



**LEGEND**

- Airport Property Line
- Runway Safety Area (RSA)
- Object Free Area (OPA)

**DECLARED DISTANCE OPTION 1a**

**DISPLACE RUNWAY 31 THRESHOLD BY 97'**

- Considers RSA Limiting Factor
- No runway extensions

	RUNWAY	
	13	31
TORA	6,451'	6,451'
TODA	6,451'	6,451'
ASDA	5,958'	6,451'
LDA	5,958'	6,354'

Note: Runway displacement provides 600' RSA prior to landing Runway 31

**KEY**

- TORA: Take-Off Runway Available
- TODA: Take-Off Distance Available
- ASDA: Accelerate-Stop Distance Available
- LDA: Landing Distance Available

SCALE IN FEET  
 DATE OF AERIAL:  
 May-2011

Option 1a also proposes changes to Runway 31 declared distances. The RSA required prior to landing is only 600 feet versus the required 1,000 feet beyond the far end of the runway. Runway 31 currently provides 507 feet of RSA prior to the landing threshold and the full 1,000 feet of RSA beyond the far end of the runway. Thus, Option 1a only considers reducing the LDA distance via a displaced threshold. As depicted on Exhibit 4G, the landing threshold would be displaced by 97 feet so as to provide 600 feet of RSA prior to landing (507 feet of existing RSA plus 97 feet of displaced threshold). Thus, the declared distances for Runway 31 would remain 6,451 feet for TORA, TODA, and ASDA. The LDA would be reduced by 97 feet for a total of 6,354 feet. It should be noted that displacing the threshold could trigger the need to relocate the ILS glideslope antenna. Costs for relocating the glideslope antenna can vary widely with a low of \$500,000 to more than \$1.0 million as each site can vary widely. Any displacement options to follow will have to include the potential need to relocate the glideslope antenna.

As outlined above, this option would not mitigate for the incompatibilities in the RPZs. The Runway 13 RPZ would still extend off airport property and cover four commercial uses. The Runway 31 RPZ would shift 97 feet to the northwest and would still extend beyond airport property to include five commercial and ten residential properties.

It should also be noted that any displacement to Runway 31 could prohibit the use of the lead-in light system. The existing lead-in light system is somewhat simplistic and may not be capable of being placed in-pavement. Without the lead-in light system, the visibility minimums

for the instrument landing system (ILS) instrument approach procedure to Runway 31 would likely be raised from  $\frac{3}{4}$ -mile to not lower than one mile. It is believed that the approach minimums should be maintained at  $\frac{3}{4}$ -mile as the airport is commonly frequented by business jet aircraft and is an FAA reliever airport. As such, any displacement scenario presented herein will also consider the installation of a medium intensity approach lighting system (MALS). Depending on the amount of Runway 31 displacement, some of the MALS lights will need to be placed in-pavement which increases the cost of the system. An estimate of \$1.0 million has been included to install MALS units with in-pavement lights.

#### RSA Declared Distance Option 1b

The second RSA declared distance option utilizes the very same methodology as in Option 1a; however, it considers the potential for the FAA to also require that the full OFA be provided. Due to the angular property line through the OFA and RSA, the southeastern corner of the OFA is impacted at 475 feet from the runway threshold versus 507 feet for the RSA. As a result, instead of the 493-foot limitations placed on the declared distances proposed in Option 1a, this alternative would need to factor a 525-foot limitation.



Under Option 1b, the TODA and TORA for both runway ends would remain the current pavement length of 6,451 feet. As depicted on Exhibit 4H, the 525-foot limitation would require a reduction of the Runway 13 ASDA and LDA to 5,926 feet. This option also requires a greater runway displacement on Runway 31 of 125 feet to allow for the full 600 feet of OFA prior to the landing threshold (only 475 feet of OFA is currently available). As a result, the Runway 31 LDA would be reduced to 6,326 feet. All other declared distances on Runway 31 would remain at 6,451 feet.

The Runway 13 RPZ would remain in its present condition under this option. The Runway 31 RPZ would be shifted to the northwest by 125 feet and would still extend beyond airport property and cover four commercial and ten residential properties.

#### RSA Declared Distance Option 2a

The next RSA declared distance option considers the potential negative impacts of reducing runway distance as put forth in Options 1a and 1b. The reduction in operational length declared available for Runway 13 is critical as the airport experiences winds from the south more than 70 percent of the year. As a result, Runway 13 is utilized far more than

is Runway 31. Thus, reducing the ASDA for Runway 13 below 6,000 feet would pose significant operational and economic impacts on airport users and businesses described in RSA Alternative C – Decrease Runway Length. Thus, RSA Option 2a proposes similar limitations on the southeast end of the runway but includes pavement extensions at the northwest end of the runway.

In RSA Option 2a, the northwest end of the runway is proposed to be extended by 535 feet. This is the maximum extension to the northwest that would allow for the full RSA and OFA north of the extended runway pavement. As depicted on Exhibit 4J, the proposed extension would place the northeastern corner of the OFA at the airport property line. Similar to RSA Declared Distance Option 1a, the landing threshold for Runway 31 would need to be displaced by at least 97 feet to meet the 600-foot RSA prior to threshold requirements.

The associated declared distance calculations for this option are presented on Exhibit 4J. Of note, the 535-foot extension would allow Runway 13 to provide nearly 6,500 feet of ASDA and LDA which is a much better alternative than Options 1a and 1b. Moreover, northerly departures and landings would have increased length available with 6,986 feet of ASDA and 6,889 feet of LDA available. The TORA and TODA would be 6,986 feet for both runways as long as the FAA allows for the RPZs to extend over incompatible uses.

As shown on the exhibit, the 535-foot northerly extension would also shift the Runway 13 RPZ 535 feet to the north. The newly shifted RPZ would extend 13 acres beyond current airport property and would encompass 13 commercial units and eight residential

units. Obviously, this RPZ shift would significantly increase the incompatible uses in the Runway 13 RPZ. The Runway 31 RPZ would be the same as that proposed in RSA Option 1a.

Another important note for this option is the proposed costs associated with a northerly extension. The land northwest of the runway pavement is relatively flat as it has been improved to meet current RSA standards. The area northwest of Taxiway B, however, is not. Approximately 200 feet north of the Taxiway B pavement extended centerline, the topography drops 10 feet. The terrain drops sharply to the east from this point in support of a drainage channel. Costs associated with extending the runway pavement would be relatively typical; however, costs associated with extending parallel Taxiway B would be much greater than typical. The runway pavement extension has been estimated to cost \$2.4 million. Extending Taxiway B to the proposed runway end was estimated to cost another \$1.5 million. A final factor to consider would be the need to relocate the localizer antenna outside of the RSA which could cost approximately \$500,000. The installation of a MALS is estimated at \$1.0 million. Thus, the total cost of extending the runway 535 feet to the north, including the extension of Taxiway B, is estimated at \$5.4 million.

#### RSA Declared Distance Option 2b

Option 2b is the same as Option 2a with the exception of the Runway 31 displaced threshold. As considered in Option 1b, the FAA could require the full OFA to be provided at the south end of the runway. Thus, this option proposes a 125-foot displacement of the Runway 31 threshold instead of 97-foot displacement proposed in Option

2a. The resultant declared distances and a depiction of the improvements are presented on Exhibit 4K. The costs of extending the runway and the RPZ shift for this option are the same as the preceding Option 2a.

#### RSA Declared Distance Option 3

The third declared distance option considers the maximum runway length which can be provided in a conventional manner while using declared distances. This option proposes a 685-foot northwesterly extension which would shift the northern RSA to the current property line. This option would only be feasible if the FAA would agree to allow the OFA to be non-standard. If the northern OFA is allowed to be non-standard, then it would follow that the southern OFA could be as well. Thus, Option 3 would only propose a 97-foot displacement of Runway 31.

The benefits achieved by Option 3 are obvious. The resultant ASDA and LDA on Runway 13 would be 6,643 feet, nearly 100 feet more than currently exists. Moreover, the Runway 31 ASDA and LDA would exceed 7,000 feet at 7,136 feet and 7,039 feet, respectively. RSA Declared Distance Option 3 is depicted on Exhibit 4L.

The negative aspects of this alternative are also obvious. The costs associated with extending the runway 685 feet to the north have been estimated at \$2.917 million. The costs to extend Taxiway B to the proposed runway end are estimated at \$1.72 million. Installation of a MALS is estimated at \$1.0 million. Finally, the localizer antenna would need to be relocated at an estimated \$500,000. Thus, the total costs associated with extending the runway and taxiway are estimated



**LEGEND**

- Airport Property Line
- Runway Safety Area (RSA)
- Object Free Area (OFA)

**DECLARED DISTANCE OPTION 1b**

**DISPLACE RUNWAY 31 THRESHOLD BY 125'**

- Consider OFA Limiting Factor
- No runway extensions

	RUNWAY	
	13	31
TORA	6,451'	6,451'
TODA	6,451'	6,451'
ASDA	5,926'	6,451'
LDA	5,926'	6,326'

Note: Runway displacement provides 600' OFA prior to landing Runway 31

**KEY**

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- ASDA: Accelerate-Stop Distance Available
- LDA: Landing Distance Available

NORTH

SCALE IN FEET

DATE OF AERIAL: May - 2011



## LEGEND

- Airport Property Line
- Runway Safety Area (RSA)
- - - RSA with Runway Extension
- Object Free Area (OFA)
- - - OFA with Runway Extension
- █ Ultimate Airfield Pavement

## DECLARED DISTANCE OPTION 2a

## DISPLACE RUNWAY 31 THRESHOLD BY 97'

- Considers Runway 31 RSA Limiting Factor
- Considers Runway 13 OFA Limiting Factor
- Extends Runway NW 535'

## RUNWAY

	13	31
TORA	6,986'	6,986'
TODA	6,986'	6,986'
ASDA	6,493'	6,986'
LDA	6,493'	6,889'

Note: Runway displacement provides 600' RSA prior to landing Runway 31

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- LDA: Landing Distance Available



DATE OF AERIAL: May - 2011



- LEGEND**
- Airport Property Line
  - Runway Safety Area (RSA)
  - RSA with Runway Extension
  - Object Free Area (OFA)
  - OFA with Runway Extension
  - Ultimate Airfield Pavement

**DECLARED DISTANCE OPTION 2b**

**DISPLACE RUNWAY 31 THRESHOLD BY 125'**

- Considers Runway 31 OFA Limiting Factor
- Considers Runway 13 OFA Limiting Factor
- Extends Runway NW by 535'

	RUNWAY	
	13	31
TORA	6,086'	6,086'
TODA	6,086'	6,086'
ASDA	6,461'	6,086'
LDA	6,461'	6,861'

Note: Runway displacement provides 600' OFA prior to landing Runway 31

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  - LDA: Landing Distance Available





## LEGEND

-  Airport Property Line
-  Runway Safety Area (RSA)
-  RSA with Runway Extension
-  Object Free Area (OFA)
-  OFA with Runway Extension
-  Ultimate Airfield Pavement

## DECLARED DISTANCE OPTION 3

## DISPLACE RUNWAY 31 THRESHOLD BY 97'

- Considers Runway 31 RSA Limiting Factor
- Considers Runway 13 RSA Limiting Factor
- Extends Runway NW 685'

	RUNWAY	
	13	31
TORA	7,136'	7,136'
TODA	7,136'	7,136'
ASDA	6,643'	7,136'
LDA	6,643'	7,039'

Note: Runway displacement provides 600' RSA prior to landing Runway 31

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