TAXIWAY A RELOCATION

This report has been prepared as a supplement to a pre-application submission to the Federal Aviation Administration (FAA) in pursuit of an Airport Improvement Program (AIP) grant to conduct an environmental study to relocate Taxiway A at Birmingham-Shuttlesworth International Airport (BHM). The contents of this report represent current information and findings being developed as part of BHM’s ongoing Airport Master Plan. This “White Paper”, in effect, combines elements of the Facility Requirements and Alternatives Analysis portions of the master plan document that are specific to Taxiway A. It has been prepared in advance of the master plan because the project (and related projects) are: time critical, complex in terms of alternatives (e.g., ranging from “band-aid” to holistic), and because of sensitivities associated with unavoidable impacts to Village Creek.

It should be noted that the need to relocate Taxiway A has also long been identified; the current FAA-approved Airport Layout Plan (ALP) for BHM identifies a Taxiway A alignment identical to the one to be carried forward into the current master plan. The current master plan will, however, likely recommend a more comprehensive solution for addressing Village Creek that better supports airport operational concerns and those of the community. While the current master plan will not be able to fully address the environmental implications, it will identify the areas requiring further investigations needed to support or refine the project’s to be pursued.

1.0 BACKGROUND

The southern portion of Taxiway A is currently offset 350 feet from Runway 6/24 (centerline to centerline). This separation distance does not meet the runway-to-taxiway centerline separation requirements of three distinct criteria: runway-to-taxiway design standards; Category-II approach clearances for Runway 6, and high-speed turnoff with course reversal. The northern segment has an offset of 600 feet meeting the standards. A “jog” occurs at Taxiway B just west of the Runway 18/36 crossover. Several procedural adaptations are in place to address the non-standard conditions, although recent changes to the airport design standards would likely increase these significantly. Restrictions currently in place include:

- Modification to Airport Design Standards— Approves non-standard condition of 350-feet between the centerlines of parallel Taxiway A and Runway 6/24 subject to operational restrictions on Taxiway A.
- Operational Adaption— Restricted use of Taxiway A during CAT II Operations (effective December 11, 1975)
- Letter of Agreement (March 21, 2011)— Requires Taxiway A to be clear for all takeoffs and landings by an Airplane Design Group VI airplane (wingspans greater than 214 and tailheight greater than 66 feet).
- Notice to Airman (issued May 1, 2015)— Closes Taxiway A between Taxiways A2 and A3 to aircraft with wingspans of more than 134 feet due to erosion of the taxiway safety area caused by Village Creek.
Village Creek traverses BHM from the northeast to the southwest, primarily on the south side of Runway 6/24. Apart from Taxiway A, Village Creek poses significant airport operational challenges: maintenance, drainage, wildlife attractant, and security. Southwest of the passenger terminal between Taxiways A3 and the Runway 6 hold apron, the creek runs parallel to and in very close proximity to Taxiway A. In this segment of the creek, particularly where it changes direction from west to southwest just south of Taxiway A3 at the apron frontage, it is eroding the taxiway safety area and is degrading the sub-base material supporting that segment of Taxiway A. Any southward relocation of Taxiway A will require a modification to the creek, either by way of channel realignment or culvert.

**FIGURE 1**
**EXISTING CONDITIONS**

As a result of the continued erosion, BAA has added wingspan restrictions that correlate the width of the eroded taxiway safety area available to aircraft wingspan. These temporary BAA operational restrictions are currently being communicated through a Notice to Airman (NOTAM). BAA indicates the erosion to the safety area is being closely monitored while repair efforts are
being evaluated and that additional restrictions could be imposed. Because of building-related wingspan restrictions also in place on the north side parallel Taxiway H, additional Taxiway A wingspan restrictions would result in significant “back-taxi-turnaround” operations on the runway, including KC-135 tanker aircraft. Currently, those aircraft cross the runway onto Taxiway A to takeoff on Runway 6. Cargo aircraft would also be subjected to back-taxi-turnaround if additional restrictions are imposed.

The following utility lines are in place near the Taxiway A – Village Creek area and would also be impacted by any relocation of Taxiway A or modification to the creek:

- 36-inch diameter water main
- 48-inch to 60-inch diameter sanitary sewer trunk line
- Gas line

The current master plan effort has identified the items above as critical elements requiring programmatic resolution. As such, the final plan will identify a sponsor proposed recommendations that accomplish the following (in order of priority):

- Eliminates the burdening operational restrictions caused by the closely spaced taxiway offset and additional erosion-induced wingspan restrictions.
- Meets current design standards for the aircraft types using or intending to use BHM on a regular basis.
- Enables high speed exit with reverse direction capability toward the passenger terminal that could defer or extend the programming trigger of the future parallel runway.
- Programmatically resolves the wider array of airport and significant community concerns associated with Village Creek’s on-airport location.

The remainder of this White Paper details the related Facility Requirements and Alternatives Analysis elements to be documented in the master plan narrative. This report breaks the subject matter into two primary explorations: Parallel Taxiway A Separation and Village Creek Alternatives. The final section identifies the level of environmental investigations anticipated to be necessary to support the grant/funding program and subsequent project pre-planning activities.
FIGURE 2
TAXIWAY SAFETY AREA EROSION

Note: Taxiway safety area available measures 67 feet from centerline (BAA, May 11, 2015)
2.0 PARALLEL TAXIWAY A SEPARATION

This section establishes the current master plan’s criteria used for recommending the proposed taxiway offset of 500 feet (centerline-to-centerline), which is also consistent with the current-approved ALP. Three factors were specifically considered in validating the current-approved ALPs proposed offset of 500 feet: critical aircraft selection and design standards application, instrument procedures implications, and high-speed exit with reverse direction. When considering the information contained in this section, it is important to understand that the level of environmental study and work effort involved for any offset distance of 400 feet to 500 feet would not appreciably differ because Village Creek, the utilities, and vehicle service road would all be impacted and would have essentially overlapping implications in terms of relocation alternatives and environmental resource investigations.

2.1 Critical Aircraft Analysis and Design Standards

Airports are planned, designed, and maintained in accordance with the design standards developed by the FAA. The primary reference document containing the standards is FAA Advisory Circular (AC) 150/5300-13A, *Airport Design*. The AC classifies airports according to the critical aircraft using the facility; the critical aircraft is the most demanding aircraft that has regularly scheduled service or performs at least 500 annual operations at the airport. The operational and physical characteristics comprising an aircraft’s grouping into airport design classifications are primarily related to aircraft size, but specifically: approach speed, wingspan, tail height, weight, and landing gear configuration.

Table 1 identifies scheduled commercial aircraft activity and other large aircraft operating at BHM between 2010 and 2014. The largest, scheduled or regularly operating aircraft at BHM are the Boeing 757-200 and the Airbus A300, which are both C-IV aircraft. Because there are a significant number of scheduled and regularly operating aircraft in Approach Category D, the current design aircraft selection will use composite D-IV characteristics. However, given the fact that BHM receives activity by the larger aircraft, is a designated alternate airport for Boeing 747-800 operations, and is pursuing significant international cargo activity, it is recommended that the long-term plan preserve for regular D-V aircraft activity in the future. Accounting for a third planning element, instrument approach visibility minimums, Runway 6/24 and related infrastructure included in the master plan would include an existing and proposed Runway Design Code (RDC) of D-IV-1200 and D-V-1200, respectively. Similarly, the plan will utilize an existing and proposed Taxiway Design Group (TDG) of 5 and 6, respectively.
### TABLE 1
COMMERCIAL AIRLINE AND LARGE AIRCRAFT OPERATIONS

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>AAC ¹</th>
<th>ADG ²</th>
<th>TDG ³</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010</td>
<td>2011</td>
<td>2012</td>
<td>2013</td>
</tr>
<tr>
<td>Bombardier CRJ-100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Embraer ERJ-135</td>
<td>D II 1B</td>
<td>1,046</td>
<td>735</td>
<td>980</td>
</tr>
<tr>
<td>Boeing 737-200</td>
<td>C II 2</td>
<td>16</td>
<td>26</td>
<td>70</td>
</tr>
<tr>
<td>Airbus A319</td>
<td>C III 3</td>
<td>6</td>
<td>48</td>
<td>144</td>
</tr>
<tr>
<td>Airbus A320</td>
<td>C III 3</td>
<td>25</td>
<td>76</td>
<td>28</td>
</tr>
<tr>
<td>Airbus A321</td>
<td>C III 3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Boeing (Douglas) DC-9</td>
<td>C III 3</td>
<td>516</td>
<td>1,738</td>
<td>2,148</td>
</tr>
<tr>
<td>Boeing 737-300</td>
<td>C III 3</td>
<td>6,556</td>
<td>6,969</td>
<td>5,389</td>
</tr>
<tr>
<td>Boeing 737-400</td>
<td>C III 3</td>
<td>23</td>
<td>24</td>
<td>34</td>
</tr>
<tr>
<td>Boeing 737-500</td>
<td>C III 3</td>
<td>1,483</td>
<td>1,104</td>
<td>857</td>
</tr>
<tr>
<td>Embraer E170</td>
<td>C III 3</td>
<td>203</td>
<td>834</td>
<td>723</td>
</tr>
<tr>
<td>Embraer E190</td>
<td>C III 3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bombardier CRJ-200</td>
<td>D II 3</td>
<td>12,490</td>
<td>8,365</td>
<td>7,377</td>
</tr>
<tr>
<td>Bombardier CRJ-700</td>
<td>D II 3</td>
<td>5,928</td>
<td>4,590</td>
<td>3,545</td>
</tr>
<tr>
<td>Bombardier CRJ-900</td>
<td>D II 3</td>
<td>744</td>
<td>1,592</td>
<td>2,618</td>
</tr>
<tr>
<td>Embraer ERJ-145</td>
<td>D II 3</td>
<td>7,631</td>
<td>7,239</td>
<td>7,650</td>
</tr>
<tr>
<td>Boeing 737-700</td>
<td>D III 3</td>
<td>8,706</td>
<td>8,620</td>
<td>8,845</td>
</tr>
<tr>
<td>Boeing 737-800</td>
<td>D III 3</td>
<td>375</td>
<td>211</td>
<td>393</td>
</tr>
<tr>
<td>Boeing 737-900</td>
<td>D III 3</td>
<td>0</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Boeing (Douglas) MD-82</td>
<td>C III 4</td>
<td>1,169</td>
<td>1,389</td>
<td>1,457</td>
</tr>
<tr>
<td>Boeing 717-200</td>
<td>C III 4</td>
<td>18</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>Boeing 707-300</td>
<td>C IV 4</td>
<td>7</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Boeing 757-300</td>
<td>D IV 4</td>
<td>0</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Boeing KC-135</td>
<td>D IV 4</td>
<td>1,110</td>
<td>930</td>
<td>1,330</td>
</tr>
<tr>
<td>Boeing (Douglas) MD-83</td>
<td>C III 5</td>
<td>1,037</td>
<td>677</td>
<td>553</td>
</tr>
<tr>
<td>Boeing (Douglas) MD-87</td>
<td>C III 5</td>
<td>16</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Boeing (Douglas) MD-88</td>
<td>C III 5</td>
<td>974</td>
<td>1,897</td>
<td>1,794</td>
</tr>
<tr>
<td>Boeing (Douglas) MD-90</td>
<td>C III 5</td>
<td>5</td>
<td>13</td>
<td>194</td>
</tr>
<tr>
<td>Boeing 727-200</td>
<td>C III 5</td>
<td>635</td>
<td>653</td>
<td>305</td>
</tr>
<tr>
<td>Airbus A300</td>
<td>C IV 5</td>
<td>606</td>
<td>616</td>
<td>621</td>
</tr>
<tr>
<td>Boeing 757-200</td>
<td>C IV 5</td>
<td>90</td>
<td>36</td>
<td>378</td>
</tr>
<tr>
<td>Airbus A330</td>
<td>C V 5</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Boeing 767-300</td>
<td>D IV 5</td>
<td>22</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>Boeing 767-400</td>
<td>D IV 5</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Boeing (Douglas) DC-10</td>
<td>D IV 5</td>
<td>22</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Boeing 777-200</td>
<td>C IV 6</td>
<td>5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Boeing (Douglas) MD-11</td>
<td>D IV 6</td>
<td>9</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Airbus A340-600</td>
<td>D V 6</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Boeing 747-300</td>
<td>D V 6</td>
<td>2</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Boeing 747-8</td>
<td>D VI 6</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. Aircraft Approach Category
2. Airplane Design Group
3. Taxiway Design Group
4. 2014 does not include December

Source: Enhanced Traffic Management System Counts (FAA) and FAA AC 150/5300-13A, Change 1
Per FAA AC 150/5300-13A, applicable design standards are shown in Table 2 for both the ultimate reference code, D-V, as well as the current composite-type reference code, D-IV.

### TABLE 2
**DESIGN STANDARDS**

<table>
<thead>
<tr>
<th>Item</th>
<th>D-V</th>
<th>D-IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Runway Centerline to Parallel Taxiway Centerline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard Approaches with Visibility &lt; ½ mile</td>
<td>400’</td>
<td>400’</td>
</tr>
<tr>
<td>Approaches with Visibility &lt; ¾ mile</td>
<td>500’</td>
<td>N/A</td>
</tr>
<tr>
<td>Runway to Taxiway Separation for Reverse Turns from a High-speed Exit</td>
<td>484’</td>
<td>427’</td>
</tr>
<tr>
<td>Minimum Recommended</td>
<td>600’</td>
<td>450’</td>
</tr>
<tr>
<td>Taxiway Safety Area (TSA)</td>
<td>259’</td>
<td>171’</td>
</tr>
<tr>
<td>Taxiway Object Free Area (TOFA)</td>
<td>320’</td>
<td>214’</td>
</tr>
</tbody>
</table>

Source: FAA AC 150/5300-13A

As shown in the above table, the standard runway to taxiway separation for both D-IV and D-V is 400 feet. In addition to the FAA’s restrictions on Category-II operations in effect since 1975, the current design standard associates additional operational restrictions whenever the airport has less than ¾-mile visibility. Given these conditions exist at BHM approximately 5.66% of the time and applying the activity data of Table 1, the operational impact equates to approximately 2,000 to 3,000 commercial airline and large aircraft operations per year.

The master plan will assess airfield capacity and provide updated recommendations accordingly. Generally, taxiway exits (including high speed exits) can be optimized, along with other shorter-term capacity enhancements, to increase efficiency and potentially defer the need for a longer term solution (such as the planned future runway). That being the case at BHM, a TDG 6 standard high-speed exit taxiway with a reverse turn has a minimum required separation range of 484 feet to 600 feet. Taxiway A’s current separation of 350 feet does not meet these minimum standards. Because runway exit enhancements will likely become important as demand increases and the previously projected capacity constraints reemerge, a taxiway separation of between 484 and 600 feet provides useful capacity buffer. Given the challenges and costs associated with relocating the taxiway and creek, and to plan and implement a new runway, it is advisable to maximize the airside safety and efficiency benefits that can be accomplished by relocating Taxiway A and Village Creek.

### 2.2 New Taxiway Design Standards Implications

The airport design standards have changed significantly since the last master plan was completed in 2002, particularly the taxiway design elements. Amongst other changes, AC 150/5300-13, *Airport Design*, now includes separate Approach and Departure Reference Codes (APRC and DPRC) that relates operational capabilities (i.e., restrictions) with various runway-to-taxiway separations. The new standards significantly expands on the information provided Table...
2, also revealing additional operating restrictions could be implemented because of Taxiway A’s proximity to the runway affecting both arrivals and departures to various extents.

Taxiway proximity generally impacts arrivals more significantly than departures and that. The AC indicates the APRC “determine[s] which aircraft can operate on taxiways adjacent to a runway under particular meteorological conditions with no special operational procedures necessary.” Table 3 shows the APRC standards for the current runway-to-taxiway separation of 350 feet and higher.

### TABLE 3
**APPROACH REFERENCE CODE (APRC) STANDARDS**

<table>
<thead>
<tr>
<th>Visibility Minimums</th>
<th>Runway to Taxiway Separation (ft)</th>
<th>≥ 350</th>
<th>≥ 400</th>
<th>≥ 500</th>
<th>≥ 550</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual</td>
<td></td>
<td>B/III/500</td>
<td>D/IV/CVIS</td>
<td>D/V/5000</td>
<td>D/VI/5000</td>
</tr>
<tr>
<td>Not lower than ½ mile</td>
<td></td>
<td>B/III/4000</td>
<td>D/IV/2400</td>
<td>D/V/2400</td>
<td>D/VI/2400</td>
</tr>
<tr>
<td>Lower than ½ mile</td>
<td></td>
<td>B/III/2400</td>
<td>D/IV/1600</td>
<td>D/V/1600</td>
<td>D/VI/1600</td>
</tr>
</tbody>
</table>

Approach Category/Wingspan Group/Visibility (visual or runway visual range [RVR value in feet])

Source: FAA AC 150/5300-13A

Table 3 indicates that additional operational restrictions may be warranted than those already implemented by both the FAA’s 1975 restrictions during Category-II approach conditions and BAA’s recently imposed erosion-based wingspan restrictions. According to current design standards, Taxiway A can only be occupied during the arrival of smaller B and III class airplanes, which would restrict its use to most commercial and large aircraft during most landings. The restriction applies to all aircraft on Taxiway A regardless of size and even during visual conditions. At the standard 400-foot offset, taxiway use should be restricted during instrument conditions whenever a D, IV, or V airplane is landing—this removes the majority if impacts during visual arrival conditions, but is still operationally significant. Very few of BHM’s operations would be impacted at 500 feet: the taxiway would need to be clear during the Category-II approach arrival of a D-V (e.g., Boeing 747) airplane.

Takeoffs are less restricted, by those restrictions are still significant at the current 350-foot separation. Table 4 shows the DPRC standards for the current runway-to-taxiway separation of 300 feet and higher.
According to the new departure standard, Taxiway A should be cleared whenever a commercial aircraft (other than a regional jet) is departing; operations by small-medium business jets and turbo-props as well as light general aviation aircraft are unaffected by an aircraft on Taxiway A. Nearly all departures can be accommodated at a 400-foot offset.

### 2.3 Operational Impacts of Existing and Potential Taxiway Restrictions

This section quantifies the operational impacts of existing and potential restrictions not currently in force. In addition to the airport planning and design standards described in Sections 2.1 and 2.2, additional obstacle clearance (OCS) standards are established for each type of instrument procedure. When an OCS is penetrated, the procedure itself is mitigated to provide an equivalent level of safety. This is most typically accomplished by maintaining the separation by increasing the decision altitude or by raising the visibility requirements. FAA Order 8260.3B, *U.S. Standard for Terminal Instrument Procedures*, and related FAA policy documents commonly referred to as TERPS, establish these clearing criteria. The most critical procedure affecting Taxiway A is the missed-approach segment of the Category-II Instrument Landing System (ILS) approach to Runway 6 which allows a decent to 100 feet above the Airport in 1,200 feet of forward visibility. Taxiway A underlies the ‘B’ surface of Missed approach Section. Within the first 3,000 feet (the touchdown zone) of the Runway 6 landing threshold, aircraft having tail heights taller than 41 feet could penetrate the OCS. Therefore, the FAA-approved mitigation authorizing that approach procedure includes a restriction on the use of Taxiway A. The current-approved ALP states the following: Restricted use of Taxiway A during CAT II Operations. Given the limited timeframes Category-II conditions occur, the restriction is limited to fewer than 30 operations per year.

Similarly, the letter of agreement (LOA) that restricts Taxiway A use during operations by ADG-VI aircraft affects fewer than 20 operations per year assuming that a single operation could restrict the flow of 1 to 3 aircraft taxi movements.

The current Notice to Airmen (NOTAM) in effect closes a segment of Taxiway A between Taxiways A2 and A3 to aircraft with wingspans of more than 134 feet which is based on width of the taxiway safety area being correlated with airplane wingspan. Currently, the taxiway safety area is breaking apart 67 feet from the centerline and continued erosion will increase result in increased restrictions on that segment of taxiway. If the safety area erodes away more than 3 feet of safety area, additional restrictions would affect KC-135 tanker aircraft which cross Runway 6/24 because of wingspan restriction on Taxiway H. That aircraft would be required to
back-taxi and turnaround on the runway for departure; operations by A300, A330, B747, and
B777 are already required to backtaxi. Aircraft with shorter wingspans can cross to Taxiway H in
order to access Runway 6. It is a primary interest to reduce runway crossings and backtaxi
operations. The operational impacts are summarized Table 5 based on past activity data and an
assumption that 60% of departures utilize Runway 6.

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boeing 707-300</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Airbus A300</td>
<td>182</td>
<td>185</td>
<td>186</td>
<td>179</td>
<td>180</td>
</tr>
<tr>
<td>Airbus A330</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Boeing 767-300</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Boeing 767-400</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Boeing (Douglas) DC-10</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Boeing 777-200</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Boeing (Douglas) MD-11</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Airbus A340-600</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Boeing 747-300</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Boeing 747-8</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>197</td>
<td>202</td>
<td>197</td>
<td>194</td>
<td>199</td>
</tr>
<tr>
<td>KC-135 (imminent impact)</td>
<td>373</td>
<td>279</td>
<td>399</td>
<td>280</td>
<td>286</td>
</tr>
<tr>
<td><strong>Total (w/ KC-135)</strong></td>
<td>570</td>
<td>481</td>
<td>596</td>
<td>474</td>
<td>485</td>
</tr>
</tbody>
</table>

Source: Enhanced Traffic Management System Counts (FAA) and FAA AC 150/5300-13A, Change 1

BAA is investigating short-term options to contain the operational impact and is seeking a long-
term solution to relocate the taxiway and the creek.

The implications associated with the changed design standards which now identifies specific
operational limitations beyond those identified above. The current standard applied to the
current Taxiway A offset of would impact nearly all of Runway 6 procedures for all aircraft types
and in all conditions. The only operations unaffected are those occurring on Taxiway H for
aircraft operating exclusively on the north side. Because the design standards do not currently
differentiate aircraft position on the taxiway (e.g., outside the touchdown zone area), the
restrictions could restrict Taxiway A use adjacent to the terminal building for takeoffs and
landings in either direction although it seems likely that a modification to design standards could
be obtained outside of the touchdown zone for arrivals. Based on that assumption, 60% of all
activity could be impacted by application of the new standard. Furthermore, it is anticipated that
FAA priority in the coming years will increasingly focus on taxiway configuration and design.
Such an initiative is largely viewed as an outgrowth of compounding efforts by the FAA to
improve runway safety largely through taxiway design modifications.
2.4 Taxiway Alternatives Dismissed

The following alternatives have been identified by the master plan, each having a fatal flaw. The environmental documentation may assess these to a higher degree, although the fatal flaw that eliminated these alternatives will remain significant factors during subsequent investigations.

2.4.1 No Build

The No Build alternative retains the current Taxiway A configuration. This alternative avoids the need to modify Village Creek and complete associated mitigations. Presumably, continued operations will be permitted through the application of rigorous enforcement of operational restrictions on Taxiway A. It also assumes that the FAA allow the existing conditions to remain in place either by approving or re-approving a modification of design standards (MOS). Given that the Airport retains plans for a future parallel runway, it seems unlikely that such a modification will be approved indefinitely given the capacity benefits associated with compliance and elimination of current restrictions. The capacity constraint caused by the current restriction will exacerbate as activity volume increases. Substantial and potentially continuous maintenance will be required to strengthen the eroding sub-base material and safety area surface.

FATAL FLAWS— This alternative does not meet the aeronautical objective of satisfying the FAA design standards. Future restrictions may be imposed as a result of recently changed design standards specifically intended emphasize runway safety.

2.4.2 400’ Separation (Figure 3)

This alternative relocates Taxiway A 50 feet providing a parallel taxiway separation of 400 feet. The relocation would lessen the missed-approach OCS impact, although some operational restrictions would remain. The additional separation does not meet the high speed exit with reverse turn for either TDG-5 or TDG-6 aircraft; under this scenario, the master plan would recommend high speed exit Taxiway A4 be removed or replaced with a standard right-angled exit. A MOS would be required as it does not meet the 500-foot standard for a precision approach having less than ½-mile visibility. Most critically, this alternative does not avoid the need to modify Village Creek, adjacent utility infrastructure, or the the vehicle service road.

FATAL FLAWS— Village Creek and utility impacts similar (or identical to) the fully-compliant alternative. Retains the potential for significant operational restrictions during instrument weather conditions associated with new taxiway design standards.
2.4.3 600’ Separation (Figure 4)

This alternative relocates Taxiway A by 250 feet to provide a parallel taxiway separation of 600 feet. This alternative meets all existing and ultimate separation standards including the recommended standard for high-speed exits. The alternative requires modifications to Village Creek, the vehicle service road, and utilities. In addition, the additional offset, would impact terminal gate push-back operations and the cargo area to require modifications to those facilities and operations. This “over-build” condition does not appear warranted given current and projected activity levels. Additionally, operations by the largest aircraft would likely occur during off-peak conditions where they can be accommodated procedurally while making more efficient use of available property.

FATAL FLAW— Adds significant additional facility and operational impacts beyond Village Creek, utility infrastructure, and vehicle service road modifications not justified by current or projected activity.
2.5 Taxiway Alternatives Considered

The finalist alternatives described in this section will be reviewed and refined in more detail, both similar to the resolution included in the current FAA-approved ALP. Both relocate Taxiway A by 150 feet to a parallel taxiway separation of 500 feet. This will meet the separation standard accounting for precision approaches on Runway 6/24. Each provides adequate separation for the majority of high-speed exit with reverse direction operations. The 500-foot offset also removes the majority of operating restrictions resulting from the new taxiway design standards that could impose significant restrictions during instrument weather conditions. Each also requires modifications to Village Creek, a community-sensitive issue, and requires the relocation of utilities infrastructure, and the vehicle service road. The 500-foot taxiway offset is expected to impact operations at the southwest cargo ramp. The two alternatives differ only in the amount of separation between the taxiway and the adjacent activity areas (e.g., aircraft parking, parallel taxiway/taxilane, and fixed structures).

2.5.1 Alternative 1 – 500’ Separation with ADG V Standards (Figure 5)

Alternative 1 applies an ADG of Group V to establish the apron/building area setbacks associated with Taxiway A for the purpose of providing maximum protection for accommodating the largest aircraft types in the future. Village Creek, the utilities, and the service road would all need to be cleared for a nominally larger area compared to Alternative 2 (below). At Terminal Concourse C, the critical aircraft parked at the far end of the pier would have its tail section positioned 120’ from the edge of relocated Taxiway A TOFA. Push-back from these critical gates could infringe onto the movement area. Should that be the case, the situation would require air traffic control (ATC) coordination. The cargo apron would also have a restricted segment significantly decreasing cargo apron activities which would likely require the relocation of some or all of the cargo activity to a new apron facility located just to the east.

2.5.2 Alternative 2 – 500’ Separation with ADG IV Standards (Figure 6)

Alternative 2 applies a smaller ADG of Group IV to establish the apron/building area setbacks. This alternative is similar to Alternative 1 and would still require the relocation of Village Creek, the utilities, and the service road (albeit to a slightly less extent). Compared to Alternative 1, this alternative provides an additional 30 feet for push-back from the outer Concourse C gates and at the cargo apron. However, it is anticipated that the cargo impact could still require the relocation of some cargo activity to a new apron facility located just to the east.

2.5.3 Master Plan Recommended Taxiway Alternative

The recommended alternative is anticipated to be one of the two above alternatives or a hybrid alternative where Taxiway A may include segments of the taxiway having a higher or lower design classification. The 2011 ALP showed Taxiway A relocated to 500’ separation to meet standards and was conditionally approved by the FAA. Since both alternatives impact the cargo apron, it may be possible to do a partial demolition of the current facilities while constructing a new building at the adjoining east apron.
3.0 VILLAGE CREEK ALTERNATIVES (Figure 7)

With the exception of the No Build alternative, Village Creek and the utilities adjacent to Taxiway A will all be similarly impacted by each of the taxiway improvement options. Village Creek is a resource of particular concern for the community and regulatory agencies and is likely to receive a high degree of public/agency scrutiny. The master plan has identified Village Creek as an item to be resolved in order to enhance the Airport in terms of security, wildlife attractant, drainage, maintenance concern (and on-airport development influence/constraint). Since a portion of Village Creek will be impacted by any of the taxiway development options, it is recommended that a more comprehensive identification and analysis of alternatives be initiated.

The Village Creek alternatives fall into two primary “schools of thought” with each alternative identified here representing a range of similar types of alternatives: narrow (Alternative 1) and broad (Alternative 2). The alternatives presented below are example alignments intended to identify the range of options to be vetted as part of a NEPA-compliant environmental assessment. Alternative 1 modifies the creek and utility corridors adjacent to Taxiway A only to the extent necessary to accommodate the taxiway relocation. Alternative 2 relocates the creek off-airport providing a new stream alignment. This report identifies two potential alignment options both moving the stream alignment to the east and south of the Airport.

3.1 Narrow Range [On-Airport] Alternatives

This set of alternatives involve some combination of shifting that portion of Village Creek at the critical segment of Taxiway A further to the southeast similar to the alignment depicted on the current ALP and/or culverting it. In addition to the modifications to Village Creek, a portion of utility infrastructure will be re-routed nearby. Based on limited space available for stream and utility relocation, it is anticipated that the majority of the creek area in the vicinity of Taxiway A will be culverted. An important design element is the slope of the creek to ensure continued flow at various levels of water volume.

The pros of this alternative include:

- Resolves Taxiway A safety area and sub-base impacts.
- Culverted sections reduce wildlife attractant considerations.
- Limits the total extent of the direct impact to the current stream channel but reduces open aquatic environment for the directly impacted sections. This approach could result in the shortest implementation schedule for construction activities.
- Provides additional protection from airport operation impacts to water quality in the creek since it will be enclosed instead of open
- No off-airport channeling impacts would be required
The cons of this alternative include:

- Does not fully resolve airport operational concerns related to security and maintenance.
- On-airport creek location to remain an airport feature influencing/constraining development indefinitely.
- There is limited vertical separation available to accommodate the required water-flow capacity. For this reason, culverting is anticipated over channeling although vertical separation and potential culvert height are anticipated design challenges at this location.
- Culverting, as opposed to channeling, includes more complicated mitigation/design measure to maintain the quality of the aquatic environment and stream habitat.
Currently, Village Creek has impacts associated with sediment loading and is scheduled for Total Maximum Daily Load (TMDL ADEM’s 303(d)list) development to address reductions. If Village Creek remains in the current configuration, stream enhancements will be required outside of the locations directly impacted by the taxiway relocation. The cross-section of the stream channel may require significant modification to meet water quality requirements. Addressing the reconfiguration on-airport may require significant changes to existing utilities to accommodate stream flows and taxiway separation.

- Construction activities would result in greater potential for increased sediment loading and impact to airport operations during the construction period that would require strict adherence to best practices and potential monitoring during construction.

- Construction would cause some operational disruption.

- Stream channel remaining in close proximity to the airfield operation would result in higher risk of stream impacts for accidental releases and allow less response time for mitigation of downstream impacts.

- The water capacity associated with enclosing the creek in a box culvert may produce greater environmental consequences on the Airport (flooding, surcharge line, etc.) and downstream (additional erosion and habitat impacts) from higher velocity discharges when exiting the culvert.

- Community/ agency anticipated to favor open channel over culvert.

The associated relocation of Village Creek and the Infield Service Road will impact a number of existing utility lines. A 36-inch diameter water main crosses the airfield from East Lake Boulevard to Village Creek, and then crosses Village Creek before turning south and splitting into two 24-inch diameter water mains. A large diameter sanitary sewer trunk line runs parallel to and along the south and east sides of Village Creek throughout the airport property. The trunk line is 48 inches in diameter south of the terminal building, increases to 54 inches in diameter as it runs parallel to Taxiway A, and then increases to 60 inches in diameter as it runs south towards the newer cargo apron. The relocations will also potentially impact active gas lines and telephone lines (fiber optic cables) located in 50th Street North. Utility lines being relocated in parallel with Taxiway A will not require new right of way or additional property to be acquired by the BAA and can be reconnected at their upstream and downstream tie points. These utilities can be relocated ahead of the taxiway, creek, or service road construction.

Storm drainage from the airfield and the Kaiser site discharge at several locations along Village Creek within the limits of the proposed relocation. These pipes, culverts and channels must be considered in the new design.
Modifications to the Kaiser site lease limits made to accommodate the relocation of Taxiway A will need to include the relocation of Village Creek, the Infield Service Road and the utility relocations. Potential impacts to the former administration building located southwest of Taxiway A and the defueling station located south of Village Creek will need to be analyzed. Security fencing and concrete barrier rail for the existing Infield Service Road were placed based on the required wingtip clearance for a KC-135 being towed into the defueling stations.

Alternative refinements to consider include relocating some or all utilities away from existing airfield pavement, particularly relocating the water main to the west end of Runway 6/24. An 8-inch blow off valve for the 36-inch water main that crosses the airfield from East Lake Boulevard to Village Creek was leaking under the shoulder of Taxiway A. This line was installed in the 1950s and is very shallow. A more significant rupture to this line could result in the loss of pavement affecting Runway 6/24, Taxiway A, and Taxiway H with the potential to severely disrupt airport operations.

3.2 Off-Airport Alternative

Alternative 2 relocates the creek entirely off airport property. Two preliminary routes were identified for off-airport relocation of Village Creek. The environmental investigations would need to further explore such alternatives to determine feasibility for implementation. Both of the realignment routes would pick-up Village Creek on the northeast side of the Airport and direct the flows south eliminating the main channel flow currently crossing under the Airport. The realigned channel would intersect the current Village Creek channel southeast of the Airport.

The pros of this alternative include:

- The off-airport location of the stream provides the opportunity to maintain and improve the current aquatic environment. The relocation also reduces risk of future impacts to the stream from operations occurring at the Airport and establish greater buffer for response and mitigation of any release.
- Relocation would provide a greater separation from wildlife habitat and aircraft.
- Relocation would provide for greater flood reduction and control opportunities.
- Relocation off-airport eliminates potential airfield access points improving security.
- Relocation could be conducted with limited impact on airport operations.
- Eliminates airport development constraints/influences associated with the creek.
The cons of this alternative include:

- The implementation time for construction would be greater than on-airport options.
- Implementation cost would be greater.
- The feasibility to implement an extensive rerouting of the creek is not known and must be determined through preliminary design investigations conducted as part of the environmental review.

Should the main channel of Village Creek be relocated off airport property, utility impacts will need to be analyzed along the proposed routes. These utilities can be relocated ahead of the creek construction.

The proposed orange route running along the west side of I59/20 and turning west at Aviation Avenue has potential impacts to existing power lines, phone lines, gas lines, cable television, water lines and sanitary sewer lines east of 65th Street. The overall impact may be minimized with additional acquisitions of homes in this area. No utilities are located within Aviation Avenue between I-59/20 and Messer Airport Highway. Messer Airport Highway and 50th Street North have water, sewer, gas, phone and power. Sanitary sewer lines and gas lines follow the old rail bed west of 50th Street North.

The proposed pink route running along the west side of I59/20 and turning south and west to follow the route of the existing channel through Forest Hill Cemetery has potential impacts to existing power lines, phone lines, gas lines, cable television, water lines and sanitary sewer lines east of 65th Street and east of the cemetery. The overall impact may be minimized with additional acquisitions of homes east of 65th Street. A water line and a sanitary sewer line cross the existing channel on the west side of the cemetery and again south of 15th Avenue and east of 50th Street. Messer Airport Highway and 50th Street North have water, sewer, gas, phone and power. Water and sewer lines cross the existing channel behind the industrial buildings on 50th Street before the tie to the main channel.

3.3 Master Plan Recommended Creek Alternative

The master plan is anticipated to recommend a comprehensive resolution to Village Creek. The airport’s desired outcome is to reduce the operational impacts and development constraints that the creek has on the airport either through relocating it off airport or culverting the on-airport portion of the creek. Any modification to the creek would likely benefit from a full exploration of potential options available.
4.0 ENVIRONMENTAL ASSESSMENT RECOMMENDATION

It is anticipated, that the National Environmental Policy Act (NEPA) document will be undertaken as an Environmental Assessment (EA) sponsored by the Birmingham Airport Authority (BAA). Although there is a possibility that a subsequent Environmental Impact Statement (EIS) may result, an EA is recommended for two primary reasons:

- FAA interest in conducting an EIS, which would require a significant amount of staffing resources of that agency, may be low compared to other airport environmental priorities nationwide.

- An EA would allow improved airport-city-agency partnering that would be advantageous to the interests in terms of resulting in mutually agreeable results, obtaining funding support, and in terms of project initiation and completion schedules.

Key points affecting the time, level of effort, and cost for the EA include: initiation and sequencing, process and approach, the significance of Village Creek as a critical resource, and order of magnitude EA preparation costs.

4.1 EA Initiation and Sequencing

Initiating the EA process while the master plan is in its formative stages is advantageous because the master plan will help inform the technical input needed for the EA (e.g., scoping and level of alternative analysis needed); establish initial dialogue with key agencies, organizations, and communities that will lay a foundation and subsequent expectations for the EA process providing a smoother transition with fewer surprises; and will speed the total time needed to implement changes by up to one year. This is important given the amount of continuous effort needed just to maintain the status quo, how significantly Village Creek influences BHM’s developmental pattern, and the ongoing progress being made around the Airport on other significant watershed planning activities that will ultimately need to interrelate. For example, the City of Birmingham’s Floodplain Management Team is assessing changes to Village Creek and its relationship with East Lake, located just northeast of the Airport; that planning effort is anticipated to complete by the end of 2015.
4.2 EA Process and Desired Approach

In keeping with the FAA’s best practices for preparing NEPA documents, BHM would use the following five-step approach to compile relevant information and to address emerging issues at key intervals during the process by providing opportunities for interim reviews and decision-making as the EA project progresses and new information becomes available. The five steps are:

- Early Project Planning
- Impact Analysis and Assessment
- Prepare the Draft EA
- Public Involvement
- Prepare the Final EA

This proven approach divides the NEPA process into smaller, more manageable tasks and ensures that no part of the process proceeds without input and direction from the FAA and other agencies involved.

4.2.1 Early Project Planning

The first step in the process is to describe the proposed project, prepare a statement of purpose and need, identify reasonable alternatives, and to outline the scope of the Environmental Assessment (EA). These efforts would largely evolve from and be coordinated with the master plan process that will be identifying and assessing alternatives and gathering stakeholder input. By initiating the EA early, more emphasis can be dedicated to identifying the data gaps and additional analytic details to be included in the EA scope. At the conclusion of Step 1, BHM would summarize the work performed in a technical memorandum outlined as follows:

- Project-Related Information
- Functional Requirements
- Statement of Purpose and Need
- Project Definition
- Alternatives Screening
- Issues and Constraints
- Summary of Scoping Comments

It should be noted that much of the information outlined in Early Project Planning is already contained within this White Paper report, including the identification of a range of alternatives and engineering support to confirm the master plan’s recommendation, specifically:

- Identification and screen of Taxiway A Offsets: 400, 500, and 600 feet
- Narrow range creek modification alternatives: relocate, culvert, and hybrid.
- Off-airport creek modifications: up to 3 primary routes
4.2.2 Impact Analysis and Assessment

After Step 1 is complete, the next step is to identify and describe the short-term and long-term environmental impacts of the Proposed Action and mitigation measures that can be taken to avoid or minimize potential harm. Generally, the requirements and procedures to be used for each resource impact category would follow FAA Order 1050.1E, Environmental Impacts: Policies and Procedures (Appendix A), and the nature and extent of the work performed would be commensurate with the importance of each impact category. To this end, it is expected that three special purpose laws would require substantial treatment in the EA; they are:

- Clean Water Act (water quality and wetlands)
- EO 11988, Floodplain Management (flood hazard areas)
- Fish and Wildlife Coordination Act (fish, wildlife and plants)

In addition, several other impact categories are also expected to require substantial treatment in the EA; they are:

- Compatible Land Use (not related to noise)
- Construction Impacts (including air emissions and water quality)
- Cumulative effects (history, nature and extent of development impacts on the stream)

For the other remaining impact categories, desktop research of existing published information should be sufficient to meet the requirements. No other environmental issues or concerns are apparent at this time and no detailed analysis of other impact categories is anticipated.

4.2.3 Preparation of the Draft EA

If there are no obvious significant environmental impacts that cannot be reasonably avoided, and if the FAA decides to continue on with the EA, the third step in the process is to prepare the Draft EA report and circulate the document for public review and comment. Step 3 deliverables would include:

- Prepare a Preliminary Draft EA
- Prepare and Circulate the Draft EA
- Public Notice of Availability and Advertising
4.2.4 Stakeholder Group and Community Participation

BHM would be proactive and take approach to public participation in the EA process including soliciting comments, advertising, holding at least one public information session specific to Village Creek, and conducting special interest meetings and a formal public hearing (if required).

After the comment period closes, BHM would address substantive comments and compile all the comments and responses to be placed in the Final EA.

4.2.5 Prepare the Final EA

Taking into consideration the findings of the Draft EA, and agency and public comments, the Final EA would be prepared at which point the FAA must then decide whether to issue a Finding of No Significant Impact (FONSI) or to prepare an Environmental Impact Statement (EIS). This step includes the following:

- Prepare the Preliminary Final EA
- Provide technical assistance to FAA staff preparing the environmental decision
- Distribute the Final EA

4.3 Village Creek as a Critical Resource

Alabama’s waterways are famous worldwide for the diversity of wildlife they support. Indeed, the state has more types of crayfish, fish, snails, and mussels than any other state in the nation. Many of the species unique to Alabama are found in the streams in and around Birmingham. Village Creek is part of the Locust Fork Watershed, which is part of the Black Warrior River Watershed, which is part of the Mobile River Basin. Water from Village Creek ultimately flows to the Mobile River and finally to the Gulf of Mexico.

When Birmingham was first settled, Village Creek provided water for the city. As the city grew, much of the creek’s watershed was paved over, and it was also used for disposal of industrial waste and other sources had to be tapped to supply drinking water. More recent efforts have been placed on restoring the creek. The Airport is often perceived as a source of contamination. That perception is an important aspect for any BHM project, particularly one that will require a modification to the creek itself, as is the case for the relocation of Taxiway A needed to meet safety standards and to remove burdensome operational restrictions.
4.4 EA Preparation Budget

The initial estimate of the cost to perform the EA described previously is $1,000,000, which could increase or decrease depending on scoping input obtained during the master planning process and also via scoping input from the FAA and the Army Corps of Engineers. Additional potential costs not covered in this estimate include, but are not necessarily limited to, the following: additional creek alternatives or significant alternative refinements not yet identified or otherwise evaluated; detailed analysis of other impact categories not anticipated to be necessary; having to conduct significantly more extensive public outreach efforts (e.g., three or more public meetings); unforeseen mitigation requirements; and a higher than assumed level of controversy that significantly prolongs the EA process.