficiency, capacity, access, flexibility, predictability, and resilience of the NAS while also reducing the environmental impact of aviation.

Major initiatives of NextGen include the completion of aeronautical surveys for use to construct approaches and map obstructions and the implementation of the ADS-B technology. This technology allows aircraft (that are equipped with GPS transponders) to broadcast their position, speed, and direction instantly and automatically, which can be interpreted by similarly equipped aircraft and air traffic control. The requirement for aircraft to be equipped with GPS transponders is not mandatory at this time.

Currently, there has been no direct implementation of the NextGen operation parameters at Birchwood Airport. Birchwood recently completed a non-vertically guided aeronautical survey. However, no instrument approaches exist. There is not an air traffic control tower at Birchwood, and many of the small GA aircraft that mostly use the airport are not ADS-B equipped. The existence of the aeronautical survey will identify existing penetrations to the visual approaches and provide future benefits not only to NextGen but also to Birchwood Airport. There are no improvements proposed under this alternative, and it will not influence any future NextGen operating parameters.

5.3.2 Alternative 2 Impact Analysis

Alternative 2 consists of removing segments of Taxiway A that are in line with Runway 03G/21G, acquiring approximately 47 acres of new land for permanent control of runway RPZ and future apron and lease lot development, and other expansion-related improvements.

The following impacts are anticipated under this alternative:

Environmental Impacts

Alternative 2 will expand the airport boundary and construct new facilities. Potential environmental impacts associated with this alternative are described below. All potential impacts would be further evaluated under a formal NEPA process if a project occurs under this alternative.

1. Historical Properties, Archeological, and Cultural Resources: Any ground-disturbing work and/or expansion beyond the existing airport property boundary will require further cultural resource evaluation. Compliance under Section 106 of the National Historic Preservation Act (NHPA) is required.
2. Air Quality: The Birchwood Airport is not located in an air quality non-attainment or maintenance area for National Ambient Air Quality Standards. The NEPA analysis would analyze whether the project would cause an increase in air traffic that would result in emissions that would exceed one or more of the National Ambient Air Quality Standards. The project, as proposed, could result in an increase in air traffic. However, at this time, that increase is not expected to have an adverse impact on air quality in the surrounding area.
3. Anadromous Fish Streams and Essential Fish Habitat: No impact is anticipated.
4. Floodplain and Regulatory Floodway: A review of the FEMA Flood Insurance Rate Maps indicated that mapped floodplains are present near the airport but not in the proposed development areas.
5. Hazardous Waste: Land acquired will be subject to an Environmental Site Assessment investigation in order to determine if hazardous waste or contaminated sites are present.
6. Migratory Birds and Eagles' Nests: This alternative includes clearing for obstruction removal and future development. Clearing operations may adversely affect migratory birds and remove the nesting habitat for eagles. Clearing will not be permitted within 660 feet of a known eagle's nest and will follow the USFWS Recommended Time Periods to Avoid Vegetation Clearing in the Southcentral Region. Vegetation clearing should not occur between May 1st and July 15th.
7. Noise: Per the FAA Environmental Desk Reference for Airport Actions (2020), a noise analysis may be required for actions involving a new airport location, a new runway, a major runway extension, or runway strengthening; or when annual operations exceed 90,000 propeller operations or 700 jet operations, and the project would result in a change in operations. Under Alternative 2, proposed improvements are not anticipated to meet these thresholds and will likely not greatly increase noise levels at and near the airport.
8. Wetlands and Other Waters of the United States: As discussed in the Environmental Overview, seasonally saturated forested and scrub/shrub emergent wetlands were identified on the southwestern edge of the airport property. This alternative is anticipated to impact wetlands. A field delineation of existing wetlands in and around each project will be required. A USACE wetland permit will be needed for the development of each component project that impacts a delineated wetland.

Construction Costs

Site development and construction costs developed for this alternative consider land acquisition; obstruction clearing; foundation and fill requirements; utility improvements; and anticipated construction methods for each component project included in this alternative.

The total anticipated cost for the construction of Alternative 2 in 2023 dollars is anticipated to be approximately \$49.5M.

Maintenance Costs

The cost of maintenance is anticipated to increase under this alternative to account for the maintenance of the new apron and taxiway areas. This includes routine mowing of new infield grass areas in the summer and snow removal of the newly paved surfaces in the winter.

This alternative will construct approximately 889,720 square feet of additional operational surfaces, which will increase the amount of DOT&PF-maintained surfaces by approximately 52%. Assuming a direct relationship between the size of the area to be maintained and the cost to perform maintenance on these areas, this alternative will result in an increase of approximately \$76,500 in annual maintenance costs in comparison to the costs reported in 2020. The 2020 maintenance costs are included in the May 2021 Financial Assessment and Maintenance Cost Generation Report for Birchwood Airport.

Revenue Generation

Alternative 2 will provide approximately 16.5 acres of newly acquired land for future lease lot development (land use) and the construction of approximately 10.7 acres of new GA Apron, adding a total of 73 tie-down spaces.

Based on the May 2021 Financial Assessment and Maintenance Cost Generation Report for Birchwood Airport, approximately 70% of the airport's total annual revenue was generated from land use, and 25% was generated by airport-based tie-down and transient parking fees. Under Alternative 2, the accessible leasable area on the airport would be increased by approximately 42%, and the number of tie-downs available to GA customers would be increased by 46%. Expansion under Alternative 2 will result in an increase of approximately \$112,470 for potential annual revenue generated in comparison to 2020 revenues, assuming a direct relationship between the amount of leasable area and tie-downs available and their associated revenue generation.

Airspace Obstructions

Under Alternative 2, the runways are rehabilitated in their existing location with little or no changes to their vertical or horizontal dimensions. The implementation of an instrument approach for Runway 21 would decrease the angle of the approach surface to 30 to 1 and increase the number of trees that are obstructions within the approach. Additional property and avigation easements will be acquired to the south of the airport boundary, which will enable tree removal to mitigate obstructions to the approaches. However, obstructions to the Transitional Surfaces south of the runway centerline will remain under this alternative.

Land Uses within the Runway RPZs

Under Alternative 2, the land within the Runway 03/21 RPZ will be acquired by DOT&PF, and the existing Avigation and Hazard easement will be vacated. This will allow the DOT&PF to have full control of future land use and development within the RPZs.

The threshold locations of Runway 03G/21G will not change, and the RPZs will remain in their existing configuration. The in-line segments of Taxiway A will be removed, which reduces the amount of taxiway area in the RPZs by approximately 68,780 square feet. The other existing

runway, taxiway, and apron areas located within the RPZs, will remain the same and are considered existing incompatible land uses that do not require a modification-to- standard to remain in the ultimate configuration.

Safety Analysis

Alternative 2 removes the in-line Taxiway A, increases Runway 03G/21G to the standard 60- foot width, increases the length of the Runway 03/21 OFA, and removes the fence located within the Runway 03 RSA. It also acquires additional property below the approaches to both runways to allow for additional obstruction removal and full control of the runway RPZs. This alternative also constructs a vehicle and pedestrian road around the south end of the airport to mitigate incursions from unauthorized runway crossings. These improvements improve airport safety from the current conditions, as represented in Alternative 1.

Alternative 2 does not provide the standard 700-foot separation between the centerline of Runway 03/21 and Runway 03G/21 required by the FAA for parallel runways. However, the risk proposed by the substandard runway separation is mitigated by the fact that simultaneous operations are not permitted at the airport. Simultaneous operations have rarely been witnessed, and most users agree that they are not a significant problem on the airport.

Meeting Demand for Additional Lease Lots

Alternative 2 would provide areas for 16.5 acres of lease lot development and 10.7 acres of new GA Apron for the installation of 73 new tie-downs.

There is a forecasted need for approximately 13 acres of leasable area in the next 10 years and 17.5 areas of leasable area in the 20-year planning horizon, assuming a minimum lease size of approximately 0.5 acres (100 feet by 250 feet). The actual number of leases developed on the new leasable land will be based on the lot configuration. This alternative provides approximately 94% of the land necessary to meet the forecasted demand for lease lots.

Approximately 38 additional small GA tie-downs are needed to meet the current and forecasted demand for public GA apron parking. Also, the need for a minimum of 7 new large aircraft/glider spaces and 10 more transient parking spaces was identified. The lease lot development provided under this alternative meets the anticipated demand by providing 52 new small tie-downs at the new GA Apron (10 of which will be used for transient parking) and a combination of six additional small tie-downs and seven large aircraft/glider tie-downs at the Northeast Apron expansion.

NextGen and Operating Parameters

Under Alternative 2, no changes to the runway configurations or airspace, are anticipated. The development of a non-precision instrument approach to Runway 21 is recommended if the FAA determines that development and implementation of the approach is feasible. Development of the approach will need to be coordinated and implemented in accordance with NextGen design and operating parameters..

5.3.3 Alternative 3 Impact Analysis

Alternative 3 would expand the airport boundary, as described in Alternative 2, and would construct new facilities. Additionally, this alternative consists of relocating the gravel/ski Runway 03G/21G to the east shoulder of Runway 03/21 and relocating Taxiway A to the south to provide 150 feet of separation between the gravel runway centerline and the centerline of Taxiway A. This alternative will expand the Northeast Apron to provide additional tie-down spaces without encroaching on the Runway 21G RPZ. Property to the south of the airport will also be acquired to meet the needs for additional hangar lease areas and aircraft tie-down areas.

Potential environmental impacts associated with this alternative are described below. All potential impacts would be further evaluated under a formal NEPA process if a project occurs under this alternative.

Environmental Impacts

Alternative 3 will expand the airport boundary and construct new facilities. Development of this alternative will likely impact the environmental resource categories as described below.

1. Historical Properties, Archeological, and Cultural Resources: Any ground-disturbing work and/or expansion beyond the existing airport property boundary will require further cultural resource evaluation. Compliance under Section 106 of the NHPA is required.
2. Air Quality: The Birchwood Airport is not located in an air quality non-attainment or maintenance area for National Ambient Air Quality Standards. The NEPA analysis would analyze whether the project could result in an increase in air traffic that would result in emissions that would exceed one or more of the National Ambient Air Quality Standards. The project, as proposed, could result in an increase in air traffic. However, at this time, that increase is not expected to have an adverse impact on air quality in the surrounding area.
3. Anadromous Fish Streams and Essential Fish Habitat: No impact is anticipated.
4. Floodplain and Regulatory Floodway: A review of the FEMA Flood Insurance Rate Map indicated that mapped floodplains are present near the airport but not in the proposed development areas. No impact is anticipated.
5. Hazardous Waste: Land acquired will be subject to an Environmental Site Assessment investigation in order to determine if hazardous waste or contaminated sites are present.
6. Migratory Birds and Eagles' Nests: This alternative includes clearing for obstruction removal and future development. Clearing operations may adversely affect migratory birds and remove the nesting habitat for eagles. Clearing will not be permitted within 660 feet of a known eagle's nest and will follow the USFWS Recommended Time Periods to Avoid Vegetation Clearing in the Southcentral Region. Vegetation clearing should not occur between May 1st and July 15th.
7. Noise: Per the FAA Environmental Desk Reference for Airport Actions (2015), a noise analysis may be required for actions involving a new airport location, a new runway, a major runway extension, or runway strengthening; or when annual operations exceed 90,000 propeller operations or 700 jet operations, and the project would result in a change

in operations. Under Alternative 3, proposed improvements are not anticipated to meet these thresholds and will likely not greatly increase noise levels at and near the airport.

8. Wetlands and Other Waters of the United States: As discussed in the Environmental Overview, seasonally saturated forested and scrub/shrub emergent wetlands were identified on the southwestern edge of the airport property. This alternative is anticipated to impact wetlands. A field delineation of existing wetlands in and around each project will be required. A USACE wetland permit will be needed for the development of each component project that impacts a delineated wetland.

Construction Costs

Under Alternative 3, site development and construction costs consider land acquisition; clearing; foundation and fill requirements; utility improvements; and anticipated construction methods.

The total anticipated cost for the construction of Alternative 3 in 2023 dollars is anticipated to be approximately \$53.6M.

Maintenance Costs

Under Alternative 3, the cost of the maintenance is anticipated to increase under this alternative to account for maintenance of new apron and taxiway areas. This includes routine mowing of new infield grass areas in the summer and snow removal of the newly paved surfaces in the winter.

This alternative will construct approximately 1,051,485 square feet of additional operational surfaces, which will increase the amount of DOT&PF-maintained surfaces by approximately 61%. Assuming a direct relationship between the size of the area to be maintained and the cost to perform maintenance of the said area, this alternative will result in an increase of approximately \$90,500 in annual maintenance costs in comparison to the costs reported in 2020. The 2020 maintenance costs are included in the May 2021 Financial Assessment and Maintenance Cost Generation Report for Birchwood Airport.

Revenue Generation

Alternative 3 will provide approximately 15 acres of newly acquired land for future lease lot development (land use) and the construction of approximately 10.4 acres of new GA Apron, adding a total of 66 tie-down spaces.

Based on the May 2021 Financial Assessment and Maintenance Cost Generation Report for Birchwood Airport, approximately 70% of the airport's total annual revenue was generated from land use, and 25% is generated by based tie-down and transient parking fees. Under Alternative 3, the accessible lease area would be increased by approximately 38%, and the number of tie-downs available to GA customers would be increased by 42%. Expansion under Alternative 3 will result in an increase of approximately \$102,000 for potential annual revenue generated in comparison to 2020 revenues, assuming a direct relationship between the amount of leasable area and tie-downs available and their associated revenue generation.

Airspace Obstructions

Under Alternative 3, Runway 03G/21G is relocated adjacent to the southeastern end of Runway 03/21. The airspace for Runway 03G/21G will generally fall within Runway 03/21's existing airspace and, therefore, obstructions to the Part 77 Airspace. Therefore, existing obstructions to the Part 77 Airspace are generally reduced from the existing conditions, provided that the obstructions within the newly acquired properties are removed.

Additional property and aviation easements will be acquired to the south of the airport boundary to allow for the ability for more tree removal. Obstructions currently present within the Runway 03G/21G Transitional Surface will be reduced compared to the existing condition and the conditions presented in Alternative 2 due to the relocation of the runway to the northwest.

Land Uses within the Runway RPZs

Under Alternative 3 and Alternative 2, land within the Runway 03/21 RPZ will be acquired, and any existing aviation hazard easements will be vacated. This will allow the DOT&PF to have full control of future land use and development within the RPZs. Similarly, land within the Runway 03G RPZ will be acquired and cleared of obstructions (trees).

The relocation of Runway 03G/21G would reduce the square footage of the apron located with the RPZ from 170,500 to approximately 11,070 square feet, with a small portion of the proposed Northeast Apron expansion limits and the summer tie-down/winter snow storage limits overlapping with the Runway 21G RPZ (none of the proposed tie-downs within either of the apron expansion areas lie within the RPZ). Similarly, the taxiway area located in the 03G/21G RPZs will be reduced from 86,760 square feet to 38,865 square feet, a total reduction of 47,895 feet. Also, due to the runway relocation, the area of Runway 03/21 that now falls within the Runway 03G/21G RPZ is increased from 32,480 square feet to 97,065 square feet.

Because the thresholds of the Runway 03G/21G would be relocated under this alternative, the FAA considers the existence of taxiways, runways, and aircraft aprons in the RPZ as new incompatible land use within an RPZ. A modification to standards for these new incompatible land uses will be required under this alternative.

Safety Analysis

Alternative 3 relocates Runway 03G/21G away from the in-line Taxiway A, increases Runway 03G/21G to the standard 60-foot width, increases the length of the Runway 03/21 OFA, and removes the fence located within the Runway 03 RSA. It also acquires additional property below the approaches to both runways, which will allow for additional obstruction removal and full control of the runway RPZs. This alternative also constructs a vehicle and pedestrian road around the south end of the airport, which will mitigate incursions from unauthorized runway crossings.

This alternative does not provide the standard 700-foot separation between the centerline of Runway 03/21 and Runway 03G/21 required by the FAA for parallel runways. However, as mentioned under Alternative 2, the risk proposed by the substandard runway separation is mitigated by the fact that simultaneous operations are not permitted at the airport. Simultaneous

operations have rarely been witnessed, but most users agree that they are not a significant problem on the airport.

Compared to Alternative 2, Alternative 3 increases safety because it relocates the gravel runway threshold closer to the main runway to make it more apparent to airport users that only one pattern is in use and simultaneous operations are prohibited. Also, this alternative reduces the severity of penetrations to the Transitional Surface adjacent to the runway and decreases the area of the taxiway and apron that fall within the Runway 03G/21G RPZs. However, the length of Runway 03G/21G is reduced from 1,802 feet to 1,710 feet, which presents a reduction in safety. The improvements shown under this alternative improve overall airport safety from the current conditions represented in Alternative 1 to a level similar to the level of safety represented in Alternative 2.

Meeting Demand for Additional Lease Lots

Alternative 3 provides space for 15 acres of lease lot development and 10.4 acres of new GA Apron for the installation of 66 new tie-downs.

This alternative provides approximately 86% of the land necessary to meet the forecasted demand for lease lots. The lease lot development provided under this alternative meets the anticipated demand by providing 46 new small tie-downs at the new GA Apron (10 of which will be used for transient parking) and a combination of five additional small tie-downs and 10 large aircraft/glider tie-downs at the Northeast Apron expansion.

NextGen and Operating Parameters

Because relocated runway 03G/21G will remain a visual runway under Alternative 3, the NextGen design and operating parameters are identical to those identified under Alternative 2. See Alternative 2 for more information.

5.3.4 Alternative 4 Impact Analysis

Alternative 4 relocates gravel/ski Runway 03G/21G to meet FAA's runway separation requirements for safe and concurrent operations between two parallel runways. The land acquisition for relocation of Runway 03G/21G also provides opportunities for apron development and new lease areas. Other related improvements to Runway 03/21 are also included in Alternative 4, most of which are similar to Alternatives 2 and 3.

Environmental Impacts

Alternative 4 will increase the airport property boundary and construct new facilities. Development of this alternative will likely impact the environmental resource categories as described below. All potential impacts would be further evaluated under a formal NEPA process if a project occurs under this alternative.

1. Historical Properties, Archeological, and Cultural Resources: Any ground-disturbing work and/or expansion beyond the existing airport property boundary will require further cultural resource evaluation. Compliance under Section 106 of the NHPA is required.

2. **Air Quality:** The Birchwood Airport is not located in an air quality non-attainment or maintenance area for National Ambient Air Quality Standards. The NEPA analysis would analyze whether the project could result in an increase in air traffic that would result in emissions that would exceed one or more of the National Ambient Air Quality Standards. The project, as proposed, could result in an increase in air traffic. However, at this time, that increase is not expected to have an adverse impact on air quality in the surrounding area.
3. **Anadromous Fish Streams and Essential Fish Habitat:** No impact is anticipated.
4. **Floodplain and Regulatory Floodway:** A review of the FEMA Flood Insurance Rate Map indicated that mapped floodplains are present near the airport but not in the proposed development areas. No impact is anticipated.
5. **Hazardous Waste:** Land acquired will be subject to an Environmental Site Assessment investigation in order to determine if hazardous waste or contaminated sites are present.
6. **Migratory Birds and Eagles' Nests:** This alternative includes the most impact of any alternative for clearing for obstruction removal and future development. Clearing operations may adversely affect migratory birds and remove the nesting habitat for eagles. Clearing will not be permitted within 660 feet of a known eagle's nest and will follow the USFWS Recommended Time Periods to Avoid Vegetation Clearing in the Southcentral Region. Vegetation clearing should not occur between May 1st and July 15th.
7. **Noise:** Per the FAA Environmental Desk Reference for Airport Actions (2015), a noise analysis may be required for actions involving a new airport location, a new runway, a major runway extension, or runway strengthening; or when annual operations exceed 90,000 propeller operations or 700 jet operations, and the project would result in a change in operations. Under Alternative 4, the new runway location may require that a noise study be performed to analyze the impact of aviation noise on the neighboring community.
8. **Wetlands and Other Waters of the United States:** As discussed in the Environmental Overview, seasonally saturated forested and scrub/shrub emergent wetlands were identified on the southwestern edge of the airport property. This alternative is anticipated to impact wetlands. A field delineation of existing wetlands in and around each project will be required. A USACE wetland permit will be needed for the development of each component project that impacts a delineated wetland.

Construction Costs

Site development and construction costs for this alternative consider land acquisition; clearing; foundation and fill requirements; utility improvements; and anticipated construction methods.

The total anticipated cost for the construction of Alternative 4 in 2023 dollars is anticipated to be approximately \$89.4M, which is significantly more than Alternatives 1, 2, and 3.

Maintenance Costs

The cost of maintenance is anticipated to increase under this alternative to account for the maintenance of new apron areas and taxiway areas. This includes routine mowing of new infield grass areas in the summer and snow removal of the newly paved surfaces in the winter.

This alternative will construct approximately 1,643,900 square feet of additional operational areas, which will increase the amount of DOT&PF-maintained surfaces by approximately 96%. Assuming a direct relationship between the size of the area to be maintained and the cost to perform maintenance of the said area, this alternative will result in an increase of approximately \$141,500 for annual maintenance costs compared to the costs reported in 2020, almost doubling the existing maintenance costs for the airport. The 2020 maintenance costs are included in the May 2021 Financial Assessment and Maintenance Cost Generation Report for Birchwood Airport.

Revenue Generation

Alternative 4 will provide approximately 36.5 acres of newly acquired land for future lease lot development (land use) and the construction of approximately 14 acres of new GA Apron, adding a total of 96 tie-down spaces.

Based on the May 2021 Financial Assessment and Maintenance Cost Generation Report for Birchwood Airport, approximately 70% of the airport's total annual revenue was generated from land use, and 25% is generated by based tie-down and transient parking fees. Under Alternative 4, the accessible lease area will increase by approximately 93%, and the number of tie-downs available to GA customers would increase by 61%. Expansion under Alternative 4 will result in an increase of approximately \$220,600 for potential annual revenue generated in comparison to 2020 revenues, assuming a direct relationship between the amount of leasable area and tie-downs available and their associated revenue generation.

Airspace Obstructions

Under Alternative 4, Runway 03/21 is reconstructed in its existing location with little or no changes to the vertical and horizontal location and, therefore, obstructions to the main runway's airspace are identical to those identified under Alternative 1. Runway 03G/21G will be relocated south and east of Runway 03/21 to meet FAA's runway separation requirements and also reduce incompatible land uses within Runway 03G/21G RPZs.

Additional property will be acquired to the south of the airport boundary to accommodate relocated Runway 03G/21G, which will provide the ability for more tree obstruction removal. In particular (and similar to Alternatives 2 and 3), DOT&PF will now be able to remove trees that are currently not on airport property that obstruct the approach to existing Runway 03 and Runway 03G/21G.

Land Uses within the Runway RPZs

Under Alternative 4, the land within the Runway 03/21 RPZ will be acquired, and the existing aviation hazard easements will be vacated. Additionally, the large acquisition of land required to accommodate the relocation of Runway 03G/21G allows DOT&PF full control of future land use and development within the RPZs for both runways. The new Runway 03G/21G RPZ will be clear of runways, aprons, and taxiways. The new airport access road will penetrate the new Runway 21G RPZ for Runway 21G. This access road will be used to provide access from the southeast side to the northeast side of the airport without crossing the runway and will mitigate runway incursions. Due to the existing airport layout and limited availability for access road location, the

land use within the Runway 03G RPZ under this alternative is considered allowable but not preferred.

Safety Analysis

Under Alternative 4, Runway 03G/21G is relocated away from in-line Taxiway A and widened to the standard 60-foot width, the length of the Runway 03/21 OFA is increased, and the fence is removed that lies within the Runway 03's RSA. It also acquires additional property below the approaches to both runways to allow for additional obstruction removal and full control of the runway RPZs. This alternative also constructs a vehicle and pedestrian road around the south end of Runway 03/21, which will mitigate incursions from unauthorized runway crossings.

In addition, this alternative relocates gravel runway 03G/21G to provide the standard 700-foot separation between the centerline of Runway 03/21 and Runway 03G/21G as required by the FAA for parallel runways. The relocation would result in distinct traffic patterns and simultaneous operations on both runways.

Airport users expressed concern that allowing simultaneous operations with two distinct patterns at Birchwood would present significant safety hazards to air operations, which would drastically outweigh the benefits presented by this alternative. Continuing to operate one traffic pattern away from neighboring communities and prohibiting simultaneous operations is preferred.

Meeting Demand for Additional Lease Lots

Alternative 4 provides area for 36.5 acres of lease lot development and 14 acres of new GA Apron for the installation of 96 new tie-downs.

This alternative provides over 100% of the land necessary to meet the forecasted demand for lease lots and allows for the maximum amount of flexibility to configure lease lots to best serve a wide range of leaseholders.

The tie-downs provided under this alternative meets the anticipated demand by providing 72 new small tie-downs at the new GA Apron (10 of which will be used for transient parking) and a combination of 10 additional small tie-downs and 10 large aircraft/glider tie-downs at the Northeast Apron expansion.

NextGen and Operating Parameters

Due to the relocation of Runway 03G/21G under Alternative 4, it is likely that a new aeronautical survey would be needed to allow for future approach procedures and to support NextGen design. As described under Alternative 2, the development of a non-precision instrument approach to Runway 21 is recommended if the FAA determines that development and implementation of the approach is feasible. Development of the approach will need to be coordinated and implemented in accordance with NextGen design and operating parameters..

Table 28: Alternatives Evaluation Matrix

Impacts on Airport	Alternative 1 No Build	Alternative 2 Maintain Existing Gravel Runway	Alternative 3 Relocate Gravel Runway to Shoulder of Main Runway	Alternative 4 Construct New Gravel Runway
Runway 03/21 Dimensions	Maintain Existing (4,012' by 100')	Match Existing (4,012' by 100')	Match Existing (4,012' by 100')	Match Existing (4,012' by 100')
Runway 03G/21G Dimensions	Maintain Existing (1,802' by 50')	Widen (1,802' by 60')	Shorten and Widen (1,710' by 60')	Widen (1,800' by 60')
Maintains Single Traffic Pattern with Simultaneous Operations Prohibited?	Yes	Yes	Yes	No
Meets FAA Runway Separation Requirements for Parallel Runways?	No	No	No	Yes
Meets Forecasted Tie-Down Demand?	No	Yes	Yes	Yes
Meets Forecasted Lease Lot Demand?	No	No. Provides 94% of lease lot area forecasted	No. Provides 86% of lease lot area forecasted	Yes. Exceed 100% of lease lot area forecasted
Constructs Parallel Taxiway A?	No	No	Yes	Yes
Maintains Direct Ski-Access to Runway 03G/21G from Ski Apron?	Yes	Yes	No – Taxi Across Paved Taxiway A	Yes
Environmental Impacts	No change. See Birchwood Airport Environmental Overview Addendum	Environmental impacts are likely greater than Alternative 1, equal to Alternative 3, and less than Alternative 4.	Environmental impacts are likely greater than Alternative 1, equal to Alternative 2, and less than Alternative 4.	Environmental impacts are likely greater than Alternative 1, Alternative 2, and Alternative 4.
Construction Costs (approx.)	\$0	\$49.5M	\$53.6M	\$89.4M
Estimated Increase in Annual Maintenance Costs (approx.)	No change. See May 2021 Financial Assessment and Maintenance Cost Generation Report for historical maintenance costs.	\$77k	\$91k	\$141k
Estimated Revenue Generation (approx.)	No change. See May 2021 Financial Assessment and Maintenance Cost Generation Report for historical maintenance costs.	\$112k	\$102k	\$221k
Removes Fence in Runway 03 OFA and Trees South of Runway 03 and 03G?	No.	Yes.	Yes.	Yes.
Other Changes to Airspace Obstructions	Remains as described in Condition and Needs Assessment.	Obstructions are less than Alternative 1 but more than Alternative 3 and Alternative 4.	Obstructions are less than Alternative 1 and Alternative 2 but more than Alternative 4.	Obstructions are less than Alternative 1, 2, and Alternative 3
Land Uses within RPZ	No change.	No change	Incompatible land uses reduced from Alternatives 1 and 2, but Mod-to-Standards Required due to runway relocation.	Incompatible land uses reduced from Alternatives 1, 2, and 3
Mod-To-Standards Required?	Yes (Taxiway A in-line with Runway 03G/21G)	No	Yes (Incompatible Land Uses within RPZ of new Runway)	No
Safety Analysis	No corrections to non-standard conditions. Existing safety hazards remain.	Removes in-line segments of Taxiway A Removes fence obstruction in Runway 03 RSA Full control of land within RPZs for obstruction removal Existing Incompatible land uses in RPZ remain Does not meet parallel runway separation requirements	Removes in-line segments of Taxiway A Removes fence obstruction in Runway 03 RSA Full control of land within RPZs for obstruction removal Reduced incompatible land uses in RPZ Reduced Length of Runway 03G/21G Does not meet parallel runway separation requirements	Removes in-line segments of Taxiway A Removes fence obstruction in Runway 03 RSA Full control of land within RPZs for obstruction removal Reduced incompatible land uses in RPZ Meets parallel runway separation requirements
NextGen Parameters	No implementation or significant contribution.	No implementation or significant contribution.	No implementation or significant contribution.	No implementation or significant contribution.

5.3.5 Preferred Alternative

The primary needs at Birchwood Airport were identified and considered under each alternative. Based on input from the airport sponsors, maintenance staff, airport users, and other local stakeholders, Alternative 2 has been chosen as the preferred alternative. While Alternative 2 does not meet the FAA's required runway separation distance, it does reconfigure existing parallel taxiways to address the safety hazard of aligned taxiways on runways.

Alternative 2 would also increase apron space to accommodate additional tie-down areas, provide for lease lot development, and ensure the RPZ is within airport boundaries, if land acquisition is successful. Compared to Alternatives 3 and 4, the preferred alternative is the least expensive in terms of estimated costs for site development and airport maintenance while still providing a safer operating environment and increased availability for leases and tie down spaces. Engineer's estimates have been prepared for Alternative 2 and are included in Appendix C.