DMW

Airport Master Plan Update
Report and Appendices

Carroll County Regional Airport
Westminster, Maryland

Prepared for:
Carroll County

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DELTA AIRPORT CONSULTANTS, INC.

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Chapter One
Forecast of Aviation Demand

This chapter includes aviation activity forecasts for the Carroll County Regional Airport (DMW) over the 20-year planning horizon (2013-2033). Forecasts of aviation demand are a key element in all airport planning. Ultimately, they form the basis for future demand-driven improvements at DMW; provide data used to estimate future off-airport impacts such as noise and traffic; and provide a basis for determining the type, size, and timing of aviation facility development. Consequently, these forecasts influence virtually all phases of the planning process.

The Federal Aviation Administration (FAA) projects future aviation activity at airports through its Terminal Area Forecast (TAF) which forecasts aviation activity 20 years into the future and is updated annually. The general requirement for FAA approval of the Master Plan Study Forecast is that it is supported by an acceptable forecasting analysis and is consistent with the TAF. An airport sponsor may request changes to the published TAF provided sufficient justification and rationale is provided.

Major sections of this chapter include:

- Purpose
- Aviation Demand Elements
- National and Local Aviation Trends
- Forecast Framework
- General Aviation Demand Forecasts
- Airport Reference Code
- Critical Aircraft
- Aviation Demand Forecast Summary

Forecasts were developed on an unconstrained basis for short, intermediate, and long term planning timeframes. These timeframes correspond to the following years:

- Short Term: 2013 - 2018
- Intermediate Term: 2019 - 2023
- Long Term: 2024 - 2033

1.1 PURPOSE

The aviation demand forecasts serve many purposes in the development of a master plan. These include:

- Facility Requirements Determination
- Runway Length Analysis
- Noise Analysis
- Compatible Land Use Analysis
- Cost Estimates/Summary of Funding Sources

1.2 AVIATION DEMAND ELEMENTS

Forecasts of aviation demand can be developed for numerous aviation demand elements. In the case of DMW, the primary demand elements focus on general aviation activity such as based aircraft and operations. For this study, aviation activity forecasts were prepared for the following aviation demand elements:

- ***Registered Aircraft:*** Defined as being either fixed or rotary wing aircraft, operated in non-airline service with a current registration.
- ***Based Aircraft:*** Defined as a general aviation aircraft which is stationed at an airport on a permanent basis. Forecasts were prepared for based aircraft and the based aircraft fleet mix.
- ***General Aviation Aircraft Operations:*** This type of operation is either a takeoff or a landing of a general aviation aircraft. Forecasts were prepared for total annual operations; local operations versus itinerant operations; operations per aircraft type; and peak period operations (i.e., monthly, daily and hourly).
- ***General Aviation Enplaned Passengers***: Defined as air travelers who have boarded departing general aviation aircraft.

The level of future military operations (either a takeoff or a landing of a military aircraft) is a function of Department of Defense policy and Congressional spending. Without a clear knowledge of this future policy or Congressional budget levels, it was assumed that future military operations at DMW would continue at 2013 levels. The FAA 5010 Master Record reports 90 military operations at DMW in 2013.

1.3 NATIONAL AND LOCAL AVIATION TRENDS

The FAA Aerospace Forecast for Fiscal Years 2013-2033 concedes that the sluggish growth of the United States (U.S.) economy has diminished the growth potential for general aviation in the short term; however, the forecast anticipates growth in the long term as U.S. economic activity improves, especially in the turbo jet, turboprop, and turbine rotorcraft markets. The FAA projects that the active general aviation fleet will increase from 220,670 units in 2012 to 246,375 units in

2033, representing an annual growth rate of 0.5 percent. The FAA further expects that the number of single and multi-engine piston aircraft will decrease during the next 20 years while turbo jet and rotorcraft aircraft will grow. This shift in the overall mix of piston-engine aircraft to turbo jet is also reflected in FAA's forecast of the number of hours flown by aircraft type. The FAA anticipates that the number of hours flown by general aviation aircraft will increase by 1.5 percent per year with turbine powered aircraft flight hours increasing 3.3 percent per year from 8,649 hours (in thousands and estimated) to 17,141 hours (in thousands) in 2033. Piston aircraft activity during this same period is expected to decrease from 14,205 hours (estimated and in thousands) in 2012 to 13,511 hours (in thousands) in 2033.

Specific to DMW, **Table 1-1** outlines FAA's forecast of aircraft operations and based aircraft for the period 2013-2033. The FAA projects no growth in operations or in based aircraft throughout the entire forecast period.

Table 1-1: FAA Terminal Area Forecast for DMW

Year	Air Carrier Operations	Air Taxi/Commuter	General Aviation	Military	Total Operations	Based Aircraft
2012[1]	0	500	68,460	90	69,050	97
2013	0	500	68,460	90	69,050	97
2018	0	500	68,460	90	69,050	97
2023	0	500	68,460	90	69,050	97
2033	0	500	68,460	90	69,050	97
% Change 2013-2033	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**

Source: FAA-TAF for DMW 2013-2033, Forecast Issued January 2013

[1]Represents FAA Estimate of Actual Activity

1.4 FORECAST FRAMEWORK

The framework for this forecast was based upon the development of a consensus or likely set of forecasts of demand, accompanied by potential adjustments (up or down) resulting from changes to basic assumptions of the likely forecast. A 20-year forecast of aviation demand carries inherent uncertainties about the future, which grow as the timeframe extends further from the base year. For this reason, a number of projections were developed which used different methods of prediction. Some methods were based upon local socioeconomic factors; others were based on national forecasts; and others used historical trends. The benefit of using a variety of projection methods occurs when the results show a forecast consensus (i.e., if a number of projections all point in the same direction, greater confidence is gained in the resulting forecast). To achieve a forecasting consensus, all projection methods employed traditional means of extrapolating historical aviation trends at DMW or its airport service area into future time frames. The airport service area for general aviation demand was assumed to be Carroll County, Maryland.

Table 1-2 presents a summary of the historical and forecast socioeconomic variables from Carroll County used in developing the general aviation forecasts for DMW.

Each of the three socioeconomic sectors in **Table 1-2** shows growth since 2004. Most striking is the over 24 percent increase in per capita personal income (PCPI), which has grown from $36,657 in 2004 to $45,507 in 2011.

Table 1-2: Service Area Socioeconomic Variables			
Year	**Population[1]**	**Employment[1]**	**PCPI (Income)[1,3]**
2004	163,915	76,607	$36,657
2005	165,519	80,271	$38,431
2006	166,950	82,286	$40,559
2007	167,390	84,557	$42,050
2008	167,433	85,279	$44,084
2009	167,028	82,512	$43,184
2010	167,247	81,836	$43,727
2011	167,288	83,126	$45,507
% Change 2004-2011	**2.1%**	**8.5%**	**24.1%**
Forecast[2]			
2012	168,680	84,897	$47,019
2013	169,454	86,232	$48,190
2018	178,560	92,140	$54,044
2023	188,820	96,580	$59,898
2033	203,140	102,300	$71,606
% Change 2012-2033	**20.4%**	**20.5%**	**52.3%**

Source: [1]Regional Economic Information System (REIS) U.S. Department of Commerce, Bureau of Economic Analysis, September 2013 for Historical Data
[2] Population and employment projections from Maryland Department of Planning, March & June 2012; Delta Airport Consultants, Inc. projections for PCPI
[3] PCPI – Per Capita Personal Income

As mentioned previously, several specific forecasting methods were used for the different aviation demand elements. These forecasting methods are described in more detail below:

Market Share Projection: Market share projections are developed by calculating historical shares of activity at DMW and projecting these respective shares into future time frames. This method of projection reflects demand based upon trends occurring in the service area and the entire U.S. Market share projections reflect historical trends and may include static (constant) or dynamic (increasing or decreasing) future market shares. It is essentially a “top-down” method of forecasting where other forecasts of activity for larger areas are used as drivers of the local share of that demand. Socioeconomic and per capita projections, on the other hand, are considered “bottom-up” methodologies and are based upon local factors.

Socioeconomic Regression Analysis: Socioeconomic regression projections are based upon an assumed causal relationship between population, income, or employment and the aviation activity in a particular area. This projection of demand is obtained by relating socioeconomic data via regression analysis to aviation activity. The resulting set of regression equations, coupled with independent projections of future socioeconomic data, produces a projection of aviation activity.

This forecast utilized population, PCPI, and employment statistics as the independent socioeconomic variables. Data from the U.S. Department of Commerce, Bureau of Economic Analysis were used to establish historical trends. Projections of population and employment through 2033 were obtained from the Maryland Department of Planning. PCPI projections were created using a separate regression analysis. The resulting PCPI projections indicate an Average Annual Growth Rate of 2.02 percent through 2033, compared to the historical Annual Average Growth Rate of 3.14 percent.

Socioeconomic Regression Analysis was used in forecasting general aviation registered aircraft.

Trend Analysis: Trend projections use historical data to formulate predictions of future activity. For this study, two trend analysis methods were used to project aviation activity: *double exponential smoothing* and *least squares linear trending*.

The *double exponential smoothing* process produces projections by combining the forecast for the previous period with an adjustment for past errors. It is desirable to correct for past errors when the error has resulted from changes in the trend. In this case, correcting for past errors will enable the development of a more realistic forecast. Double exponential smoothing is appropriate when the time series contains a linear trend. It acts by calculating two smoothed series - a single and a double smoothed value. Both will lag behind any trend. However, the difference between them indicates the size of the trend. This difference is used to adjust the forecast for the trend.

The second trend method used was *least squares linear trending*. This method uses aviation activity regressed against time to produce a projection. No assumptions about the causes of trends are included in the trending methodology.

1.5 GENERAL AVIATION DEMAND FORECASTS

The forecasts of general aviation demand which have been developed for DMW are listed below and are presented in the following sections:

A) Registered Aircraft Forecast

B) Based Aircraft Forecast
   - *Based Aircraft Fleet Mix*

C) Annual General Aviation Operations Forecast
   - *Local versus Itinerant*
   - *General Aviation (GA) Operational Fleet Mix*
   - *GA Operational Peaking Characteristics*

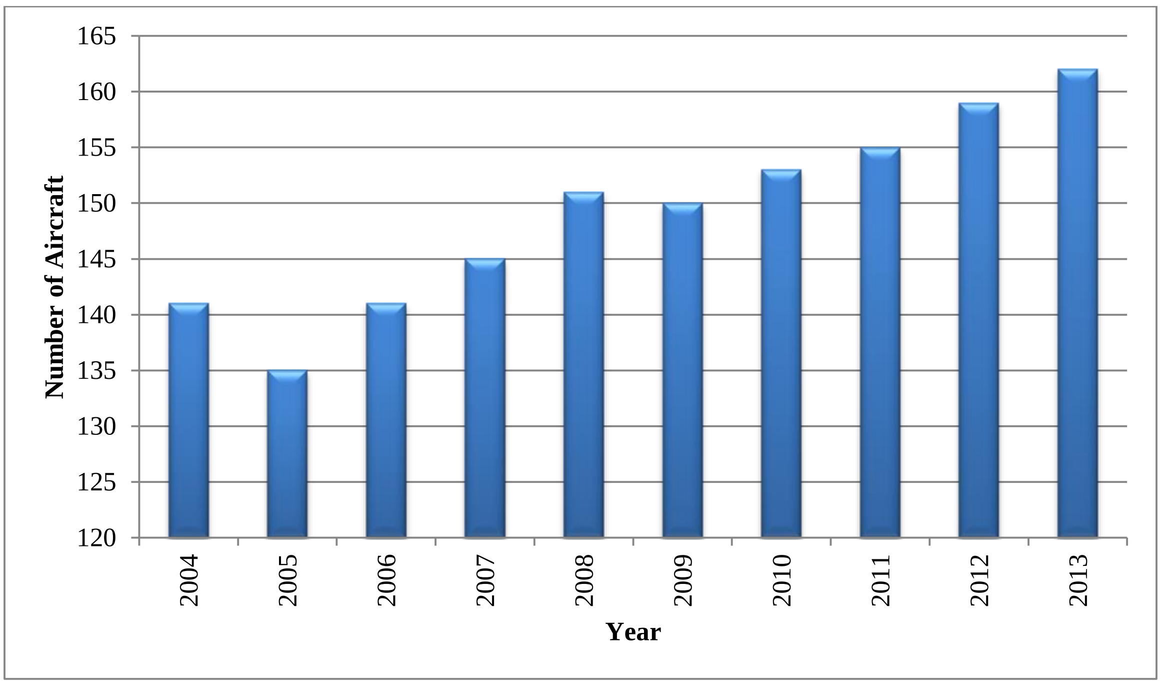
D) General Aviation Enplanements

A) Registered Aircraft Forecast

A registered aircraft is defined as being either fixed or rotary wing, operated in non-airline service with a current registration. The number of aircraft based at DMW is dependent, in part, upon the nature and magnitude of aircraft ownership in the service area surrounding the airport. As mentioned, the airport service area for general aviation users is Carroll County, Maryland.

Historical information used to develop the registered aircraft forecast is based on aircraft information by type for the service area on an annual basis. **Figure 1-1** presents a graphic illustration of the service area's registered aircraft growth trends since 2004. The historical number of registered aircraft in Carroll County has increased by approximately 15 percent since 2004, from 141 to 162 in 2013.

Figure 1-1: Service Area Registered Aircraft History



Source: Avantext data; FAA registered aircraft database

To arrive at an acceptable forecast of service area registered aircraft, eight projections were made using market share, socioeconomic regression and trend analysis methodologies. **Table 1-3** presents a summary of the projections for registered aircraft demand in the service area.

Market Share Projection: The *Constant* Market Share Projection of demand predicts the number of registered aircraft if the service area keeps pace with the anticipated national growth in registered aircraft. The Constant Market Share for the DMW service area yields a total of 181 registered aircraft by the year 2033 representing a 0.56 percent increase per year and 19 additional aircraft.

The *Dynamic* Market Share Projection of demand examines historical market shares and develops a linear trend of these market shares to generate the projection of 243 registered aircraft by the year 2033, which represents a 2.05 percent increase per year and yields a net increase of 81 aircraft over the planning period.

Socioeconomic Regression: The Socioeconomic Regression Projections included employment and income statistics from the service area. These projections resulted from the regression analyses between each indicator and registered aircraft in the service area from 2004 through 2013. Both of these projections showed positive growth throughout the planning period, forecasting 211 (employment) and 213 (income) based aircraft at DMW in 2033.

Trend Analysis: The Trend Analysis Projections, similar to the Socioeconomic Regression Projections, examined the historical trend of registered aircraft. The Trend Analysis methodology projected growth using *Linear Trend Analysis* (least squares) and *Double Exponential Smoothing Analysis*. Since the historical trend is upward, both the linear trend projection and the exponential smoothing projection show an increase in service area registered aircraft over the period, forecasting 216 and 225 based aircraft, respectively, in 2033.

Derived Projections: Derived Projections are simply derivatives of the other existing projections. As its name implies, the High/Low Average is the average of the highest and lowest projections. The Multiple Average is the average of all projections. Both of these derived projections were well above the Constant Market Share projection, meaning that the service area is anticipated to grow faster than the U.S. trend. If historical growth is any indicator of future growth, Carroll County should outpace the U.S. market. Since 2005, the County has added 27 registered aircraft, which is significantly higher than the 19 additional registered aircraft in 2033 predicted by the Constant Market Share projection method.

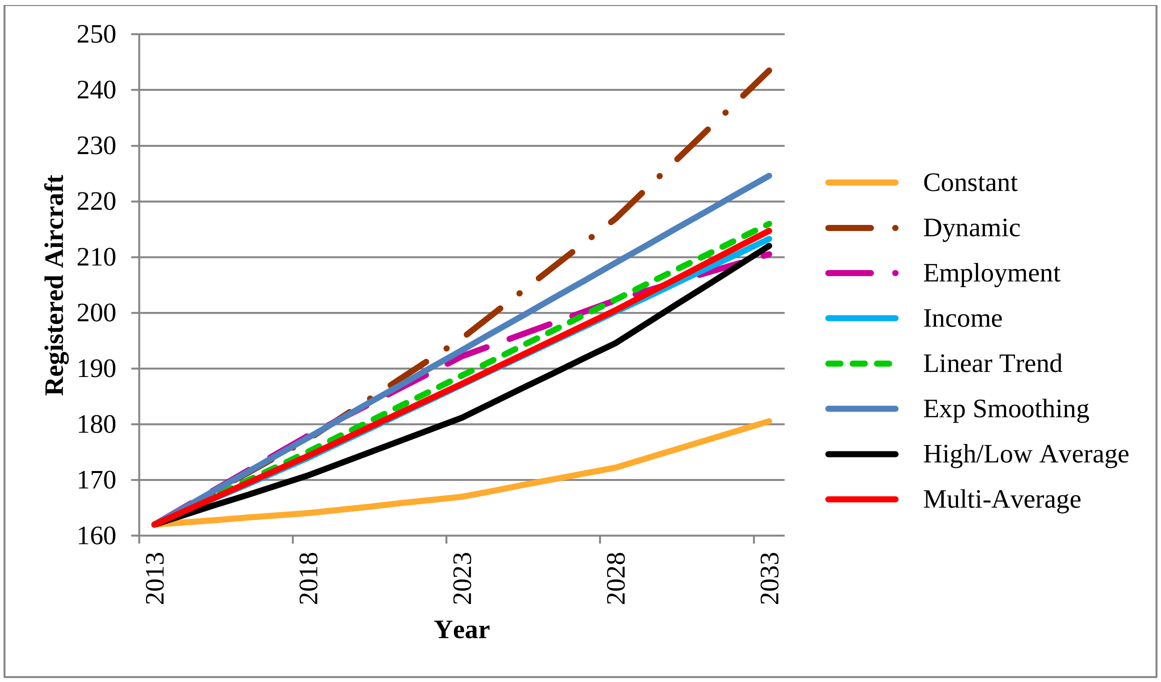
Table 1-3: Forecast of Registered Aircraft in the DMW Service Area

	Projection	**Forecast**				*% Change 2013-2033*
	Base 2012	**2013**	**2018**	**2023**	**2033**	
Market Share						
Constant	159	162	164	167	181	11.73%
Dynamic	159	162	177	195	243	50.00%
Socioeconomic						
Employment	159	162	178	192	211	30.25%
Income	159	162	174	187	213	31.48%
Trend Analysis						
Linear Trend	159	162	175	189	216	33.33%
Exponential Smoothing	159	162	178	193	225	38.89%
Derived Projection						
High/Low Average	159	162	171	181	212	30.86%
Multi-Average	159	162	174	187	215	32.72%
Selected Forecast	***159***	***162***	***174***	***187***	***215***	***32.72%***

Source: Delta Airport Consultants, Inc. analysis

As illustrated in **Figure 1-2**, all other projections produced 2033 forecasts which are significantly higher than the Constant Market Share, and which are significantly lower than the Dynamic Share. To diminish the influence of these projections, the Multiple Average projection was selected as the preferred registered aircraft forecast. As this is the average of all projections, this forecast better represents the mid-range. The preferred forecast of registered aircraft shows a growth from 162 in 2013 to 215 in 2033, an overall growth of over 32 percent.

Figure 1-2: Summary of Registered Aircraft Projections



Source: Delta Airport Consultants, Inc. analysis

B) Based Aircraft Forecast

A based aircraft is a general aviation aircraft that is stationed at an airport. The based aircraft population at DMW was projected using market share methodology that relied on the forecast of registered aircraft as the "market" and DMW based aircraft as the "share." To generate the historical data for based aircraft, the FAA Form 5010 Master Record and discussions with airport management concerning any new aircraft basing activity were used. As shown in **Table 1-4**, a *constant market share projection* was used to forecast based aircraft at DMW. This forecast employed the 2013 market share of 56.2 percent throughout the future periods.

Table 1-4: Forecast of Based Aircraft			
Year	**Service Area Registered Aircraft**	**DMW Based Aircraft**	**Market Share**
2012 (Base)	159	97	61.6%
2013	162	91	56.2%
Forecast			
2018	174	98	56.2%
2023	187	105	56.2%
2033	215	121	56.2%

Source: Delta Airport Consultants, Inc. analysis

Although FAA TAF shows a no-growth, straight-line projection of 97 based aircraft over the planning horizon (see **Table 1-1**), the Market Share forecast shows a growth from the current 91 based aircraft in 2013 to 121 in 2033. The difference between the TAF and this Market Share forecast can be explained by the strong socioeconomic activity in the County and at the Airport. In 2013 alone, for example, two additional based jets were recorded at DMW.

Based Aircraft Fleet Mix

An aircraft fleet mix refers to the characteristics of a population of aircraft. General aviation aircraft are classified with regard to specific physical traits such as aircraft type (whether fixed wing or rotorcraft), weight, and number and type of engines. Fleet mix categories include: single-engine, multi-engine, turbojet, rotorcraft, and "other," which could include gliders and lighter-than-air vehicles. Projection of the fleet mix at DMW involved the consideration of the effects of the national trends in aircraft manufacturing, and the service area registered aircraft fleet mix. **Table 1-5** presents the national forecasts of fleet mix from the FAA Aerospace Forecast for Fiscal Years 2013-2033.

Table 1-5: National Forecast of Aircraft Types – By Fleet Mix						
Year	**Single-Engine**	**Multi-Engine**	**Turbojet**	**Rotorcraft**	**Other**	**Total**
2013	169,288	22,903	12,230	10,995	5,670	221,085
2018	167,898	23,153	14,420	12,815	5,635	223,920
2023	167,524	23,301	16,895	14,590	5,605	227,915
2033	173,700	23,955	24,620	18,555	5,545	246,375
% in 2013	**76.57%**	**10.36%**	**5.53%**	**4.97%**	**2.56%**	**100%**
% in 2033	**70.50%**	**9.72%**	**9.99%**	**7.53%**	**2.25%**	**100%**
% change in share 2013-2033	**-6.07%**	**-0.64%**	**4.46%**	**2.56%**	**-0.31%**	**-**

Source: FAA Aerospace Forecasts for Fiscal Years 2013-2033

Throughout the planning period, turbojet aircraft are anticipated to make up a larger portion of the national aircraft fleet, from 5.53 percent in 2013 to 9.99 percent in 2033; while the fleet mix shares of both single-engine and multi-engine aircraft will shrink (see **Table 1-5**). Despite a projected decrease in fleet share of 6.07 percent, single-engine aircraft will continue to represent the largest component of the national aircraft fleet.

As depicted in **Table 1-4,** the total number of based aircraft at DMW is expected to grow from 91 to 121 over the forecast period. Correspondingly, operational fleet mix changes are also anticipated at DMW as a result of new aircraft replacing aircraft that are retired or sold. While the total number of aircraft increases, the based fleet at DMW is anticipated to mimic the national fleet mix trends and move toward a more sophisticated, larger, business-type aircraft mix.

Table 1-6 presents the forecast of based aircraft fleet mix anticipated for DMW. As shown, the predominance of single-engine aircraft will continue throughout the planning period. Turbojets and rotorcraft are expected to constitute a greater percentage share of the overall fleet mix at DMW in 2033, consistent with national trends.

Table 1-6: General Aviation Based Aircraft Fleet Mix at DMW						
Year	**Single-Engine**	**Multi-Engine**	**Turbojet**	**Rotorcraft**	**Other**	**Total**
2013	74	12	4	1	0	91
2018	77	13	6	2	0	98
2023	81	14	8	2	0	105
2033	89	17	12	3	0	121
% in 2013	**81.32%**	**13.19%**	**4.40%**	**1.10%**	**0.00%**	**100%**
% in 2033	**73.55%**	**14.05%**	**9.92%**	**2.48%**	**0.00%**	**100%**
% change in share 2013-2033	**-7.76%**	**0.86%**	**5.52%**	**1.38%**	**0.00%**	**-**

Source: FAA Aerospace Forecasts for Fiscal Years 2013-2033
FAA Form 5010-1, Airport Master Record - September 2013
Delta Airport Consultants, Inc. analysis

C) Annual General Aviation Operations Forecast

An aircraft operation is defined as either a takeoff or a landing (i.e., a takeoff and landing are considered two operations.)

Local versus Itinerant

Local operations are performed by aircraft that operate within the local traffic pattern or within sight of the airport. They can also be assigned to aircraft arriving or departing from local practice areas within 20 miles of the airport. In essence, local operations are associated with pilot training. Itinerant operations are all other aircraft operations other than local operations. FAA 5010 Master Record data for DMW reports that local operations consist of 74 percent of operations while itinerant operations consist of 26 percent of total operations at DMW; these percentages are anticipated to remain the same through the planning period.

The forecast for annual general aviation operations was derived for both local and itinerant operations through the use of the operations-per-based-aircraft (OPBA) ratio. The OPBA for the base year (2012) applied to the forecast of based aircraft in order to determine the forecasted total operations. **Table 1-7** presents the forecast of total general aviation operations, as well as the forecasted breakdown of local and itinerant operations, at DMW.

Table 1-7: Forecast of Local and Itinerant General Aviation Operations at DMW

Year	Based Aircraft	Local Ops	Local OPBA	Itinerant Ops (GA & Air Taxi)	Itinerant OPBA	Total Ops	Total OPBA
Base							
2012	97	26,625	272	9,375	96	36,000	367
Forecast							
2013	91	24,714	272	8,683	95	33,397	367
2018	98	26,615	272	9,351	95	35,966	367
2023	105	28,516	272	10,019	95	38,535	367
2033	121	32,861	272	11,546	95	44,407	367
% change 2013-2033						**32.97%**	

Source: Historical operation data from FAA 5010, Airport Master Record
Forecast from Delta Airport Consultants, Inc. analysis

Growth in the overall level of general aviation operations is expected to occur as a natural outgrowth in the number of based aircraft and business and corporate use of DMW. The results of the general aviation operations forecast show a growth from 36,000 operations in 2012 to 44,407 operations in 2033, which represents an increase of 32.97 percent over the planning period.

Table 1-8 presents the local/itinerant operations breakdown for the planning period. For purposes of this analysis, itinerant operations are further divided into general aviation and air taxi.

Table 1-8: Local/Itinerant Operations Breakdown for DMW						
	Base 2012	**Forecast**				**% Change 2013-2033**
		2013	**2018**	**2023**	**2033**	
TOTAL OPERATIONS	**36,000**	**33,397**	**35,966**	**38,535**	**44,407**	**32.97%**
Local Operations						
General Aviation	26,625	24,714	26,615	28,516	32,861	**32.97%**
Itinerant Operations						
General Aviation	8,875	8,183	8,851	9,519	11,046	**34.99%**
Air Taxi	500	500	500	500	500	**0.00%**

Source: Delta Airport Consultants, Inc. analysis

General Aviation (GA) Operational Fleet Mix

The operational fleet mix forecast presents a breakdown of aircraft operations by aircraft type using the operations forecast outlined in **Table 1-7**. **Table 1-9** presents the forecast of operational fleet mix for general aviation users at DMW. While single-engine aircraft activity is expected to continue to represent the majority of aircraft operations for DMW during this period, the percentage growth rates for turbojet and rotorcraft are expected to significantly eclipse piston aircraft growth activity. The operational fleet mix forecasts for multi-engine and rotorcraft-type aircraft were derived by multiplying the based aircraft fleet mix (see **Table 1-6**) by the forecasted OPBA (see **Table 1-7**). The operational fleet mix forecast for turbojet aircraft was found by applying the growth rate of historical turbojet operations and extrapolating from the base year. After subtracting these forecasted operations from total operations, the remaining operations were assumed to be by single-engine aircraft.

Table 1-9: Forecast of General Aviation Operational Fleet Mix at DMW

Year	Single-Engine	Multi-Engine	Turbojet[1]	Rotorcraft	Other	Total
Base						
2012	29,109	5,510	646	735	0	36,000
Forecast						
2013	27,680	4,404	946	367	0	33,397
2018	39,037	4,771	1,424	734	0	35,966
2023	30,672	5,138	1,991	734	0	38,535
2033	33,603	6,239	3,464	1,101	0	44,407
% Change 2013-2033	**21.40%**	**41.67%**	**266.17%**	**200.00%**	**-**	**32.97%**

Source:
[1]Flightwise data used for historical turbojet operations. Projections based on airport fleet mix and declining training activity for single engine aircraft.

GA Operational Peaking Characteristics

An important measure of airport activity is periodic peaking. Forecasts were developed for peak month, design day, and design hour. Ideally, a comprehensive historical data pool should be analyzed to determine the peaking characteristics. As DMW is a non-towered airport, this data was not available. The alternative approach taken in developing these activity descriptions is outlined below:

- **Peak Month**: Peak month operations are calculated assuming that the peak month is 10 percent busier than the average month (annual operations/12x110%).

- **Average Day**: Average peak day operations are defined as the average day during the peak month. It is calculated by dividing the peak month by 30.

- **Peak Hour**: Peak Hour operations represent the highest number of operations during the busiest hour of an average day during a peak month. Peak hour operations are assumed to be 15 percent of the average peak day.

Table 1-10 presents the forecast of peak hour and peak month operations at DMW.

Table 1-10: Forecast of General Aviation Peak Period Operations at DMW

Year	Annual Operations	Peak Month Operations	Peak Day Operations	Peak Hour Operations
Base				
2012	36,000	3,300	110	17
Forecast				
2013	33,397	3,061	102	15
2018	35,966	3,297	110	17
2023	38,535	3,532	118	18
2033	44,407	4,070	136	20

Source: Delta Airport Consultants, Inc. analysis

D) General Aviation Enplanements

Forecasts of annual general aviation enplaned passengers can be used by airport management and FBOs to determine the need for such landside facilities as the general aviation terminal building sizes and the amount of automobile parking areas and access roads. GA enplanements include those persons traveling for corporate/business reasons, air charters, air taxis, and other transient departures.

The Aircraft Owners and Pilots Association (AOPA) estimates that an average of 2.5[1] passengers per general aviation departure is a reasonable estimate of GA aircraft occupancy. For this study, this factor was applied to all forecast GA departures. As mentioned previously, one operation equals either one takeoff or one landing; therefore the operations figures from **Table 1-7** were divided in half in order to determine the number of departures. **Table 1-11** presents a forecast of total general aviation enplanements at DMW.

Table 1-11: Forecast of General Aviation Enplanements at DMW

Year	Enplanements-Per-Departure	Total Departures	Total Enplanements
2012	2.5	18,000	45,000
Forecast			
2013	2.5	16,699	41,746
2018	2.5	17,983	44,958
2023	2.5	19,268	48,169
2033	2.5	22,204	55,509

Source: Delta Airport Consultants, Inc. analysis

[1] Source: http://www.aopa.org/whatsnew/stats/activity.html

1.6 AIRPORT REFERENCE CODE

Runway design is based in part on the airport reference code (ARC) for the runway under study. The FAA uses the ARC to relate airport design criteria to the operational and physical characteristics of the airplane types that will operate at a particular airport. The ARC has two components relating to the airport design aircraft. The first component, depicted by a letter, is the *aircraft approach category* and relates to aircraft approach speed (operational characteristic). The aircraft approach category is a grouping of aircraft based on 1.3 times their stall speed in their landing configuration at their maximum certificated landing weight.

The second component, depicted by a Roman numeral, is the *airplane design group* and relates to airplane wingspan or tail height (physical characteristics), whichever is the most restrictive. The airplane design group is a grouping of airplanes based on wingspan or tail height. Where an airplane is in two categories, the most demanding category should be used.

The ARC represents a basis for planning as it influences the type and extent of facility design on an airfield. **Table 1-12** denotes the aircraft approach category and airplane design group.

Table 1-12: Aircraft Approach Category and Airplane Design Group

Aircraft Approach Category		Airplane Design Group		
Aircraft Approach Category	**Approach Speed**	**Group #**	**Tail Height (ft [m])**	**Wingspan (ft [m])**
A	Less than 91 knots	I	< 20’ (< 6m)	< 49’ (<15m)
B	91 knots or more but less than 121 knots	II	20’ - < 30’ (6m- < 9m)	49’ - <79’ (15m- < 24 m)
C	121 knots or more but less than 141 knots	III	30’ - < 45’ (9m - < 13.5m)	79’ - < 118’ (24m - < 36m)
D	141 knots or more but less than 166 knots	IV	45’ - < 60’ (13.5m – 18.5m)	118’ - < 171’ (36m - < 52m)
E	166 knots or more	V	60’ - < 66’ (18.5m - < 20m)	171’ - < 214’ (52m - < 65m)
		VI	66’ – 80’ (20m - < 24.5m)	214’ - < 262’ (65m - < 80m)

Source: AC 150/5300-13A

1.7 CRITICAL AIRCRAFT

The determination of the future critical aircraft at DMW is necessary in order to establish the airport reference code (ARC) for DMW. The critical aircraft is defined as the aircraft or family of aircraft with the largest wingspan and highest approach to landing speed that uses the airport on a regular basis. The FAA defines regular basis as more than 500 itinerant operations per year. In some cases, the critical aircraft may be two different aircraft, where one aircraft establishes design criteria based on the largest wingspan and another establishes design criteria based on the highest approach to landing speed.

The first step in identifying the critical aircraft is to review the jet aircraft currently based at the airport. **Table 1-13** lists the based turbojet aircraft at DMW.

Table 1-13: Based Turbojet Aircraft (2013) at DMW

AIRCRAFT	QUANTITY
Canadair Challenger 605	1
Cessna Citation XL	1
Dassault Falcon 2000	1
Embraer Phenom 300	1

Source: DMW Local Records, 2013

Skytech, Inc. serves as the Fixed Base Operator (FBO) for DMW and serves a variety of jet aircraft operators, including the Phenom 300 and the Challenger 605 based at DMW. As indicated in the accompanying letter from Vice-President David Conover (see Appendix A), Skytech provides a broad range of maintenance and repair services to its DMW turbojet and turboprop customers. In addition, Skytech's affiliations with fractional owner/operator firms such as Flight Options and Flex Jets introduce transient aircraft operations to DMW that include Hawker 800s and Lear Jets. NetJets also operates Gulfstream 450 and Hawker 800 aircraft at DMW. Although demand for this class of aircraft remains high among their clients, Al Ball, NetJets Manager of Operational Analysis, notes that the existing runway length often prevents operations except during dry runway conditions. Skytech also highlighted the need for client aircraft to divert to an alternate airport when the runway surface is contaminated. More detail regarding recommended runway length is provided in Chapter Two of this document.

The 2007 DMW Master Plan noted the existing critical design aircraft as the Gulfstream III which represents an approach Category C and design Group II aircraft. The 2007 DMW Master Plan and associated Airport Layout Plan (ALP) also identified the Gulfstream V as the future critical aircraft indicating the need to accommodate design Group III in future airport development. Since that time, the anticipated flight operations of the Gulfstream V have not occurred and examination of the current and forecasted operational data indicates the current and future design criteria should remain Group II. While Group II operations at DMW consistently exceed 500 annually, the review of the Flightwise data (2010-2013) indicated no Group III operations occurred.

The critical family of aircraft for DMW during the current planning period (2014-2033) therefore is the medium-size business jet, similar to the based Challenger 605 aircraft. Aircraft such as the Challenger are approach Category C aircraft, and design Group II.

G450 and two Challenger 300s at DMW. Photo taken May 2013

1.8 AVIATION DEMAND FORECAST SUMMARY

Table 1-14 presents a summary of the forecasts of aviation demand for DMW. As shown, based aircraft are anticipated to grow from 91 to 121 by the year 2033. Aircraft operations are projected to grow at a compound annual growth rate of 1.43 percent over the 20 year planning period. Turbo-jet operations are forecast to grow at a compound annual growth rate of 6.7 percent over the same period.

Table 1-14: Forecast Summary for DMW

		Forecast				CAGR 2013-2033
	2012 (Base)	2013	2018	2023	2033	
Forecast of General Aviation						
Service Area Registered Aircraft	159	162	174	187	215	**1.43%**
Based Aircraft	97	91	98	105	121	**1.43%**
Single-Engine		74	77	81	89	**0.93%**
Multi-Engine		12	13	14	17	**1.76%**
Turbo Jet		4	6	8	12	**5.65%**
Rotorcraft		1	2	2	3	**5.65%**
Operations	**36,000**	**33,397**	**35,966**	**38,535**	**44,407**	**1.43%**
Local	26,625	24,714	26,615	28,516	32,861	**1.43%**
Itinerant	9,375	8,683	9,351	10,019	11,546	**1.43%**
Operations by Aircraft Type						
Single-Engine	29,109	27,680	29,037	30,672	33,603	**0.97%**
Multi-Engine	5,510	4,404	4,771	5,138	6,239	**1.76%**
Turbo Jet	646	946	1,424	1,991	3,464	**6.70%**
Rotorcraft	735	367	734	734	1,101	**5.65%**
Military[1]	90	90	90	90	90	**0.00%**
Peak Hour Operations	17	15	17	18	20	**1.66%**
Enplaned Passengers	45,000	41,746	44,958	48,169	55,509	**1.43%**

[1] Military operations forecasts were not conducted and are listed for reference only.

Chapter Two
Runway Analysis

This section evaluates the runway length and width based on the existing and future aircraft expected to use the Carroll County Regional Airport (DMW). The recommendations are based on FAA advisory circulars (AC), specific manufacturers' aircraft performance data, and runway use limitations placed on fractional owner and on-demand operations such as Title 14 of the Code of Federal Regulations (14CFR) Part 91K and Part 135. The section also examines the instrument approach procedures currently published for DMW and the improved minimums or additional procedures necessary to enhance safe and efficient all-weather operating capability.

2.1 INTRODUCTION

The determination of runway length and width required for an airport is based on standards presented in Chapter Three of FAA AC 150/5300-13A (AC-13A), *Airport Design* and FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*. AC-13A notes that the runway should be long enough to accommodate arrival and departure requirements for the design aircraft.

All aircraft operational considerations, to include the takeoff, landing, and accelerate stop distances, and obstacle clearance, need to be considered when determining runway length. Additional factors considered include the design aircraft approach speed, its maximum certificated take-off weight, useful load and length of haul, the airport's field elevation above sea level, the mean daily maximum temperature at the airfield, and runway surface conditions, such as wet and slippery.

2.2 SERVICE TO NATIONAL FLEET OF BUSINESS JETS

The initial analysis of recommended runway length for DMW is based on performance curves developed from FAA-approved airplane flight manuals in accordance with Federal Aviation Regulations. Guidance on runway length analysis is provided in AC 150/5325-4B, *Runway Length Requirements for Airport Design*. Tables 3-1 and 3-2 of the AC (see **Figures 2-1** and **2-2**) provide a listing of aircraft identified by the FAA to comprise 75 percent and 100 percent of the national fleet of business jets, respectively.

A majority of the aircraft (13 of 19) within the top 25 percent tier of the national business jet fleet is served by DMW; these aircraft are noted by arrows on **Figure 2-2**. As documented in **Chapter One**, the Challenger series aircraft from the top 25 list is also based at DMW. Additionally, fractional jet operators and aircraft management firms such as NetJets, Flex Jets, and Flight Options operate aircraft from the top 25 list at DMW, including the Hawker 800, Gulfstream, and Citation series.

These firms operate primarily under 14CFR Part 135, and consequently, are subject to Part 135.385, *Landing Limitations: Destination Airports* (commonly referred to as the "60 Percent Rule"). This regulation requires that the arriving turbojet aircraft must be able to land within 60 percent of the effective runway length, or if the runway is wet and slippery, the effective runway length must be at least 115 percent of the runway length required for that specific aircraft operation.

Given the based and transient jets operating at DMW from the FAA 100 percent fleet list, the 100 percent fleet table should be used for determining baseline runway length requirements.

Figure 2-1

75 Percent Fleet

Figure 2-2

Remaining 25 Percent Airplanes in 100 Percent Fleet

2.3 FAA RUNWAY LENGTH MODELS

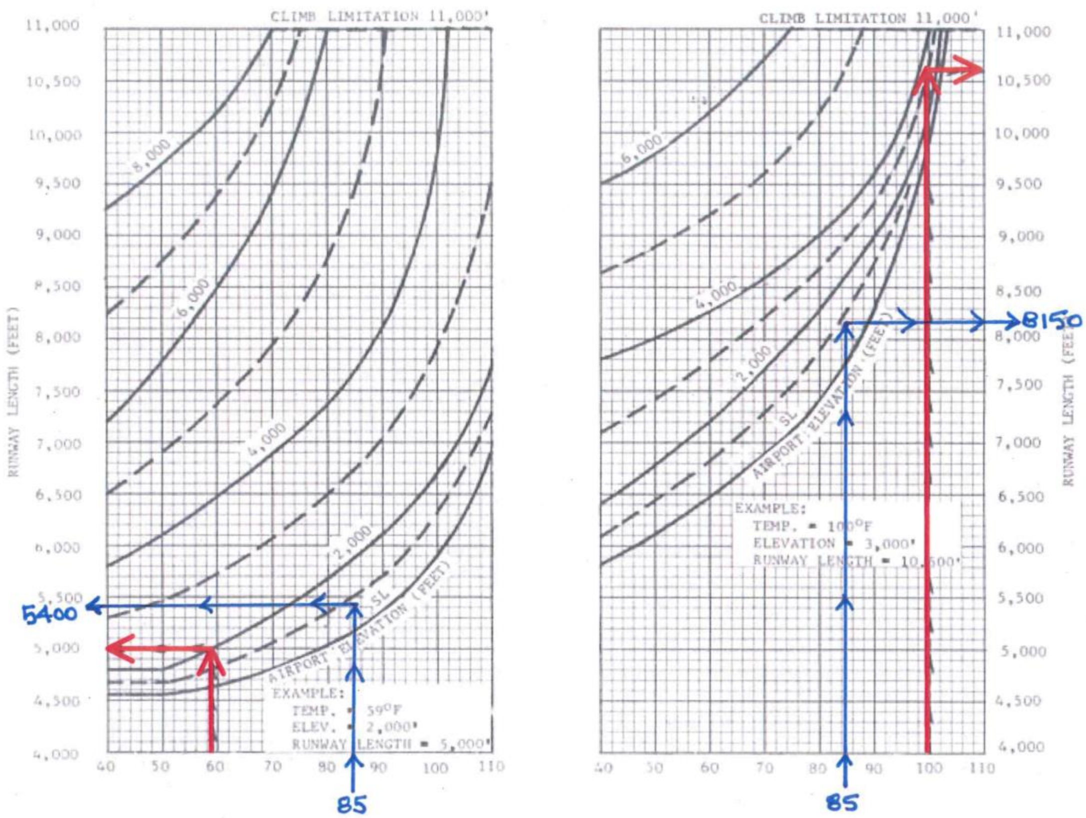
Having defined 100 percent of the fleet as appropriate for the DMW analysis, the useful load factor of these aircraft is also considered. The mean daily maximum temperature (85°F) and the airfield elevation (789 MSL) are used in **Figure 2-3** to determine **a runway length requirement of approximately 5,400 feet for the 60 percent useful load.**

For purposes of this analysis, the term *useful load* refers to the difference between the maximum allowable structural gross weight and the operating empty weight of the aircraft in question. **The 60 percent table is used in this analysis to establish a baseline recommended length of 5,400 feet and is supplemented with adjustments from FAA guidance and specific operator detail later in this study.**

2.4 RUNWAY LENGTH ADJUSTMENTS

The runway length obtained from **Figure 2-3** is based on no wind, a dry runway surface, and a zero effective runway gradient. As such, and as stated in FAA AC 150/4325-4B, the obtained runway length is to be increased to account for (1) takeoff operations when the effective runway gradient is other than zero and (2) landing operations of turbojet powered airplanes under wet and slippery runway surface conditions. The increase is not cumulative since the first length adjustment applies to takeoffs and the latter to landings. After both adjustments have been independently applied, the greatest resultant length becomes the recommended runway length.

Figure 3-2. 100 Percent of Fleet at 60 or 90 Percent Useful Load



Mean Daily Maximum Temperature of Hottest Month of the Year in Degrees Fahrenheit

100 percent of feet at 60 percent useful load **100 percent of feet at 90 percent useful load**

SOURCE:
ADVISORY CIRCULAR (AC 150/5325-4B TABLE 3-1, DATED 07-01-2005) PROVIDED BY FAA (FEDERAL AVIATION ADMINISTRATION - WWW.FAA.GOV).

www.deltaairport.com

RUNWAY LENGTH REQUIREMENT
CARROLL COUNTY REGIONAL AIRPORT

FIGURE 2-3

DRAWN BY:	ABC	CHECKED BY:	RGL	SCALE:	NONE	DATE:	MARCH 2014

DRAWING: 13063 - exh-Runway Length Table.dwg LAYOUT: L-1

In consideration of wet and slippery conditions during landing operations, AC 150/5325-4B requires the runway length for turbojet-powered airplanes obtained from the 60 percent useful load curve to be increased by 15 percent, or up to 5,500 feet, whichever is less. Thus in the case of DMW, the length of 5,400 feet noted above is increased to **a recommended length of 5,500 feet.**

2.5 AIRCRAFT PERFORMANCE ANALYSIS

General aviation (GA) airports such as DMW continue to experience an increase in use by business jets as corporations satisfy their executives' needs for flexibility in scheduling, speed, and privacy.

As of February 2014, DMW had four based turbojets including a Canadair Challenger 605, a Dassault Falcon 2000, a Cessna Citation XL, and an Embraer Phenom 300. As discussed in **Chapter One**, the number of based business jets is forecast to grow to 12 by 2033, and during the same period, the number of annual turbojet operations is forecast to increase from 946 to 3,464. In reviewing the runway length requirements produced from the performance charts and runway length adjustments, **the existing useable primary runway length of 5,100 feet was found to be inadequate to accommodate the turbojet fleet currently operating at DMW.**

Information from based and transient jet operators was solicited to document their operational needs:

- Skytech, Inc., which provides FBO services at DMW, expressed customer's concerns that the current runway length is inadequate to support their operational needs during inclement weather conditions. The most critical operational limitation experienced has been the reduction of useful load capability. Mr. Dave Conover, Vice-President for Skytech, notes that this limitation has required existing and potential clients to operate from Martin State Airport or Harrisburg rather than DMW due to passenger and fuel loading requirements. Letters of support for the runway project from Skytech are attached as **Appendix A**. Skytech also maintains affiliations with fractional jet operators such as Flight Options and Flex Jets as an FAA Certified Repair Station. Mr. Conover noted that the runway extension is critical to Skytech's continued growth in this business segment at DMW.

- TTi Aviation, LLC, has two jets based at DMW; a Citation XL and a Falcon 2000 EX. Mr. Steve Brodie, Chief Pilot/Aviation Manager for TTi Aviation, noted that the existing runway length is inadequate to support their operations year round and specifically during any contaminated runway conditions. A letter of support for the runway project from TTi Aviation is included in Appendix A.

As noted previously in this chapter, the existing 5,100 feet runway length is inadequate to accommodate the existing and future turbojet operations at DMW. The 60 percent useful load, plus adjustments, results in a recommended length of 5,500 feet.

2.6 INSTRUMENT APPROACH PROCEDURES

Generally, Runway 16 is the preferred approach during instrument meteorological conditions at DMW due to wind direction. Therefore, the instrument approach procedures for Runway 16 are a key element in maintaining airport operational efficiency in all-weather conditions.

There is currently an RNAV (GPS) instrument approach to Runway 16 with established LPV minima of 1081 MSL (292 feet AGL) and one mile visibility. **It is recommended the County improve approach minima for the existing RNAV (GPS) with reduction of visibility to less than 3/4 mile with installation of a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR). This reduction in visibility requires additional separation between the runway and existing parallel taxiway. FAA design guidance specifies 400 feet separation between runway and taxiway, which requires relocation of the existing runway**. This required relocation is depicted on the currently approved Airport Layout Plan (ALP). FAA guidance since the 2007 Master Plan requires a review of land uses within the Runway Protection Zone (RPZ) including roadways. This review of land uses within the proposed RPZ (after the runway has been relocated) is presented in **Chapter Three**.

The approved ALP also depicts installation of an Instrument Landing System (ILS) comprised of glideslope and localizer. Recent technological advancements in satellite navigation now support minimums for GPS approach procedures as low as can be achieved with the much more expensive, ground based ILS. As such, discussions with the County during the scope of this Study have indicated their desire to **eliminate the proposed ILS and pursue visibility minima reduction to less than ¾ mile with the existing RNAV (GPS) approach.**

There are currently two instrument approach procedures to Runway 34, an RNAV (GPS) and a VOR approach. The RNAV (GPS) offers LPV minima as low as 988 MSL (200 feet AGL) and one mile visibility and the VOR offers minima as low as 1480 MSL (692 feet AGL) and one mile visibility. **It is recommended that the County pursue approach minima for the existing RNAV (GPS) with reduction of visibility to not lower than 3/4 mile.**

2.7 RUNWAY WIDTH AND RUNWAY-TAXIWAY SEPARATION

Runway width is specified within FAA AC 150/5300-13A based on the Runway Design Code (RDC). The design standard width for a C-II runway such as DMW is 100 feet for all specified visibility minimums, and thus **a width of 100 feet should be provided throughout the planning period.**

As stated in Section 2.6, the recommended improvement in approach minima will require an increase in the runway-centerline to taxiway-centerline separation distance, per design standards in AC 150/5300-13A. The existing separation between the runway and parallel Taxiway A is 300-feet which satisfies design standards for a C-II runway with approach minima not lower than one mile. As the approach minima for the existing RNAV (GPS) are reduced to lower than ¾ mile, the separation distance required by AC 13A increases to 400-feet, requiring the relocation of the existing runway 100-feet to the west. The relocation is recommended to occur toward the west because the majority of airfield facilities are located east of the runway. Relocating the runway to the east would encroach on the existing terminal area and diminish the available facilities at DMW.

2.8 CONCLUSIONS AND RECOMMENDATIONS

In conclusion, this section has demonstrated the need to provide a runway length at DMW beyond the existing 5,100 feet consistent with FAA guidance. This need is supported by identification of the "family of medium size business jets" as the critical design aircraft (represented by the Challenger 605) as well as several other factors including:

- Service to the 100 percent fleet of U.S. business jets;
- Runway length determination for the 100 percent fleet; and
- Letters of support from both based and transient users.

Runway length determination for the 100 percent fleet for 60 percent useful load produced a recommended runway length of 5,400 feet. It is important to recognize that this length from the FAA tables (Tables 3-1 and 3-2 from the AC 150/5325-4B) does not account for wind, runway condition, or effective runway gradient. Correspondence from DMW jet operators is provided as attachments. **Based on this analysis, it is recommended that a runway length of 5,500 feet be considered as the critical length requirement and be used as the basis for primary runway planning at DMW during the planning period. It is further recommended that the County retain the 6,400 foot runway length depicted on the current ALP as conceptual development for the 'ultimate' phase beyond the 20-year planning period of this study.**

It is also recommended that instrument approach procedures be achieved as depicted on the currently approved ALP with minimums less than 3/4 mile visibility for Runway 16 (including installation of a MALSR) and not lower than 3/4 mile visibility for Runway 34.

Achievement of these recommendations, consistent with FAA design guidance, requires relocation of the existing runway to the west to provide adequate separation from the parallel taxiway. The relocation also allows the County to achieve the desired reduction in instrument approach minimums and establish associated RPZ's free of incompatible land uses.

Blast pads are also recommended to be constructed at each runway end to mitigate erosion due to the forecasted increase of jet traffic.

Chapter Three
Noise and Compatible Land Use

This chapter evaluates the airport noise contours developed for both the base year (2012) and forecast year (2033) and discusses land use compatibility issues related to the Airport and the proposed development.

3.1 NOISE

Noise, defined as "undesirable sound," is typically the most significant off-airport environmental impact associated with aircraft operation. Noise is measured in decibels (dB). Aircraft sound levels are quantified for single events using the A-weighted decibel scale (dBA), which was developed to measure sounds with more emphasis on frequencies that can be heard by the human ear.

The Federal Aviation Administration (FAA) specifies metrics to be used in measuring aircraft noise. The metric used in this analysis is the Day Night Average Sound Level (DNL or L_{dn}). DNL is the average cumulative sound level that provides a measure of the total sound energy during a 24-hour period. A 10-decibel (dB) weighting penalty is added to aircraft noise occurring during the nighttime hours (between 10:00 pm and 7:00 am). The 10 dB penalty represents the added intrusiveness of noise events that occur during normal sleep hours when ambient sound levels are typically about 10 dB lower than during daytime hours, because of the annoyance associated with sleep disruption.

The FAA's Integrated Noise Model (INM) Version 7.0d was used to prepare noise contours to evaluate potential aircraft noise effects for the base (2012) scenario. INM is the computer program used to determine the total effect of aircraft noise in an airport environment. INM produces noise contours, which are computer-generated lines that connect points of equal noise levels resulting from aircraft operations and are overlaid on a base map. The INM was used to produce aircraft noise contours for DNL 65, 70, and 75 for existing conditions (2012); a No-Build scenario for a future year (2033); and, a Build scenario for a future year (2033). The methodology is described in Sections A through C below; the Noise Analysis Technical Appendix is included as **Appendix B**.

The estimated noise effects of airport operations can be interpreted in terms of the probable effect on human activities characteristic of specific land uses. 14 Code of Federal Regulations (CFR) Part 150 guidelines for evaluating land use compatibility with noise exposure are discussed in **Section 3.2**. Whether a land use is compatible or non-compatible is determined by comparing the measured DNL at a specific site with the compatibility guidelines. Generally, the FAA considers DNL 75 and higher to be incompatible with most land uses, while DNL 65 is compatible with most land uses. Above 65 DNL, noise sensitive land uses (such as residential) are typically discouraged.

.

A) Existing Conditions (2012)

The data used as input to the INM for the year 2012 noise contours were comprised of the following:

- Runway layout and use
- Number of aircraft operations
- Operational time of day
- Aircraft fleet mix
- Flight tracks and profiles

Runway layout and use: DMW has one runway, Runway 16-34, which is 5,100-feet long and 100-feet wide. Runway 34 is used 90% of the time annually and Runway 16 is used 10% of the time.

Aircraft Operations: The 2012 aircraft operations by category are presented in **Chapter One** (**Table 1-9)** and are shown again in **Table 3-1** below:

Table 3-1: Aircraft Operations by Category, 2012	
Aircraft Category	**Operations**
Single-Engine	29,109
Multi-Engine	5,510
Jet	646
Rotorcraft	735
Total	**36,000**

Source: Delta Airport Consultants, Inc.

Operational time of day: Based on discussions with airport management, FBO staff, and airport users, it was estimated that approximately three percent of the operations at the Airport occur during the nighttime hours.

Aircraft fleet mix: The FAA's Traffic Flow Management System (TFMSC) for calendar year 2012 was used to develop the 2012 INM aircraft fleet mix for DMW. TFMSC data provides information on traffic counts by airport and includes the specific aircraft types operating at that airport, data which is collected when pilots file flight plans. For the purposes of preparing DNL contours, operational data were segregated by aircraft type and by type of operation (local or itinerant). The detailed 2012 Aircraft Operations and INM Fleet Mix are included in **Appendix B**.

Flight Tracks and Profiles: Flight paths utilized by arriving, departing, and local touch-and-go operations in north flow (arrivals to and departures from Runway 34) and south flow (arrivals to and departures from Runway 16) were determined through interviews with airport management and airport users. A series of flight path centerlines were then established for each runway and were splayed within the INM in order to reflect the typical range of flight paths used by individual flights.

2012 Noise Contours: The noise contours for the existing conditions (2012) are shown in **Figure 3-1**. The total area encompassed by the 65 DNL contour is 51.5 acres, all of which lies within the Airport's existing property boundary. There are no residences or other noise sensitive land uses within the 2012 65 DNL contour.

Figure 3-1

Existing (2012) Noise Contours

B) Future No Build Scenario (2033)

The Future No Build scenario includes the same runway layout and use, operational time of day, flight tracks, and profiles as the Existing (2012) scenario. However, the year 2033 aircraft operations and fleet mix were defined using the aviation activity forecast in **Chapter One** (**Table 1-9**) which is shown again in **Table 3-2**:

Table 3-2: Aircraft Operations by Category, 2033	
Aircraft Category	**Operations**
Single-Engine	33,603
Multi-Engine	6,239
Jet	3,464
Rotorcraft	1,101
Total	**44,407**

Source: Delta Airport Consultants, Inc.

Aircraft fleet mix: The 2033 No Build aircraft fleet mix was determined by multiplying the percentages by aircraft type that occurred in 2012 by the total operations forecasted to occur at the Airport in 2033. The 2033 No Build INM aircraft operations and fleet mix are provided in **Appendix B**.

2033 No Build Noise Contours: The noise contours for the Future No Build scenario (2033) are shown in **Figure 3-2**. The total area encompassed by the 65 DNL contour is 63.1 acres, all of which lies within the Airport's existing property boundary. There are no residences or other noise sensitive land uses within the 2033 65 DNL contour for the Future No-Build option.

Figure 3-2

Future No Build (2033) Noise Contours

C) Future Build Scenario (2033)

The Future Build scenario includes the same aircraft operations, fleet mix and operational time-of-day as the 2033 No Build scenario. However, the runway layout reflects the proposed new runway discussed in **Chapter Two**, which would parallel the existing runway and would be extended to a length of 5,500-feet.

Runway Layout and Use: The proposed new runway would parallel the existing runway and would therefore maintain the runway-end designations "16" and "34". The total length of the new runway is proposed to be 5,500-feet. The existing runway would no longer be in service once the new runway is operational.

The runway use percentages for the Future Build scenario were the same as the 2033 No Build scenario.

Flight Tracks: The INM flight tracks for the 2033 Build Alternative were reflective of the new runway location.

2033 Build Noise Contours: The noise contours for the Future Build scenario (2033) are shown in **Figure 3-3**. The total area encompassed by the 65 DNL contour is 63.3 acres. Due to the location of the proposed runway, the 2033 Build Alternative 65 DNL contour extends slightly off airport property to the west of the proposed runway, over an area of industrial land use. There are no residences or other incompatible land uses within the 2033 Build Alternative 65 DNL contour.

Figure 3-3

Future Build (2033) Noise Contours

3.2 COMPATIBLE LAND USE

Estimates of noise effects resulting from aircraft operations can be interpreted in terms of the probable effect on human activities characteristic of specific land uses. The guidelines for evaluating land use compatibility with noise exposure presented in Appendix A of 14 CFR Part 150 are shown in **Table 3-3**. These guidelines reflect the average response of large groups of people to noise. Therefore, the guidelines might not reflect an individual's perception of an actual noise environment. Compatible or non-compatible land use is determined by comparing the predicted or measured DNL at a specific site with the compatibility guidelines provided in the table. Furthermore, there are some land uses that are compatible with noise levels between DNL 65-75. All land uses are considered to be compatible with noise less than or equal to DNL 65.

Table 3-3: Land Use Compatibility with Yearly Day-Night Average Sound

Land use	DNL expressed in dB(A)					
	Below 65	65–70	70–75	75–80	80–85	Over 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail—building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade—general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

Source: 14 C.F.R. Part 150

Y (Yes) = Land Use and related structures compatible without restrictions. N (No) = Land Use and related structures are not compatible and should be prohibited. NLR = Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.

25, 30, or 35=Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structure.

(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

(2) Measures to achieve NLR 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.

(4) Measures to achieve NLR 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal level is low.

(5) Land use compatible provided special sound reinforcement systems are installed.

(6) Residential buildings require an NLR of 25.

(7) Residential buildings require an NLR of 30. (8) Residential buildings not permitted.

The Carroll County Regional Airport is located in Carroll County, Maryland, approximately three miles north of the central business district of the City of Westminster. According to the Carroll County Generalized Zoning map (see **Figure 3-4**), the airport property is designated "Restricted Industrial" and is immediately bordered by Agricultural and Conservation zoning designations to the north and west. The City of Westminster immediately borders the airport property to the southwest, south, and east with property also zoned Restricted Industrial (see **Figure 3-5**). A residential area is located approximately ½ mile southeast of the Runway 34 end. Residential uses are generally not considered compatible with airport operations. As confirmed in **Section 3.1**, no incompatible land uses are contained within the 65 DNL noise contour.

Insert Figure 3-4– Carroll County general zoning map

Insert Figure 3-5– City of Westminster zoning map

While airport noise is the major factor affecting land use compatibility, other factors listed below should be considered when addressing overall land use compatibility around an airport. Generally, the objective of land use compatibility planning for airports is to encourage compatible land uses to locate around airport facilities while discouraging or containing the incompatible land uses in the airport vicinity.

A) Tall Structures

Structures such as cell towers, wind turbines, vegetation (trees), terrain, and tall buildings can inhibit airport operations and pose a safety concern. According to ACRP Report 27- *Enhancing Airport Land Use Compatibility*, it is critical to discourage tall structures within the airport approach and departure surface.

Current and Proposed Conditions at DMW: The obstruction analysis conducted as part of the Airport Layout Plan (ALP) Update did identify tree, terrain, obstructions to the 34:1 GPS non-precision instrument approaches and 40:1 TERPS Departure surfaces on both runway ends. The Carroll County zoning ordinance (§158.054) protects Federal Aviation Regulation (FAR) Part 77 surfaces surrounding the Airport from communications towers which may penetrate these surfaces. **It is recommended that the airport sponsor and the County expand the current zoning ordinance to prevent all incompatible land uses within the departure surface.**

B) Visual Obstructions

Those objects and substances which can impede visibility around airports include smoke, glare, steam, dust, and light emissions, especially for airport operations taking place without navigational aids (NAVAIDs). These visual obstructions should be managed as practicable to minimize their effect on aircraft and airport operations.

Current and Proposed Conditions at DMW: While there are no known visual obstructions in the airport vicinity, **it is recommended that the County zoning ordinance prevent visual**

obstructions in areas around the Airport to protect pilots from visual obstructions. This includes glare from solar panels and other installations off airport property.

C) Wildlife and Bird Attractants

Wetlands, bodies of open water, and certain crops can attract wildlife and birds and cause safety hazards for airport operations. Wildlife attractants are defined in AC 150/5200-33B, as human-made structures, land-use practices, or human-made or natural geographic features that can attract or sustain hazardous wildlife within the landing or departure airspace or the airport's Airport Operations Area (AOA). Architectural features, landscaping, waste disposal sites, wastewater treatment facilities, agricultural or aquaculture activities, surface mining, and wetlands can all act as wildlife attractants.

<u>Current Conditions at DMW</u>: While there are no known bodies of open water in the Airport's vicinity, National Wetlands Inventory data consulted in July 2014 identifies two small wetland bodies on airport property within approximately ½ mile of the Runway 16 end: one approximately three-acre area of Freshwater Forested/Shrub wetland and one approximately 3.4-acre area of Freshwater Emergent wetland. There are no known landfills or water treatment facilities in the vicinity of the Airport. McDaniel College Golf Club is located approximately one-mile south of the Runway 34 end, on the opposite side of College View Boulevard. **The FAA Advisory Circular (AC) 150/5200-33B, *Hazardous Wildlife Attractants on or near Airports*, recommends that airports serving turbine-powered aircraft maintain a separation distance of 10,000-feet between hazardous wildlife attractants (such as those mentioned above) and the air operations area (AOA).**

D) High Concentrations of People / Runway Protection Zone (RPZ)

Areas where high concentrations of people gather, such as schools, churches, or arenas, are generally considered to be incompatible with airport operations. Land use around an airport is the primary concern within the Runway Protection Zone (RPZ). The FAA requires the airport owner to control the defined RPZ area to enhance protection of people and property on the ground. Such control includes the clearing and maintenance of incompatible objects and activities. As per AC-13A, "control" is exercised through the acquisition of property interest as well as the clearing and maintenance of RPZ areas of incompatible objects and activities.

Current and Proposed Conditions at DMW: The majority of land within each RPZ is on airport property with the exception of an approximately 0.82-acre corner of the Runway 16 RPZ and an approximately 1.39-acre corner of the Runway 34 RPZ (excluding the road right-of-way within the Runway 34 RPZ). According to the FAA *Interim Guidance on Land Uses within a Runway Protection Zone* regional FAA staff must consult with the National Airport Planning and Environmental Division (APP-400) when any of the following land uses would enter the limits of the RPZ as the result of: an airfield project (e.g., a runway extension or shift); a change in the critical design aircraft which increases RPZ dimensions; a new or revised instrument approach procedure that increases RPZ dimensions; or a local development proposal in the RPZ (see list in **Table 3-4**).

Table 3-4: Land Uses Requiring Coordination with APP-400
• Buildings and structures, including: residences, schools, churches, hospitals, and
• Recreational land use, including: golf courses, sports fields, and amusement parks
• Transportation facilities, including rail facilities, public roads/highways and parking
• Fuel storage facilities (above and below ground)
• Hazardous materials storage (above and below ground)
• Wastewater treatment facilities
• Above-ground utility infrastructure, including electrical substations and solar panel

Source: FAA Interim Guidance on Land Uses within a Runway Protection Zone

The proposed RPZs for both runway ends will increase in size as a result of the improved approach minimums recommended in **Chapter Two**. With the improved approach minimum for Runway 16 of less than ¾ mile, the proposed RPZ will measure 78.914-acres. With the improved approach minimum for Runway 34 of not lower than ¾ mile, the proposed RPZ will measure 48.978-acres. The area of proposed RPZ which is off airport property is approximately 34.55-acres on the

Runway 16 end and approximately 7.39-acres on the Runway 34 end (excluding Meadow Branch Road). **Per FAA guidance in AC-13A the Airport should acquire all property within the RPZ to prevent incompatible land uses within these areas.**

Chapter Four
FAA Design Standards Review

The existing (as of May 2014) and proposed airfield and facility configuration has been reviewed based on current FAA design standards found in AC 150/5300-13A (AC-13A). Specific on-airport configurations and areas of analysis at Carroll County Regional Airport (DMW) are discussed in the following text.

As stated in **Chapter One**, the airport reference code (ARC) for DMW is C-II. The FAA uses the ARC to relate airport design criteria to the operational and physical characteristics of the airplane types that will operate at a particular airport. As established in **Chapter One**, the critical family of aircraft for DMW during the current planning period (through 2033) is the medium-size business jet, similar to the based Challenger 605 aircraft, which is Approach Category C and Design roup II. The ARC for DMW is anticipated to remain C-II throughout the planning period.

AC-13A introduces the Runway Design Code (RDC) which is a code signifying the design standards to which the runway is to be built, and which is composed of the ARC plus the visibility minimums expressed by Runway Visual Range (RVR) values in feet of 1200, 1600, 2400, 4000 and 5000 (see **Table 4-1**). There is currently an RNAV (GPS) instrument approach to both runway ends at DMW with one mile visibility; there is also a VOR approach to Runway 34 with one mile visibility. Therefore the RDC for Runway 16-34 is C-II-5000. With the incorporation of the improved visibility minimums recommended in **Chapter Two**, the RDC for Runway 16-34 will be C-II-2400.

Table 4-1: Visibility Minimums

RVR (ft)	Flight Visibility Category (statute mile)
5000	Not lower than 1 mile
4000	Lower than 1 mile but not lower than ¾ mile (APV ≥ ¾ but < 1 mile)
2400	Lower than ¾ mile but not lower than ½ mile (CAT-I PA)
1600	Lower than ½ mile but not lower than ¼ mile (CAT-II PA)
1200	Lower than ¼ mile (CAT-III PA)

Source: AC 150/5300-13A

AC-13A also introduces the Taxiway Design Group (TDG) which is a classification of airplanes based on outer-to-outer Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance of the aircraft, and whose categories include 1A, 1B, and 2 through 7. The TDG determines the width of taxiways and taxilanes as well as fillet standards and, in some instances, runway to taxiway and taxiway/taxilane separation requirements. The corresponding taxiway design group for the critical design aircraft for DMW is TDG 2.

4.1 RUNWAY AND TAXIWAY SAFETY AREAS

The Runway Safety Area (RSA) is a defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from the runway. The current RSA design standards contained in AC-13A are based on 90% of overruns being contained within the RSA. The RSA for Runway 16-34 is 500-feet wide and extends 1,000-feet beyond each runway end which meets the design standards for C-II runways as specified in AC-13A. **A RSA with a width of 500-feet which extends 1,000-feet beyond each runway end should be provided throughout the planning period.**

Similar to the RSA, the Taxiway Safety Area (TSA) is a defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an aircraft deviating from the taxiway. Taxiway A is the parallel taxiway serving Runway 16-34. AC-13A dictates the dimensions of TSAs based on Airplane Design Group (ADG). The TSA for Taxiway A and all connector taxiways is 79-feet wide which meets the design standards for Group II as specified in the AC. **A TSA with a width of 79-feet should be provided for all taxiways throughout the planning period.**

A taxilane is a taxiway designed for low speed and precise taxiing, usually located on an apron. The taxilane safety area standard for Group II is 115-feet wide. **A taxilane safety area with a width of 115-feet should be provided throughout the planning period.**

4.2 RUNWAY PROTECTION ZONES

The RPZ is a trapezoidal-shaped area situated at ground level prior to the threshold or beyond the runway end to enhance the safety and protection of people and property on the ground. The existing RPZ for both ends of Runway 16-34 spans 29.465-acres, with a 500-foot inner width, a length of 1,700-feet and an outer width of 1,010-feet. As discussed in **Section 3.2**, the majority of land within each RPZ is on airport property with the exception of an approximately 0.82-acre corner of the Runway 16 RPZ and an approximately 1.39-acre corner of the Runway 34 RPZ (excluding public road rights-of-way). The proposed RPZs for both runway ends will increase in size as a result of the improved approach minimums. With the improved approach minimum for Runway 16 of less than ¾ mile, the proposed RPZ will have a 1,000-foot inner width, a length of 2,500-feet, and an outer width of 1,750-feet, measuring 78.914-acres. With the improved approach minimum for Runway 34 of not lower than ¾ mile, the proposed RPZ will have a 1,000-foot inner width, a length of 1,700-feet, and an outer width of 1,510-feet, measuring 48.978-acres. The area of proposed RPZ which is off airport property is approximately 34.55-acres on the Runway 16 end and approximately 7.39-acres on the Runway 34 end (excluding Meadow Branch Road). **Per FAA**

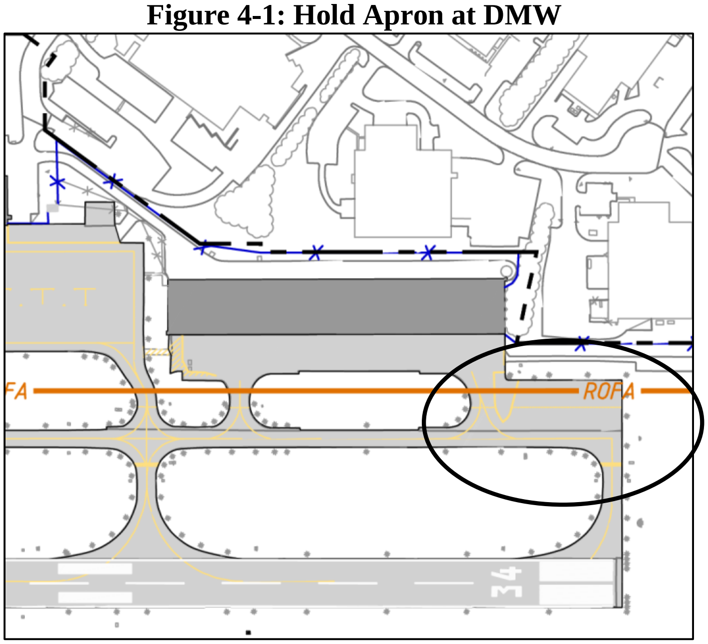
guidance in AC-13A, the Airport should acquire all property within the RPZ to prevent incompatible land uses within these areas.

4.3 RUNWAY OBJECT-FREE AREAS

The Runway Object-Free Area (ROFA) is an area centered on the ground on the runway provided to enhance the safety of aircraft operations by remaining clear of objects, except for objects that need to be located in the ROFA for air navigation or aircraft ground maneuvering purposes. The ROFA clearing standard requires clearing the ROFA of above-ground objects protruding above the nearest point of the RSA. The ROFA for Runway 16-34 is 800-feet wide and extends 1,000-feet beyond each runway end, per the design requirements for C-II runways in AC-13A. **A ROFA width of 800-feet should be provided throughout the planning period.**

The hold apron east of the Runway 34 end is almost entirely within the ROFA (see **Figure 4-1**). Per AC-13A, taxi and hold aircraft are permitted within the ROFA.

Figure 4-1: Hold Apron at DMW



Source: Delta Airport Consultants, Inc.

4.4 RUNWAY LENGTH AND WIDTH

AC-13A specifies a runway width of 100-feet for C-II runways. Runway 16-34 is 100-feet wide which satisfies this standard. **A runway width of 100-feet should be provided throughout the planning period.**

Runway 16-34 is 5,100-feet long. FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*, describes procedures for establishing the appropriate runway length based on accommodating landing and departures for the design aircraft. **Chapter Two** of this document, *Runway Analysis,* details the methodology used to determine the recommended runway length at DMW. After identifying the family of medium-size business jets represented by the Challenger 605 as the critical design aircraft and considering service to the 100 percent fleet of U.S. business jets as well as letters of support from existing airport users, the analysis recommends a runway length of 5,500-feet. **A runway length of 5,500-feet should be considered as the critical length requirement and used as the basis for primary runway planning at DMW during the planning period.**

4.5 OBSTRUCTIONS

An aerial survey and obstruction analysis were conducted as part of the Airport Layout Plan (ALP) update effort.

A) FAR Part 77 Obstructions

Several obstructions to existing Federal Aviation Regulation (FAR) Part 77 “imaginary” surfaces were identified. Existing obstructions include vegetative (tree) obstructions to the existing Part 77 transitional, approach and horizontal surfaces to both runway ends. The Part 77 horizontal surface is obstructed by trees and an antenna on a residence; the Part 77 conical surface is obstructed by a tower.

Trees and natural terrain represent the majority of the obstructions to the proposed FAR Part 77 obstructions to each runway end. The number of obstructions to the proposed Part 77 surfaces for

Runway 34 is significantly higher than existing due to the proposed runway extension to the north, which is a less developed and more forested area.

B) Departure Surface Obstructions

The obstruction survey identified terrain penetrations and tree obstructions to the 40:1 TERPS Departure Surface to each runway end. In addition, public and private roads are obstructions to the Departure Surface on both runway ends once the prescribed 15-foot obstruction clearance area from CFR 14 Part 77.17 is taken into account.

Trees and natural terrain represent the majority of the obstructions to the proposed 40-1 Departure Surfaces to each runway end. Similar to the proposed FAR Part 77 surfaces on this runway end, the number of obstructions to the proposed Runway 34 Departure Surface is significantly higher than existing. due to the proposed runway extension to the north, which is a less developed and more forested area.

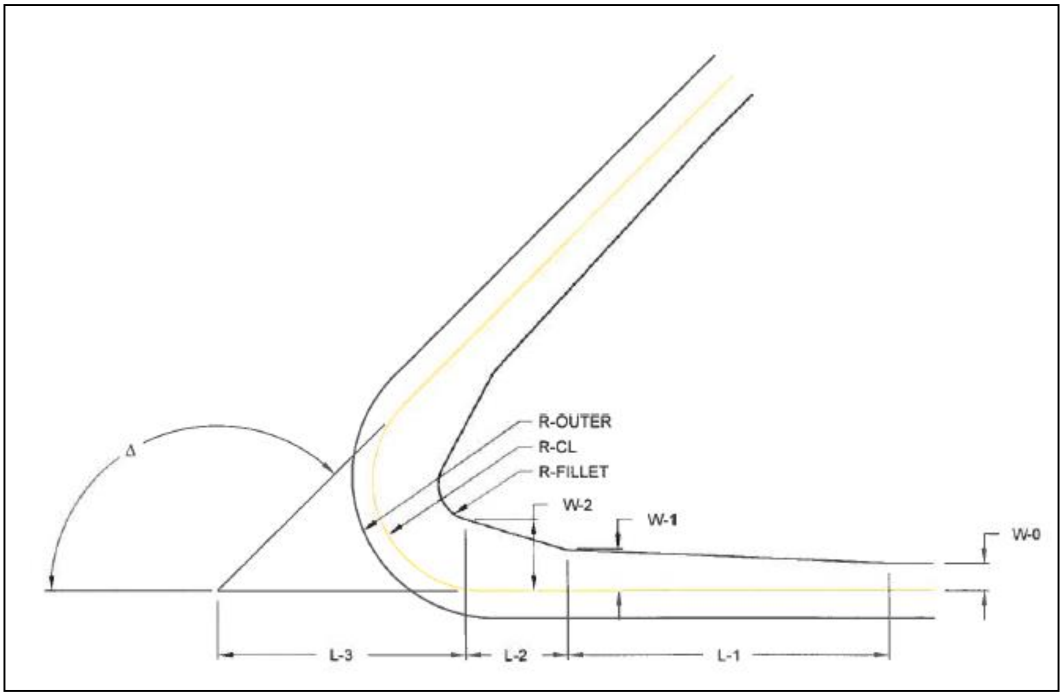
4.6 TAXIWAY WIDTH AND FILLET STANDARDS

Parallel Taxiway A and the connector taxiways at DMW are 35-feet wide, which meets the 35-foot width requirement for TDG 2 per AC-13A. **A taxiway width of 35-feet should be provided throughout the planning period.**

Taxiway fillets are the additional pavement provided on taxiway curves. As an airplane negotiates a turn designed for cockpit over centerline taxiing, the main gear requires this additional pavement. Per AC-13A, at the start of the turn, the taxiway is widened on the inside of the turn for a length L-1, with the distance from the taxiway centerline to the pavement edge tapering from W-0 to W-1. As the airplane continues, the distance from the taxiway centerline to the pavement edge taper must be increased further, for a length L-2, from W-1 to W-2, ending at a distance L-3 from the point of intersection. The tapers associated with the dimensions L-1 and L-2 are symmetrical about a line bisecting the angle between the two centerlines, and the "L-2" tapers are connected by a fillet of radius R-fillet, tangent to both (see **Figure 4-2**).

Taxiway fillet geometry has been updated in the Airport Layout Plan (ALP) to meet the design standard required by AC-13A.

Figure 4-2: Fillet design example



Source: FAA AC 150/5300-13A

4.7 RUNWAY INCURSION PREVENTION

Runway incursion is defined as any occurrence at an airport involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and takeoff of an aircraft. AC-13A provides guidance for runway incursion prevention with the objectives of increasing situational awareness for pilots, improving taxiway geometry, and improving operational use of taxiways.

A) Taxiway and Taxilane Design

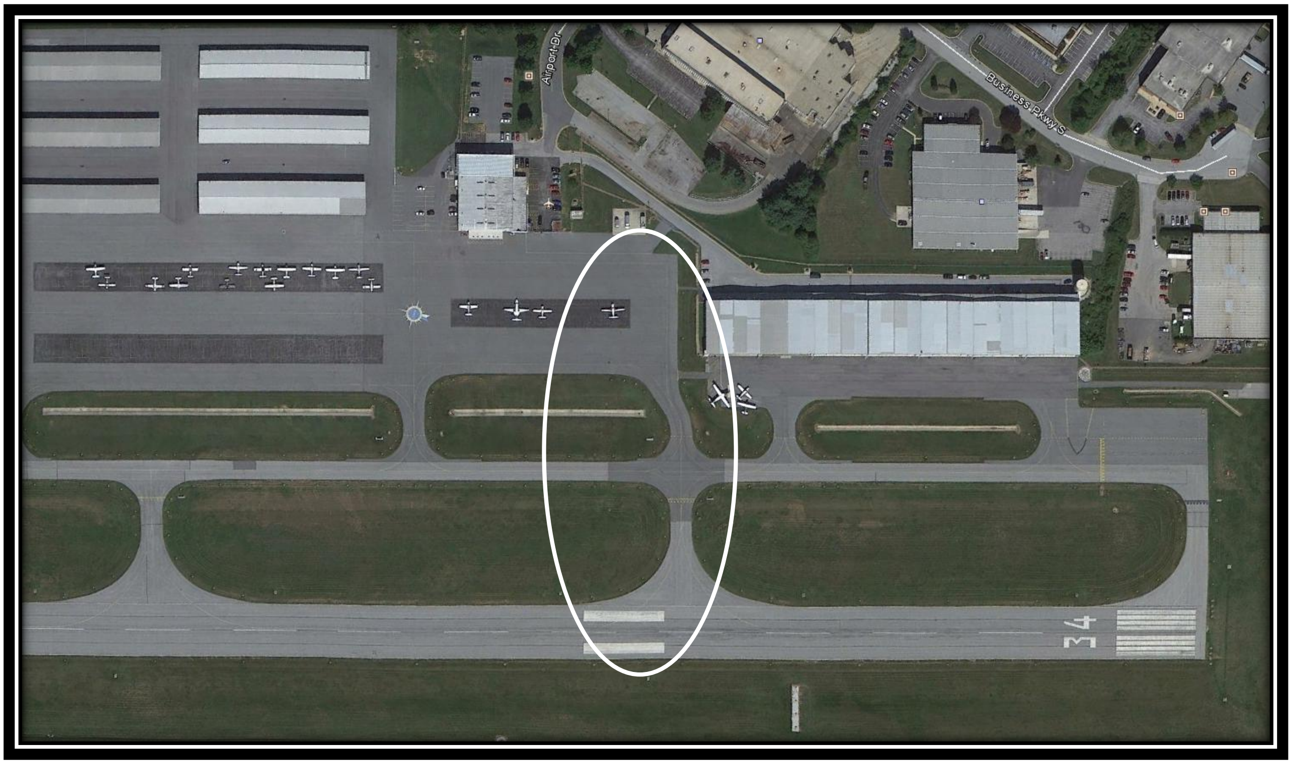
AC-13A recommends existing taxiway geometry be improved whenever feasible, with emphasis on "hot spots," which are locations on an airport movement area with a history of potential risk of collision or runway incursion, and where heightened attention by pilots and drivers is necessary.

1. **Three-node concept**: Complex intersections increase the possibility of pilot error. The "three-node" concept means that a pilot is presented with no more than three choices at an intersection (generally, left, right, and straight ahead).

2. **Taxiway/runway interface**: Optimally, taxiways and runways would intersect at a 90° (right) angle with the exception of high-speed exit taxiways. (The right angle provides the best visual perspective to a pilot at an intersection.) Taxiways providing direct access from a ramp/terminal to the runway are discouraged.

3. **Entrance taxiways**: Entrance taxiways should be connected to the runway end at a right angle. Entrance taxiways should not be designed to provide direct access from an apron. Each entrance taxiway should have its own taxiway designator, markings and elevated signage. **Figure 4-3** denotes the entrance taxiway leading directly from the terminal area apron to the runway, which does not conform to current FAA design standards.

Figure 4-3: Entrance Taxiway at DMW



Source: Google Earth

B) Apron Layout

Apron locations that allow direct access onto a runway are not recommended. The apron layout should allow the design of taxiways in a manner that promotes good situational awareness by forcing pilots to consciously make turns. Taxiways originating from aprons and forming a straight line across runways are not recommended. Other design features which are discouraged in the AC are:

1. **Wide throat taxiway entrances from aprons**. Such large pavement expanses adjacent to an apron may cause pilot confusion and loss of situational awareness. Wide expanses of pavement also make it difficult for pilots to identify signs and lighting.

2. **Taxiway connectors** that cross over a parallel taxiway from an apron and directly onto a runway. A staggered layout is best.

3. **Direct connection** from an apron to a parallel taxiway at the end of a runway.

4.8 NAVIGATIONAL AIDS

Navigational aids, or NAVAIDs, are electronic or visual air navigation aids, lights, signs, and associated supporting equipment. According to AC-13A, electronic NAVAIDs emit an electronic signal that either (1) is received by special equipment located on the aircraft, or (2) provides information about the location of the aircraft for air traffic control (ATC) purposes. Visual NAVAIDs consist of a light source that is perceived and interpreted by the pilot.

According to AC-13A, any object that is located near an active runway can present an increased risk to aircraft operations. Objects within the ROFA, RSA and Obstacle Free Zone (OFZ) are not permitted unless the object is required to be in a certain location to perform its function. In this case, AC-13A requires that the object within the RSA be supported by frangible structures to minimize damage to aircraft in the case of an accidental strike. **Table 4-2** lists select NAVAIDs which may be permitted within the RSA or ROFA because of their fixed-by-function status.

There are several NAVAIDs in place at DMW, including the following which are highlighted in **Table 4-2**:

- MIRL (Medium-Intensity Runway Lights)
- MITL (Medium-Intensity Taxiway Lights)
- REIL (Runway End Identifier Lights)
- PAPI (Precision Approach Path Indicator)
- Rotating Beacon
- Lighted Wind Indicator
- AWOS (Automated Weather Observation Station)

Table 4-2: Fixed-by-Function Designation for NAVAIDs for RSA and ROFA

NAVAID	Fixed-by-Function		
	In RSA	**In ROFA**	**Associated Equipment**
Airport Beacon	No	No	N/A
Approach Lighting System (ALS)	Yes	Yes	No[1]
Airport Surveillance Rader (ASR)	No	No	N/A
Automated Weather Observation Station (AWOS)	No	No	N/A
DME	No	No	No
Glideslope	No[2]	No[2,3]	No
Lead-In Lighting System (LDIN)	Yes	Yes	No[1]
Localizer	No	No	No
LLWAS	No	No	No
Non-Directional Beacon (NDB)	No	No	N/A
REIL	Yes	Yes	No[1]
Runway Lights/Signs	Yes	Yes	No
RTR	No	No	No
RVL	No	Yes	Yes
RWSL	Yes	Yes	No
Taxiway Lights/Signs	Yes	Yes	No
VOR/TACAN/VORTAC	No	No	N/A
PAPI & VASI	Yes	Yes	No
WAAS	No	No	No
WCAM	No	No	No
WEF	No	No	No
Windcone	No	No	No

Source: AC 150/5300-13A

Notes:

1. Flasher light power units (Individual Control Cabinets) are fixed-by-function.

2. End Fire glideslopes are fixed-by-function in the RSA/ROFA.

3. Allowing a GS within ROFA due to a physical constraint should be evaluated on a case-by-case basis.

Several airport signs are located within the RSA, ROFA and OFZ at DMW. Per AC 150-13A, runway signs are permitted within the RSA and ROFA (see **Table 4-2**).
No NAVAIDs penetrate the FAR Part 77 surface.

The design standards prescribed in AC-13A help to maintain safety and efficiently at airports according to national policy. Complying with the standards included in the AC ensures that aircraft in a particular category can operate at the Airport without restrictions or encumbrances which could impact safe operations.

Chapter Five
Cost Estimates and Funding Sources

5.1 INTRODUCTION

This section provides a development program which has been prepared for the airport for short-range (1-5 years), intermediate-range (6-10 years), and long-range (11-20 years) planning periods, addressing identified airfield needs according to air traffic projections for each period. Capital cost estimates (in current year dollars) have been developed to reflect the phase-by-phase airport development based on the recommend Airport Layout Plan (ALP). The budget data provided in this chapter represents an order-of-magnitude estimate of the total project cost, including construction and additional expenses such as engineering, administration, surveying, and testing. These are preliminary estimates for planning purposes; more detailed cost estimates should be developed prior to the implementation of a project in order to ensure that sufficient funding is available to complete the identified scope of work. To this end, project cost estimates should be periodically reviewed and updated to reflect annual inflation and other changing conditions. The recommended phasing plan should also be evaluated periodically and adjusted to reflect changes in demand, local priorities, economic conditions, and availability of funding.

5.2 COST ESTIMATES

Table 5-1: Short-Term Capital Improvement Projects					
		Funding			
Year	**Project Description**	**FAA**	**MAA**	**Local /Other**	**TOTAL**
1	Environmental Assessment	$270,000	$15,000	$15,000	$300,000
	YEAR 1 TOTAL	**$270,000**	**$15,000**	**$15,000**	**$300,000**
2	Land Acquisition	$4,500,000	$250,000	$250,000	$5,000,000
2	Obstruction Removal	$500,000	$25,000	$25,000	$500,000
	YEAR 2 TOTAL	**$5,000,000**	**$275,000**	**$275,000**	**$5,500,000**
3	Relocate Meadowbranch Road (Design)	$630,000	$35,000	$35,000	$700,000
3	Construct Runway (Design)	$4,320,000	$240,000	$240,000	$4,800,000
3	Construct 2 Corporate Hangars	$0	$0	$9,000,000	$9,000,000
	YEAR 3 TOTAL	**$4,950,000**	**$275,000**	**$9,275,000**	**$14,500,000**
4	Relocate Meadowbranch Road (Construction)	$2,700,000	$150,000	$150,000	$3,000,000
4	Runway, Parallel Taxiway (Design)	$2,250,000	$125,000	$125,000	$2,500,000
	YEAR 4 TOTAL	**$4,950,000**	**$275,000**	**$275,000**	**$5,500,000**
5	Runway, Parallel Taxiway (Design)	$360,000	$20,000	$20,000	$400,000
5	Construct Runway (Construction)	$4,640,000	$257,777	$257,779	$5,155,556
	YEAR 5 TOTAL	**$5,000,000**	**$277,777**	**$277,779**	**$5,555,556**

Table 5-2: Intermediate-Term Capital Improvement Projects					
		Funding			
Year	**Project Description**	**FAA**	**MAA**	**Local/Other**	**TOTAL**
1	Construct Runway (Construction)	$5,000,00 0	$277,777	$277,779	$5,555,556
	YEAR 1 TOTAL	**$5,000,00**	**$277,777**	**$277,779**	**$5,555,556**
2	Construct Runway (Construction)	$5,000,00 0	$277,777	$277,779	$5,555,556
2	Construct 2 Corporate Hangars			$8,000,000	$8,000,000
	YEAR 2 TOTAL	**$5,000,00**	**$277,777**	**$8,277,779**	**$13,555,55**
3	Construct Runway (Construction)	$5,000,00 0	$277,777	$277,779	$5,555,556
3	Terminal Parking (Design & Construction)	$0	$0	$1,400,000	$1,400,000
	YEAR 3 TOTAL	**$5,000,00**	**$277,777**	**$1,677,779**	**$6,955,556**
4	Construct Runway (Construction)	$5,000,00 0	$277,777	$277,779	$5,555,556
4	Terminal Building (Design & Construction)	$0	$0	$2,500,000	$2,500,000
	YEAR 4 TOTAL	**$5,000,00**	**$277,777**	**$2,777,779**	**$8,055,556**
5	Construct Runway (Construction)	$5,000,00 0	$277,777	$277,779	$5,555,556
	YEAR 5 TOTAL	**$5,000,00**	**$277,777**	**$277,779**	**$5,555,556**

Table 5-3: Long-Term Capital Improvement Projects					
		Funding			
Year	**Project Description**	**FAA**	**MAA**	**Local/Other**	**TOTAL**
1	Construct Runway (Construction)	$5,000,000	$277,777	$277,779	$5,555,556
	YEAR 1 TOTAL	**$5,000,000**	**$277,777**	**$277,779**	**$5,555,556**
2	Construct Runway and Parallel Taxiway (Construction)	$5,000,000	$277,777	$277,779	$5,555,556
	YEAR 2 TOTAL	**$5,000,000**	**$277,777**	**$277,779**	**$5,555,556**
3	Parallel Taxiway (Construction)	$5,000,000	$277,777	$277,779	$5,555,556
3	Corporate Hangar (Design & Construction)	$0	$0	$3,000,000	$3,000,000
	YEAR 3 TOTAL	**$5,000,000**	**$277,777**	**$3,277,779**	**$8,555,556**
4	Parallel Taxiway (Construction)	$5,000,000	$277,777	$277,779	$5,555,556
	YEAR 4 TOTAL	**$5,000,000**	**$277,777**	**$277,779**	**$5,555,556**
5	Parallel Taxiway (Construction)	$5,000,000	$277,777	$277,779	$5,555,556
	YEAR 5 TOTAL	**$5,000,000**	**$277,777**	**$277,779**	**$5,555,556**
6	Parallel Taxiway (Construction)	$1,429,000	$79,444	$79,445	$1,588,884
6	Expand Terminal Apron (Design)	$414,000	$23,000	$23,000	$460,000
6	Construct 3 Corporate Hangars (Design & Construction)	$0	$0	$10,000,000	$10,000,000
	YEAR 6 TOTAL	**$1,843,995**	**$102,444**	**$10,102,445**	**$12,048,884**
7	Expand Terminal Apron (Construction)	$3,366,000	$187,000	$187,000	$3,740,000
	YEAR 7 TOTAL	**$3,366,000**	**$187,000**	**$187,000**	**$3,740,000**
8	Expand North Apron (Design)	$414,000	$23,000	$23,000	$460,000
	YEAR 8 TOTAL	**$414,000**	**$23,000**	**$23,000**	**$460,000**
9	Expand North Apron (Construction)	$3,366,000	$187,000	$187,000	$3,740,000
	YEAR 9 TOTAL	**$3,336,000**	**$187,000**	**$187,000**	**$3,740,000**
10	Expand South Apron (Design)	$234,000	$13,000	$13,000	$260,000
	YEAR 10 TOTAL	**$234,000**	**$13,000**	**$13,000**	**$260,000**

5.3 SUMMARY OF FUNDING SOURCES

The purpose of this section is to analyze the capacity of the Carroll County Board of Commissioners to undertake the recommended projects included on the recommended ALP. It is anticipated that four primary sources of funding would be utilized to implement the Airport's Capital Improvement Program (CIP). These sources include: Federal Aviation Administration (FAA), Maryland Aviation Administration (MAA), local funding, and private investment. Each governmental source may have specific eligibility criteria and application guidelines that require diligent planning and administration to ensure that sufficient funds are received to implement this program.

A) FAA - Airport Improvement Program (AIP)

The Airport Improvement Program (AIP) provides federal grants to public agencies for the planning and development of public-use airports which are included in the National Plan of Integrated Airport Systems (NPIAS). The NPIAS identifies nearly 3,400 airports in the United States that are considered to be significant to the national air transportation system, and therefore are eligible to receive federal grants under the AIP. As mentioned previously, DMW is included in the NPIAS which classifies it as a *reliever* airport. For small primary, reliever, and general aviation airports, the AIP grant covers a range of 90-95 percent of eligible costs, based on statutory requirements. Eligible projects include those improvements related to enhancing airport safety, capacity, security, and environmental concerns. Projects related to airport operations and revenue-generating improvements (such as hangar buildings) are typical not eligible for grants.

B) Maryland Aviation Administration (MAA)

The Maryland Aviation Administration's (MAA) Statewide Airport Development Grant Program offers financial assistance to public-use airports receiving eligible funds through the FAA-funded AIP. The MAA program is designed to provide half of the project cost for the local share of an AIP project- that is, if the AIP-funded portion of a project is 90-percent, then the MAA would fund half (5-percent) of the remaining 10-percent of the project cost. State funds are made available by annual budget authorizations; funds for individual airport projects are administered by the MAA's Office of Regional Aviation Assistance (ORAA).

C) Local Funds

Airports have the ability to fund capital projects from surplus revenues generated at the airport; funds generated through the issuance of airport bonds; and public infrastructure or development funds provided by, or to, the local government operator of the airport.

D) Private Investment

Private funds are assumed to be provided by airport tenants or third-party investors. Privately-funded projects are typically reserved for non-eligible items including revenue-generating improvements (such as hangar space, parking, concession space, and car rental).

APPENDIX A

Airport User Letters of Support

DELTA AIRPORT
CONSULTANTS, INC.

Joseph D. McKelvey
Manager
Carroll County Regional Airport
200 Airport Road
Westminster, MD 21157

Dear Mr. McKelvy,

We appreciate the opportunity to voice our support for the proposed airport runway expansion. As you know, Skytech, Inc. brings in service clients typically in from a 500 mile radius and our sales operations attracts clients from the US and Internationally. Additionally, our FBO operations and our affiliations with Flight Options and Flex Jets allows us to attract and attempt to base here at DMW much larger aircraft than we normally service in our FAA Certified Repair Station. Our expansion in this segment of our business will be most affected by the runway expansion and is critical to our continued growth here at DMW. The typical aircraft we are looking to expand operations with are the 604 /605 Challengers, Falcon series 900 /2000, Hawker 800's, Phenom 300, Lear 55/60, Legacy 135, PC24 and Citation X aircraft. This mix of aircraft covers our strategic partners preferred mix of aircraft and offers the passenger capacity and range that is increasingly in demand in the marketplace.

The issue we have with the existing runway is that the aforementioned list of aircraft can all operate out of here with varying degrees of limitations. In ideal conditions - such as day, dry and VFR they still run into situations where they can barely take enough fuel to complete the trips typically run on these ships with the typical passenger load due to the accelerated stop distance runway requirements for jets. If the conditions here provide a wet or contaminated runway, low IFR or cross winds they cannot take off or return to DMW and have to look at alternate airports and when the trips are running FAA part 135 the rules are even tighter. Even slightly contaminated runways can add twice the normal runway landing distance required as noted in FAA AC91-79. In short, part 135 charter, corporate operations and operators looking to base at an airport have to have an expectation that they are likely to be able to depart, complete a trip and return safely in reasonable conditions. Based on the existing 5,100' runway, this is not an assurance these turbine operators can provide to their clients. So, they remove the question and fly to another local airport that may not be as convenient but, allows them to complete their missions safely.

In conclusion, we have continued to expand the base of operations at DMW. But, we are limited with the existing runway and even some of our existing base clients, especially the Phenom 300, Citation Excel and Falcon 2000 find themselves routinely diverting to Martin State or Harrisburg due to the runway length requirements. While a 6000 ft runway would provide for a majority of operations in reasonable weather; even a 500' expansion would add to our runway margins and allow us to better service and retain our existing clients as well as inviting aircraft to return to DMW that have not been able to operate out of here regularly. If you have any questions or would like to discuss this matter further please feel free to contact me.

Best regards,

David E. Conover
Vice President
Skytech, Inc.

Skytech, inc.

1/23/14

Mr. Joseph D. McKelvey
Manager
Carroll County Regional Airport
200 Airport Drive
Westminster, MD 21157

Mr. McKelvey,

As a follow up to our letter of December 17th, we have reviewed the flight manuals for some of the targeted aircraft that we mentioned. Additionally, we questioned some of our existing customers as well as some potential new customers to obtain runway data under varying conditions for their aircraft. While some of these aircraft use us on occasion, they cannot use Westminster as their principle base since during certain weather conditions or when they have high passenger loads (in most cases that is somewhere in the 6-10 pass) coupled with a trip that may exceed 1000 nautical miles or more. Unfortunately, that trip scenario can be more the norm than the exception since that is what the mid-size jets are designed for. Basically, since everything revolves around operating safety margins; the existing runway creates an obstacle for anyone looking to base a ship here or be able to plan on using Westminster as a regular base of operations.

As an example – as part of my search I tried to obtain information from a potential flight department for a "very notable" Baltimore based business whom looked at Westminster to move their Falcon 2000 and G250 here from Martin State and they advised me that after looking at the option to move very seriously, they decided to extend their lease at Martin State due to the runway limitations here. However, when their lease expires they will evaluate all their options again at that time. We had acceptable quotes on the table and available facilities for them. Hopefully the next time around we will be able to add the runway extension to seal the deal.

The Phenom 300 that is based here is on the attached list even though the numbers looks like there is a good safety margin. But, we have to remember that jets and FAA 135 operations dictate runway performance at very specific speeds, exact 3 degree decent/ approach profiles and plan a touchdown on the "runway touchdown markings" which are located approximately 1000' down the runway and not before. Since landing distances are computed on "available" remaining runway after landing; if a flight crew does everything perfect in accordance with FAA Advisory Circular AC91-79 they have approximately 4000' of useable runway. Aircraft that try and cut it closer to the very end of the runway risk landing short and may have also violated the safety margins built into the normal flight path approach to the runway for obstacle avoidance.

In short, I hope this information is useful as the process continues on evaluating runway requirements here at Westminster. If you have any questions please feel free to contact me.

Thanks,

David E. Conover
Vice President
Skytech, Inc.

200 Airport Drive Westminster, MD 21157 Office: (410) 574-4144 Fax: (410) 876-0386
Baltimore • Charlotte • www.skytechinc.com

Aircraft type	Gross weight rnwy 34 dry std temp	Gross weight rnwy 16 dry std temp	Gross weight rnwy 34 dry 85 f temp	Gross weight rnwy 16 dry 85 f temp	Gross weight rnwy 34 wet	Gross weight rnwy 16 wet	Gross weight rnwy 34 snow contam.	Gross weight rnwy 16 snow contam.	Gross weight rnwy 34 10/20 kts cross wind	Gross weight rnwy 16 10/20 kts cross wind
Phenom 300	3300	3220	3800	3740	4100	4006	4800	4700	3300	3220
Lear 60	5600	5400	6200	5950	6000	5900	5700/ 9400	5600/ 9400	5700	5600
Citation X	5310	5930	5930	5930	6060	6060	6106	6819	n/a	n/a
Falcon 2000	5515	5315	6065	5829	5830	5745	6870	6603	5515	5315
Challenger 605	6295	6295	6780	6780	9820	9820	9178	9178	6295	6295
Challenger 300	4990	4900	5250	5154	5270	5182	4880	4920	4990	4900
G4	5760	5760	6210	6210						
G5	6320	6006	6520	6353	6423	6243	7868	6906	6320	6006

Numbers represent the highest of either take-off or landing distances required. Information received from current operators and from performance data in aircraft flight manuals.

December 4, 2013

Mr. Joe Mckelvey
Airport Manager
Carroll County Regional Airport
203 Airport Drive, #4
Westminster, MD 21157

Dear Mr. Mckelvey,

Thank you for the opportunity to voice our support of the proposed runway extension at Carroll County Regional Airport (KDMW). Our company, TTi, currently bases two jets at your airport, a Citation XLS CE560XL and a Falcon 2000 EX EASy DA2TH.

In reviewing the operational capabilities and requirements of our Falcon and given our typical mission profile, we frequently need the capability to depart KDMW with a useful load at or above 90 percent. The existing runway length is inadequate to support our operations year round and during all weather conditions. I have enclosed sample performance computations for the Falcon which demonstrate the limitations for our operation. Our maximum certified takeoff weight is 42,800 pounds and our basic operating weight (no fuel or passengers/cargo is 25,500 pounds) and our max mission fuel is 16,700 pounds. Without any cargo or passengers but WITH full fuel, our weight is 42,200. There are NO scenarios where we can depart with full fuel much less with any passengers/cargo with full fuel. Best case scenario is that we depart with one passenger and 4500 pounds of fuel less than full.

As you can see from the attached for the 28 degrees C and 30 degrees C table, we not only cannot take enough fuel for the range of the aircraft, we cannot take passengers on long range trips.

I have also included landing performance tables. These tables demonstrate that we cannot land at KDMW in virtually ANY contaminated condition including wet runway. We use the 1.67 landing factor of FAR 135 guidance even though we operate our aircraft FAR Part 91. The included landing tables are only run for 115% of actual landing distance. NOT any landing factor.

The TTi flight mission has been limited because of runway length at KDMW. We have to position to KMDT or KBWI to go on longer trips with passengers. In the last 9 months, we have flown to Asia, Europe and multiple times to the US West Coast. In many instances we have had to reposition to another airport or alter itineraries to depart for our destination. In the coming months/years we will be increasing our international destinations in location and frequency as well as the US West Coast. We anticipate multiple trips to Europe, Asia and South America. We possibly will be also looking at replacement aircraft for greater mission capability, which will enhance our need for longer runway. In order to maximize our current aircraft capabilities on our longest missions, a 6500 foot runway would be ideal. It would allow us to depart in the summer months on most long range missions and would allow a safety margin in the winter months with colder temperature long range flight departures as well as dealing with contaminated runway arrivals in many instances.

I would be happy to expound on my analysis and answer any questions you may have.

Thank you for your efforts to make Carroll County Airport a true business airport.

Sincerely,

Steve Brodie
Chief Pilot/ Aviaiton Manager
TTi Aviation LLC
203 Airport Drive Corporate Hangar #3
Westminster, MD 21157

-- -KDMW --	TAKEOFF PERFORMANCE DASSAULT FALCON 2000LX PW 308C ENG	-- -KDMW -- WESTMINSTER, MD CARROLL COUNTY REGL/POAGE
ELEVATION 789		

*** APR ARMED *** TAKEOFF SF2 (20.0 FLAPS+SLATS) AIR CONDITIONING BLEEDS AUTO

RUNWAY		16	34	
TORA(FT)		5100	5100	
TODA(FT)		5100	5100	CLIMB
ASDA(FT)		5100	5100	
SLOPE(%)		-0.29	0.29	LIMIT
TMP DEG C	N1- A/I OFF/ENG	LIMIT WEIGHT / LIMIT CODE		
28	96.7	38584 FL	37964 FL	42800.
30	96.4	38385 FL	37765 FL	42800.
32	96.1	38024 FL	37413 FL	42800.
34	95.8	37663 FL	37062 FL	42800.
36	95.0	37251 FL	36666 FL	42800.
HW	+LBS/KT	139	137	
TW	-LBS/KT	423	426	
QNH	+LBS/.1	113	113	
QNH	-LBS/.1	132	132	
ANTIICE ON-LBS		NA	NA	42800
ACCEL ALT(MSL)		2280	2280	

*** OBSERVE STRUCTURAL LIMITS *** 03Dec13

-- -KDMW --	TAKEOFF PERFORMANCE	-- -KDMW --
	DASSAULT FALCON 2000LX	WESTMINSTER, MD
ELEVATION 789	PW 308C ENG	CARROLL COUNTY REGL/POAGE

*** APR ARMED *** TAKEOFF SF2 (20.0 FLAPS+SLATS) AIR CONDITIONING BLEEDS AUTO

*** WET RUNWAY ***

RUNWAY		16	34	
TORA(FT)		5100	5100	
TODA(FT)		5100	5100	CLIMB
ASDA(FT)		5100	5100	
SLOPE(%)		-0.29	0.29	LIMIT
TMP	N1- A/I			
DEG C	OFF/ENG	LIMIT WEIGHT / LIMIT CODE		
28	96.7	36928 FL	36877 FL	42800.
30	96.4	36741 FL	36689 FL	42800.
32	96.1	36434 FL	36384 FL	42800.
34	95.8	36128 FL	36078 FL	42800.
36	95.0	0 FL	0 FL	42800.
HW	+LBS/KT	135	135	
TW	-LBS/KT	NA	NA	
QNH	+LBS/.1	104	104	
QNH	-LBS/.1	127	127	
ANTIICE ON-LBS		NA	NA	42800
T/R INOP -LBS		0	0	
ACCEL ALT(MSL)		2280	2280	

*** OBSERVE STRUCTURAL LIMITS *** 03Dec13

-- -KDMW -- LANDING PERFORMANCE -- -KDMW --
DASSAULT FALCON 2000LX WESTMINSTER, MD
ELEVATION 789 PW 308C ENG CARROLL COUNTY REGL/POAGE

*** APPROACH CLIMB LIMITS - APPROACH SF1 (10 FLAPS+SLATS) ***
CLIMB PERFORMANCE NOT LIMITING BELOW 50 (C)

TEMP(C)	-20	50
CLMB WT	39300.	39300.

CORRECTIONS: APU DOOR OPN SUBTRACT 0 POUNDS ABOVE -20. DEGREES C
ANTIICE ON SUBTRACT 0 POUNDS ABOVE -20. DEGREES C
A/I ON + RESIDUAL ICE SUBTRACT 0 POUNDS ABOVE -20. DEGREES C

*** LANDING FIELD LENGTH LIMITS - LANDING SF3 (40 FLAPS+SLATS)

RUNWAY LENGTH SLOPE	WIND KTS	-- ALL BRAKES OPERATIVE -- FACTOR 60% DRY	WET	FACTOR 80% DRY	WET	UNFACTORED DRY	WET	ONE BRK INOP 10% PENALTY DRY	WET
	-10	25540	NA	39269	32180	39300	39300	39300	38169
	-5	29088	23201	39300	35821	39300	39300	39300	39300
16									
5100FT	0	32401	26367	39300	39292	39300	39300	39300	39300
-0.29									
	10	34827	28814	39300	39300	39300	39300	39300	39300
	20	37284	31098	39300	39300	39300	39300	39300	39300
	CRIT TW	0	0	-5	0	-10	-10	-10	-5
	-10	25540	NA	39269	32180	39300	39300	39300	38169
	-5	29088	23201	39300	35821	39300	39300	39300	39300
34									
5100FT	0	32401	26367	39300	39292	39300	39300	39300	39300
0.29									
	10	34827	28814	39300	39300	39300	39300	39300	39300
	20	37284	31098	39300	39300	39300	39300	39300	39300
	CRIT TW	0	0	-5	0	-10	-10	-10	-5

03Dec13

-- -KDMW -- LANDING PERFORMANCE -- -KDMW --

DASSAULT FALCON 2000LX WESTMINSTER, MD

ELEVATION 789 PW 308C ENG CARROLL COUNTY REGL/POAGE

*** APPROACH CLIMB LIMITS - APPROACH SF1 (10 FLAPS+SLATS) ***

CLIMB PERFORMANCE NOT LIMITING BELOW 50 (C)

TEMP(C)	-20	50
CLMB WT	39300.	39300.

CORRECTIONS: APU DOOR OPN SUBTRACT 0 POUNDS ABOVE -20. DEGREES C
ANTIICE ON SUBTRACT 0 POUNDS ABOVE -20. DEGREES C
A/I ON + RESIDUAL ICE SUBTRACT 0 POUNDS ABOVE -20. DEGREES C

*** LANDING FIELD LENGTH LIMITS - LANDING SF3 (40 FLAPS+SLATS)

BASED UPON 115% OF AFM SUPPLEMENT 1 LANDING DISTANCES

RUNWAY LENGTH SLOPE	WIND KTS	--- CONTAMINATED RUNWAYS - T/R OPERATIVE --- STD WATER / SLUSH .12 IN	.25 IN	.50 IN	SNOW .12 IN	.25 IN	.50 IN	COMPACT SNOW	ICE
	-10	NA	NA	NA	24151	27068	27068	27068	NA
	-5	22440	22440	20219	27578	30586	30586	30586	NA
16									
5100FT	0	25544	25544	23375	30882	33970	33970	33970	NA
-0.29									
	10	27995	27995	25601	33319	36467	36467	36467	NA
	20	30297	30297	27980	35677	38812	38812	38812	NA
	CRIT TW	0	0	0	0	0	0	0	0
	-10	NA	NA	NA	24151	27068	27068	27068	NA
	-5	22440	22440	20219	27578	30586	30586	30586	NA
34									
5100FT	0	25544	25544	23375	30882	33970	33970	33970	NA
0.29									
	10	27995	27995	25601	33319	36467	36467	36467	NA
	20	30297	30297	27980	35677	38812	38812	38812	NA
	CRIT TW	0	0	0	0	0	0	0	0

03Dec13

Roy G. Lewis

From: Allan Ball [ball@netjets.com]
Sent: Thursday, October 03, 2013 9:34 AM
To: Roy G. Lewis
Subject: RE: DMW Operations

Good morning Roy,

Here's the breakdown for DMW:

2007 – 96 operations
2008 – 126
2009 – 42
2010 – 50
2011 – 36
2012 – 27
2013 – 46

BE400 – 26
CE525B – 2
CE560 – 28
CE560E – 28
CE560EP – 15
CE560XL – 58
CE560XLS – 55
CE680 – 18
CE750 – 18
DA2000 – 2
DA2EASY – 2
EMB505 – 2
G200 – 14
G450 – 6
GIV – 97
GIV-SP – 14
HS-125-800 – 28
HS-125-900 – 4
LR-45 – 2
S-76C – 4

I was surprised to see this much activity. I highlighted the types that are probably the most performance limited at 5100 feet in our fleets. Note the 117 Gulfstream 450/IV operations. At 5100 feet of runway length, the aircraft type is fairly close to dry only landings. It seems like the flight activity is up a little this year; last year looked really slow.

Things are busy here – Global and Embraer aircraft now online, soon with the Challenger 350.

Let me know if this helps you out.

Al Ball
Manager
Operational Intelligence & Analysis
NetJets® Inc.

BOMBARDIER

CHALLENGER 605

GENERAL SPECIFICATIONS. PERFORMANCE. DIMENSIONS.

BOMBARDIER
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Equipped with the new Rockwell Collins Pro Line 21 avionics suite and a redesigned, more spacious interior, the Bombardier Challenger* 605 business jet elevates the Challenger tradition of productivity and value to a whole new level. Its next-generation flight deck offers a 55% increase in total display area and state-of-the-art LCD technology that supports real-time satellite graphical weather and Electronic charts to enhance situational awareness and reduce pilot workload. To ensure greater passenger comfort in flight, its fully rethought and restyled cabin offers increased usable volume and work area, and a new Ethernet-based Cabin Electronic System that features galley and VIP touch screen controls. An all-around performer, the Challenger 605 brings a new level of technology, flexibility and comfort to the skies, backed by the performance and reliability you expect from a Bombardier Challenger.*

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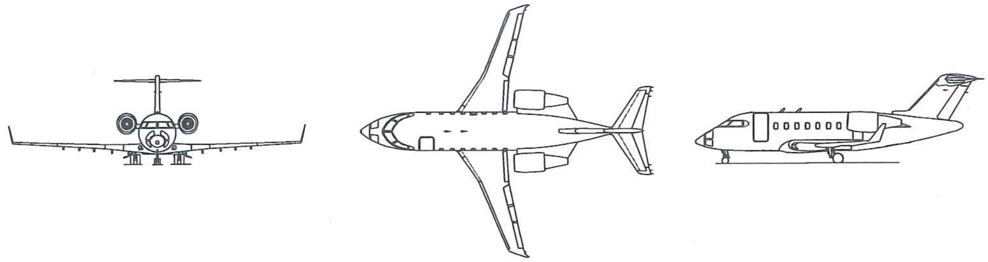
PERFORMANCE IS BASED ON MAXIMUM TAKEOFF/LANDING WEIGHT, SEA LEVEL, STANDARD DAY (ISA) CONDITIONS, UNLESS OTHERWISE NOTED.

PRINTED IN CANADA (11/05)



GENERAL

Capacity

Crew:	2+1
Passengers:	Up to 12

Engines

General Electric CF34-3B turbofans
Thrust: 8,729 pounds (38.84 kN) thrust at takeoff
9,220 pounds (41.0 kN) thrust APR
Flat-rating: ISA + 15°C (86°F)

Avionics

- Rockwell Collins Pro Line 21 with four 10" x 12" (25.4 cm x 30.5 cm) LCD screens and integrated menu control
- Dual autopilot with single autothrottle
- EFIS/EICAS system with synoptics
- Dual FMS-6000 with coupled lateral and vertical nav, performance calculations
- Dual Honeywell Laseref V Inertial Reference System with automatic position initialization
- Integrated Radio Tuning with Rockwell Collins Pro Line 21 VHF/Nav radios
- Integrated electronic standby instruments

PERFORMANCE

Range

Maximum range at M 0.74:	4,045 NM	4,655 SM	7,491 km
Maximum range at M 0.80:	3,732 NM	4,295 SM	6,912 km

(NBAA IFR Reserves, ISA, with 5 pax/2 crew and maximum fuel)

Speed	Mach	kt	mph	km/h
High-speed cruise	0.82	470	541	870
Typical cruise speed	0.80	459	528	850
Long-range cruise speed	0.74	425	489	787

Airfield Performance

Balanced field length (SL, ISA, MGTOW):	5,840 ft (1,780 m)
Landing distance (SL, ISA, MLW):	2,777 ft (846 m)

Ceiling

Maximum operating altitude:	41,000 ft (12,497 m)
Climb to cruise altitude of 37,000 ft (11,278 m):	22 minutes

Noise Level

EPNdB

Takeoff:	81.2
Approach:	90.3
Sideline:	86.2

DIMENSIONS

External

Length:	68.42 ft (20.85 m)
Wingspan:	64.33 ft (19.61 m)
Wing area: (basic)	492 ft^2 (45.71 m^2)
Height overall:	20.67 ft (6.30 m)

Internal

Cabin length: (from cockpit divider to end of pressurized compartment)	28.42 ft (8.66 m)
Cabin maximum width: (centerline)	8.17 ft (2.49 m)
Cabin width: (floorline)	7.17 ft (2.19 m)
Cabin height:	6.08 ft (1.85 m)
Floor area: (excluding cockpit)	202 ft^2 (18.77 m^2)
Total volume: (from cockpit divider to end of pressurized compartment)	1,150 ft^3 (32.56 m^3)

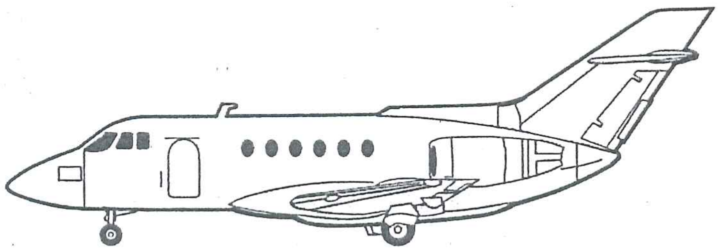
Weights

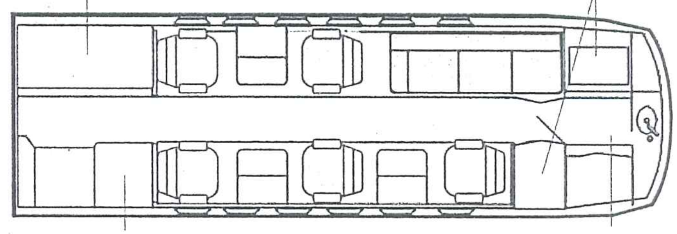
A. Maximum ramp weight:	48,300 lb (21,909 kg)
B. Maximum takeoff weight:	48,200 lb (21,863 kg)
C. Maximum landing weight:	38,000 lb (17,237 kg)
D. Maximum zero fuel weight:	32,000 lb (14,515 kg)
E. Standard basic operating weight:	26,985 lb (12,240 kg)
F. Maximum fuel weight:	20,000 lb (9,072 kg)
Payload – full fuel (A-E-F):	1,315 lb (596 kg)
Maximum payload (D-E):	5,015 lb (2,275 kg)
Fuel with maximum payload:	16,300 lb (7,394 kg)

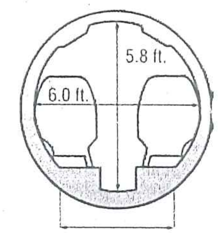
BOMBARDIER

Hawker 800

Mid-Cabin Jet







BASIC VARIABLE COST DATA

Variable Cost per Hour Components	
Engine and APU Maintenance Reserves	$344.98
Airframe Maintenance	$398.43
Fuel Cost @ $3.80 per gallon based on 260 gph	$988.00
Total Variable Cost per Hour	$1,731.41
Average Block Speed (kts / mph)	385 / 445
Variable Cost per Naut. Mile / Stat. Mile	$4.50 / $3.91

ADDITIONAL AIRCRAFT INFORMATION

Typical Passenger Capacity	8
Baggage Capacity External / Internal (cubic ft)	00.0 / 48.0
Years in Production	1984 - 1995
Number of Aircraft Produced (approximate)	360
Average Pre-Owned Asking Prices (in millions)	$4.2 - $6.7

BASIC AIRCRAFT PERFORMANCE DATA

Seats Full Range (Naut. Miles / Stat. Miles)	2,390 / 2,750
Ferry (No Payload) (Naut. Miles / Stat. Miles)	2,570 / 2,960
Balance Field Length* (Take-off Distance) (ft)	6,300
Landing Distance (ft)	3,825
Normal Cruise Speed (kts / mph)	430 / 495
Long Range Cruise Speed (kts / mph)	390 / 450
Ceiling Service (ft)	39,000

*Consideration must also be given to, but not limited to: passenger weights, baggage weight, winds, runway length, temperature and airport elevation.

Sterling Aviation

Sterling Aviation, LLC

FLAPS 15° with Zero Wind

Hard, level dry runway (APR ON) Tire speed 190 mph or 210 mph

NOTE: With engine antice ON, add 10° C to the actual air temperature before entering the table.

Field Pressure Altitude Feet	Airplane Weight lb: 28,000 OAT °C	TOFL	V_1 kts	V_R kts	V_2 kts	27,000 OAT °C	TOFL	V_1 kts	V_R kts	V_2 kts	26,000 OAT °C	TOFL	V_1 kts	V_R kts	V_2 kts
Sea Level						37	5800	124	130	136	39	5540	121	128	133
	34	5970	126	133	139	35	5630	123	130	136	35	5230	120	128	134
	30	5640	126	133	139	30	5250	122	130	137	30	4890	119	128	135
	25	5280	125	133	140	25	4920	121	130	138	25	4590	118	128	135
	20	5110	125	133	140	20	4760	121	130	138	20	4440	117	128	135
	15	5030	125	133	140	15	4700	121	130	138	15	4380	118	128	135
	10	4940	125	133	140	10	4610	121	130	138	10	4300	118	128	135
	5	4860	125	133	140	5	4530	121	130	138	5	4230	117	128	135
	0	4780	125	133	140	0	4460	121	130	138	0	4160	118	128	135
1000											36	5680	121	128	133
	31	6140	127	133	139	33	5870	124	130	136	35	5600	120	128	134
	30	6050	126	133	139	30	5620	123	130	137	30	5230	119	128	134
	25	5650	125	133	140	25	5260	122	130	137	25	4900	118	128	135
	20	5340	125	133	140	20	4980	121	130	138	20	4640	118	128	135
	15	5210	125	133	140	15	4850	121	130	138	15	4530	118	128	135
	10	5120	125	133	140	10	4780	121	130	138	10	4460	118	128	135
	5	5030	125	133	140	5	4700	121	130	138	5	4380	118	128	135
	0	4950	125	133	140	0	4630	121	130	138	0	4310	118	128	135
2000											33	5840	121	128	133
	27	6230	126	133	139	30	6040	124	130	136	30	5600	120	128	134
	25	6060	126	133	139	25	5630	123	130	137	25	5240	119	128	134
	20	5700	125	133	140	20	5310	122	130	137	20	4950	118	128	135
	15	5420	125	133	140	15	5050	121	130	138	15	4710	118	128	135
	10	5310	125	133	140	10	4950	121	130	138	10	4610	118	128	135
	5	5220	125	133	140	5	4860	121	130	138	5	4540	118	128	135
	0	5130	125	133	140	0	4790	121	130	138	0	4470	118	128	135
	V_{FTO} = 170 kts					V_{FTO} = 169 kts					V_{FTO} = 166 kts				
	V_{ERC} = 187 kts					V_{ERC} = 183 kts					V_{ERC} = 180 kts				
	V_{REF} = 137 kts					V_{REF} = 136 kts					V_{REF} = 134 kts				

GIV-SP TAKEOFF PLANNING CHART

WET RUNWAY **AIRPORT PRESSURE ALTITUDE = SEA LEVEL** **TAKEOFF FLAP 20°**

74,600 LB MTOGW	OAT (°C)	50	45	40	35	30	25	20	15	5	-5	-15
	OAT (°F)	122	113	104	95	86	77	68	59	41	23	5
	RATED EPR	1.59	1.62	1.64	1.67	1.70	1.70	1.70	1.70	1.69	1.69	1.69
– 74,600 LB –												
V_{FS} = 173 KCAS	FLD LNGTH	******	******	******	6,820	6,400	6,300	6,190	6,090	5,930	5,720	5,510
V_{SE} = 180 KCAS	V_1 KCAS	******	******	******	133	131	132	132	132	132	133	133
V_{REF} = 158 KCAS	V_R KCAS	******	******	******	146	145	145	145	145	145	145	145
MAX TEMP = 37°C	V_2 KCAS	******	******	******	150	150	150	150	150	150	150	150
– 70,000 LB –												
V_{FS} = 167 KCAS	FLD LNGTH	******	******	6,410	6,000	5,640	5,550	5,460	5,370	5,230	5,040	4,860
V_{SE} = 174 KCAS	V_1 KCAS	******	******	129	127	125	125	125	125	126	126	126
V_{REF} = 154 KCAS	V_R KCAS	******	******	141	140	140	140	140	140	140	140	140
MAX TEMP = 43°C	V_2 KCAS	******	******	145	145	145	145	145	145	145	145	145
– 65,000 LB –												
V_{FS} = 161 KCAS	FLD LNGTH	******	5,910	5,530	5,190	4,880	4,800	4,720	4,640	4,520	4,360	4,210
V_{SE} = 168 KCAS	V_1 KCAS	******	123	121	119	117	117	118	118	118	118	119
V_{REF} = 148 KCAS	V_R KCAS	******	136	135	134	134	134	134	134	134	134	134
MAX TEMP = 49°C	V_2 KCAS	******	140	140	140	140	140	140	140	140	140	140
– 60,000 LB –												
V_{FS} = 155 KCAS	FLD LNGTH	5,410	5,090	4,930	4,780	4,650	4,570	4,490	4,410	4,270	4,110	3,960
V_{SE} = 161 KCAS	V_1 KCAS	118	116	116	117	117	117	117	117	117	117	118
V_{REF} = 142 KCAS	V_R KCAS	130	129	129	128	127	127	127	127	127	127	127
MAX TEMP = 50°C	V_2 KCAS	135	135	135	135	135	135	135	135	135	135	135
– 55,000 LB –												
V_{FS} = 148 KCAS	FLD LNGTH	5,030	4,870	4,720	4,580	4,460	4,380	4,310	4,240	4,090	3,940	3,800
V_{SE} = 154 KCAS	V_1 KCAS	116	116	117	117	118	118	118	118	118	118	118
V_{REF} = 136 KCAS	V_R KCAS	126	125	124	124	123	123	123	123	123	123	123
MAX TEMP = 50°C	V_2 KCAS	131	131	131	131	131	131	131	131	131	131	131
– 50,000 LB –												
V_{FS} = 142 KCAS	FLD LNGTH	4,780	4,640	4,500	4,380	4,270	4,190	4,120	4,050	3,910	3,770	3,630
V_{SE} = 147 KCAS	V_1 KCAS	117	117	117	118	118	118	118	118	119	119	119
V_{REF} = 130 KCAS	V_R KCAS	125	124	123	122	122	122	122	122	122	122	122
MAX TEMP = 50°C	V_2 KCAS	131	131	131	131	131	131	131	131	131	131	131
– 45,000 LB –												
V_{FS} = 134 KCAS	FLD LNGTH	4,550	4,420	4,300	4,190	4,080	4,020	3,950	3,880	3,750	3,610	3,480
V_{SE} = 139 KCAS	V_1 KCAS	117	118	118	119	119	119	119	119	119	120	120
V_{REF} = 123 KCAS	V_R KCAS	124	123	122	121	121	121	121	121	121	121	121
MAX TEMP = 50°C	V_2 KCAS	131	131	131	131	131	131	131	131	131	131	131

NOTES: 1. INCREASE AVAILABLE FIELD LENGTH 2% FOR EACH 5 KNOTS HEADWIND (UP TO 40 KNOTS).
2. DECREASE AVAILABLE FIELD LENGTH 18% FOR EACH 1% OF UPHILL SLOPE (UP TO 2%).

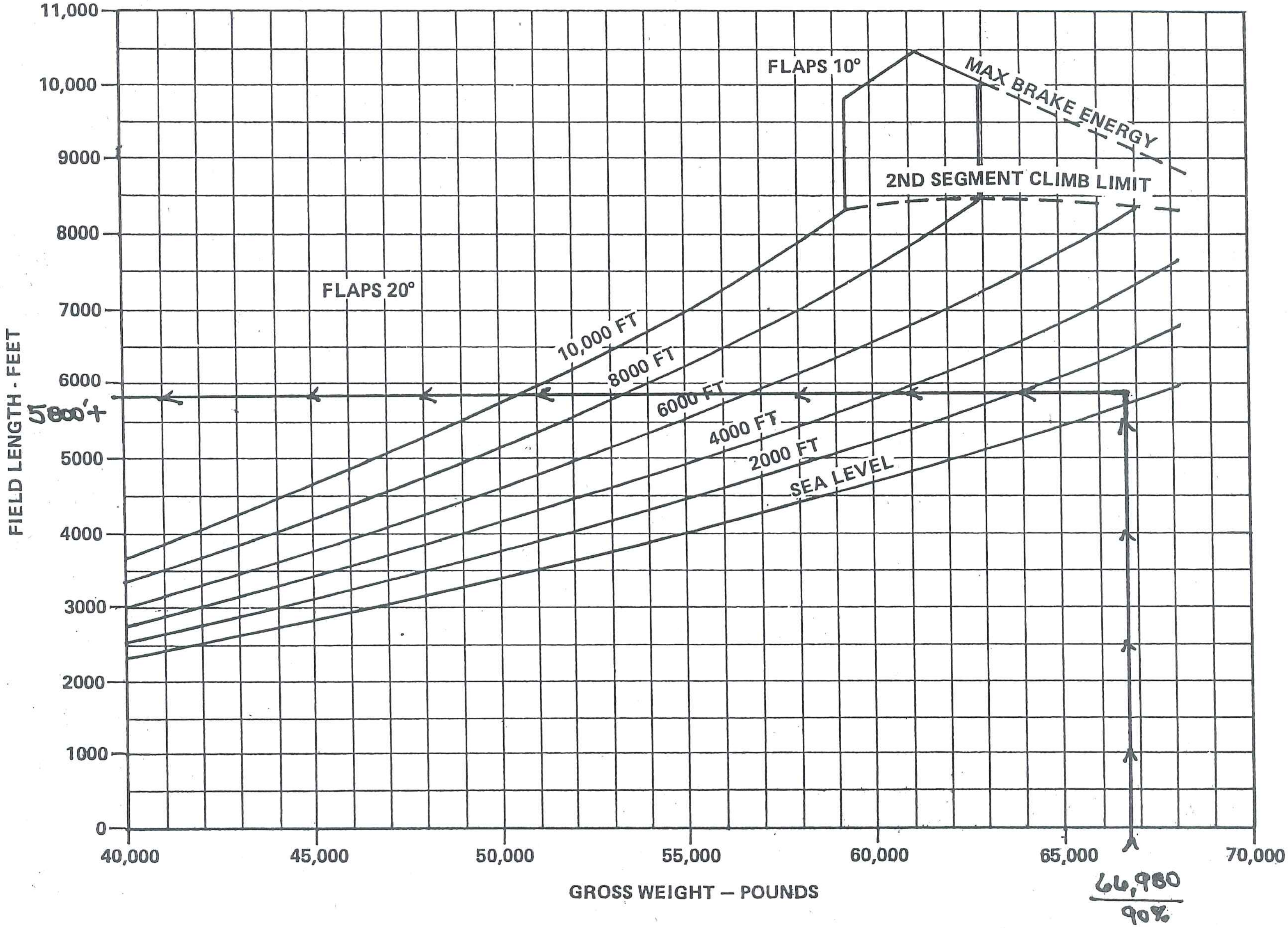
General Specifications

Gulfstream IV-SP
vs Gulfstream IV and Gulfstream III

	GIV-SP	GIV	GIII
Weights (lbs)			
Maximum Ramp Weight	75,000	73,600	70,200
Maximum Takeoff Weight	74,600	73,200	69,700
Maximum Zero Fuel Weight	49,000	46,500	44,000
Maximum Landing Weight	66,000	58,500	58,500
Typical Basic Operating Weight	42,500	42,500	38,000
Maximum Useful Load	32,500	31,100	32,200
Maximum Payload	6,500	4,000	6,000
Maximum Fuel Capacity (1)	29,500	29,500	28,300
Maximum Payload with Full Fuel	3,000	1,600	3,900
Maximum Fuel with Full Payload	26,000	27,100	26,200
Performance			
Standard Passenger Load	8	8	8
Initial Cruise Altitude - ft. (2)	41,000	41,000	41,000
Final Cruise Altitude - ft. (3)	45,000	45,000	45,000
Maximum Certified Altitude - ft.	45,000	45,000	45,000
Long Range Cruise Speed - Mach	0.80	0.80	0.77
Normal Cruise Speed - Mach	0.80	0.80	0.80
High Speed Cruise - Mach	0.85	0.85	0.85
Mmo - Mach	0.88	0.88	0.85
Range at Long Range Cruise - nm	4,220	4,220	3,691
Range at Mach 0.80 - nm	4,220	4,220	3,567
Range at High Speed Cruise - nm	3,056	3,018	2,819
FAA Takeoff Distance - ft. (4)	5,460	5,265	5,115
FAA Landing Distance - ft. (5)	3,190	3,393	3,250
All Engine Rate of Climb - ft/min (4)	4,122	4,219	4,049

(1) Fuel density = 6.75 lb/gal.
(2) ISA Conditions, Takeoff at MTOW
(3) Normal Cruise, max range mission, with fuel remaining for 2 hours flight, plus NBAA IFR reserves.
(4) Max Takeoff Weight, Sea Level, ISA Conditions
(5) Max Landing Weight, Sea Level, ISA Conditions

GULFSTREAM III
BALANCED FIELD LENGTH
ISA + 10° C



APPENDIX B

Noise Analysis Technical Appendix

DELTA AIRPORT
CONSULTANTS, INC.

CARROLL COUNTY REGIONAL AIRPORT MASTER PLAN UPDATE

Noise Analysis Technical Report

Prepared for:
Delta Airport Consultants

Prepared by:
KB Environmental Sciences, Inc.

FINAL
August 12, 2014

TABLE OF CONTENTS

SECTION 1
Introduction

Carroll County Regional Airport (DMW) located in Westminster, Maryland is currently preparing an update to its Master Plan. As part of the Master Plan Update, Noise Exposure Maps (NEMs) were prepared for the following scenarios:

- *Existing Conditions*, using the Master Plan baseline year of 2012;
- *Future No Build Conditions*, using the Master Plan out-year forecast for 2033; and,
- *Future Build Alternative*, including a proposed replacement runway using the same forecast year of 2033.

This noise analysis technical report describes the methodology used to develop the NEMs and the resulting noise exposure levels in the vicinity of the airport.

SECTION 2

Methodology

The NEMs were developed using the Federal Aviation Administration (FAA) Integrated Noise Model (INM) Version 7.0d. The INM was developed by the FAA using methods and calculations from SAE International's Aerospace Information Report (AIR) 1845, *Procedure for the Calculation of Airplane Noise in the Vicinity of Airports*.

The INM produces aircraft noise contours that delineate areas of equal day-night average sound levels (DNL). The INM works by defining a network of grid points at ground level around an airport. It then selects the shortest distance from each grid point to each flight track and computes the noise exposure generated by each aircraft operation, along each flight track. Corrections are applied for atmospheric acoustical attenuation, acoustical shielding of the aircraft engines by the aircraft itself, and aircraft speed variations. The noise exposure levels for each aircraft are then summed at each grid location. The cumulative noise exposure levels at all grid points are then used to develop noise exposure contours for selected values (e.g. 65, 70 and 75 DNL). Using the results of the grid point analysis, noise contours of equal noise exposure can then be plotted.

A DNL is a 24-hour (average day), time-weighted sound level that is expressed in A-weighted decibels and is abbreviated as dB(A) or dB. The FAA, and other federal agencies, use DNL as the primary measure of noise impact because: it correlates well with the results of attitudinal surveys regarding noise; it increases with the duration of noise events; and, it accounts for an increased sensitivity to noise at night by increasing each noise event that occurs during nighttime hours (i.e., 10 pm to 7 am) by 10 dB(A).

In Appendix A of 14 CFR Part 150, the FAA identifies, as a function of yearly (365-day average) DNL value, land uses which are compatible and land uses which are noncompatible in an airport environs. As shown in **Table 2-1**, the FAA considers all land uses to be compatible with aircraft noise if the DNL is less than 65 dB(A).

The procedures used to develop the 2012 and 2033 NEMs are described in 14 CFR Part150 Appendix A and Subpart B. Appendix A of 14 CFR Part 150 stipulates the following regarding the preparation, illustration, and documentation of NEMs:

- Continuous contours depicting 65, 70, and 75 DNL must be developed;
- NEMs must identify runway locations, flight tracks, an outline of an airport's boundaries, noncompatible land uses within the 65 DNL, and the location of noise sensitive buildings (e.g., schools, hospitals);
- Estimates are to be made of the number of people residing within the 65, 70, and 75 DNL contours.

Subpart B of 14 CFR Part 150 stipulates that forecast conditions are to be representative of conditions at least five years in the future and assumptions concerning future conditions are to be reasonable regarding, among other factors, the type and frequency of aircraft operations and the number of nighttime operations.

Table 2-1. Land Use Compatibility

Land use	DNL expressed in dB(A)					
	Below 65	65–70	70–75	75–80	80–85	Over 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N(1)	N(1)	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N(1)	N(1)	N(1)	N	N
Public Use						
Schools	Y	N(1)	N(1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y(2)	Y(3)	Y(4)	Y(4)
Parking	Y	Y	Y(2)	Y(3)	Y(4)	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail—building materials, hardware and farm equipment	Y	Y	Y(2)	Y(3)	Y(4)	N
Retail trade—general	Y	Y	25	30	N	N
Utilities	Y	Y	Y(2)	Y(3)	Y(4)	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y(2)	Y(3)	Y(4)	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y(6)	Y(7)	Y(8)	Y(8)	Y(8)
Livestock farming and breeding	Y	Y(6)	Y(7)	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y(5)	Y(5)	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts and camps	Y	Y	Y	N	N	N
Golf courses, riding stables and water recreation	Y	Y	25	30	N	N

SLUCM=Standard Land Use Coding Manual. Y (Yes) = Land Use and related structures compatible without restrictions. N (No) = Land Use and related structures are not compatible and should be prohibited. NLR = Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30, or 35=Land use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structure.
(1) Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.
(2) Measures to achieve NLR 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
(3) Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
(4) Measures to achieve NLR 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal level is low.
(5) Land use compatible provided special sound reinforcement systems are installed.
(6) Residential buildings require an NLR of 25.
(7) Residential buildings require an NLR of 30.
(8) Residential buildings not permitted.

Source: 14 CFR Part 150

SECTION 3

Existing Conditions (2012)

This section details the development of DNL contours at 65, 70, and 75 dB(A) for the current 2012 conditions. The data used as input to the INM for the year 2012 NEM were comprised of the following:

- Runway layout and use,
- Number of aircraft operations,
- Operational Time-of-Day,
- Aircraft fleet mix, and
- Flight tracks and profiles.

This section discusses each of the above data elements and concludes with the NEM.

3.1 Runway Layout and Use

DMW has one runway, Runway 16/34, which is 5,100 feet long and 100 feet wide. Of the two available runway ends, Runway 34 is used predominantly (90% of the time annually) versus Runway 16 which is used the remaining 10% of the time.

3.2 Aircraft Operations

An aviation activity forecast for DMW was prepared as part of the Master Plan Update with a baseline year of 2012. The overall forecast of aviation activity was divided into categories of aircraft. The 2012 aircraft operations by category is provided in **Table 3-1.** As shown, in 2012 there were 36,000 operations at DMW (an average of approximately 99 operations per day). An aircraft operation is defined as either one arrival or one departure. A touch-and-go operation – an arrival of an aircraft and the departure of the same aircraft – is defined as two operations.

Table 3-1. 2012 Aircraft Operations by Category

Aircraft Category	Operations
Single-Engine	29,109
Multi-Engine	5,510
Jet	646
Rotorcraft	735
Total	**36,000**

Source: 2014 Carroll County Regional Airport Master Plan Update

3.3 Operational Time-of-Day

As previously stated, DNL is calculated such that aircraft operations that occur after 10 pm and before 7 am (i.e., during the nighttime) are penalized by the addition of 10 dB(A) to each operation. Based on discussions with airport management, FBO staff, and airport users, it was estimated that approximately 3 percent of the operations at the airport occur during the nighttime hours.

3.4 Fleet Mix

The FAA's Traffic Flow Management System Count (TFMSC) for calendar year 2012 was used to develop the 2012 INM aircraft fleet mix for DMW. TFMSC data provides information on traffic counts by airport and includes the specific aircraft types operating at that airport. TFMSC source data are created when pilots file flight plans.

The INM includes a number of individual aircraft types as well as a number of FAA-approved substitute aircraft. The TFMSC data for DMW was reviewed and each aircraft type was assigned an INM aircraft type (or approved substitute).

For the purposes of preparing DNL contours, operational data were segregated by aircraft type and by type of operation. Aircraft operations were segregated as being local or itinerant. An itinerant operation is defined as an aircraft departure where the aircraft leaves the airport vicinity and lands at another airport, or an aircraft landing where the aircraft arrives from another airport. Local operations are aircraft conducting touch-and-go training operations. A touch-and-go operation occurs when an aircraft departs an airport, lands on a runway and then departs again without stopping.

The 2012 INM aircraft operations and fleet mix are provided in **Table 3-2.**

Table 3-2. 2012 Aircraft Operations and INM Fleet Mix

Operation Type	Aircraft Category	INM Aircraft	Annual Operations
Itinerant	Single-Engine Piston	GASEPV	1,930
		CNA172	269
		CNA182	109
		PA28	84
		CNA206	64
		GASEPF	10
		PA31	7
	Multi-Engine Piston	BEC58P	4,545
	Turbo-Prop	CNA208	491
		CNA441	415
		SD330	46
		1900D	8
		DHC8	3
		HS748A	2
	Jet	CNA560XL	156
		CNA55B	137
		CL600	111
		LEAR35	69
		MU3001	42
		IA1125	33
		F10062	22
		CNA560E	21
		CIT3	13
		CNA525C	12
		CNA510	8
		CNA680	6
		CNA750	6
		GIIB	4
		EMB145	2
		GIV	2
		LEAR25	2
	Rotorcraft		
		B206L	745
		Itinerant Total	*9,375*
Local	Single-Engine Piston		
		CNA172	26,625
		Local Total	*26,625*
		Grand Total	**36,000**

Sources: Traffic Flow Management System Counts (TFMSC), Master Plan Update

3.5 Flight Tracks and Profiles

The INM uses airport-specific ground tracks and vertical flight profiles to compute three-dimensional flight paths for each modeled aircraft. The “default” INM vertical profiles, which consist of altitude, speed, and thrust settings, are compiled from data provided by aircraft manufacturers.

The location of flight paths is an important factor in determining the geographic distribution of noise contours on the ground. Flight paths utilized by arriving, departing, and local touch-and-go aircraft operating in north flow (arrivals to and departures from Runway 34) and south flow (arrivals to and departures from Runway 16) were determined through interviews with airport management and airport users. A series of flight path centerlines were then established for each runway. These centerline tracks were splayed within the INM in order to reflect the typical range of flight paths used by individual flights. The itinerant INM flight tracks are shown on **Figures 3-1** and **3-2**. It should be noted that itinerant rotorcraft also utilize these tracks.

The local touch-and-go tracks are shown on **Figure 3-3**. There is a touch-and-go track from each runway end. Touch-and-go operations at DMW use a left traffic pattern from Runway 16 and a right pattern from Runway 34. The pattern altitude at DMW is 810 feet above field elevation (AFE).

3.6 2012 Noise Exposure Map

The aircraft noise contours for 2012 are provided on **Figure 3-4.** **Table 3-3** provides the area, in acres, of each contour interval (i.e., 65-69 DNL, 70-74 DNL, and 75 and greater DNL). As shown, the total area encompassed by the 65 DNL contour is 51.5 acres. The 65 DNL contour lies within the airport’s existing property boundary. There are no residences or other noise sensitive land uses within the 2012 65 DNL contour.

Table 3-3. 2012 Noise Contour Areas

DNL (dB(A))	Area (Acres)
65 - 69	32.8
70 - 74	12.7
75 +	6.0
Total	**51.5**

Source: INM 7.0d

Figure 3-1. 2012 INM Itinerant Flight Tracks – North Flow

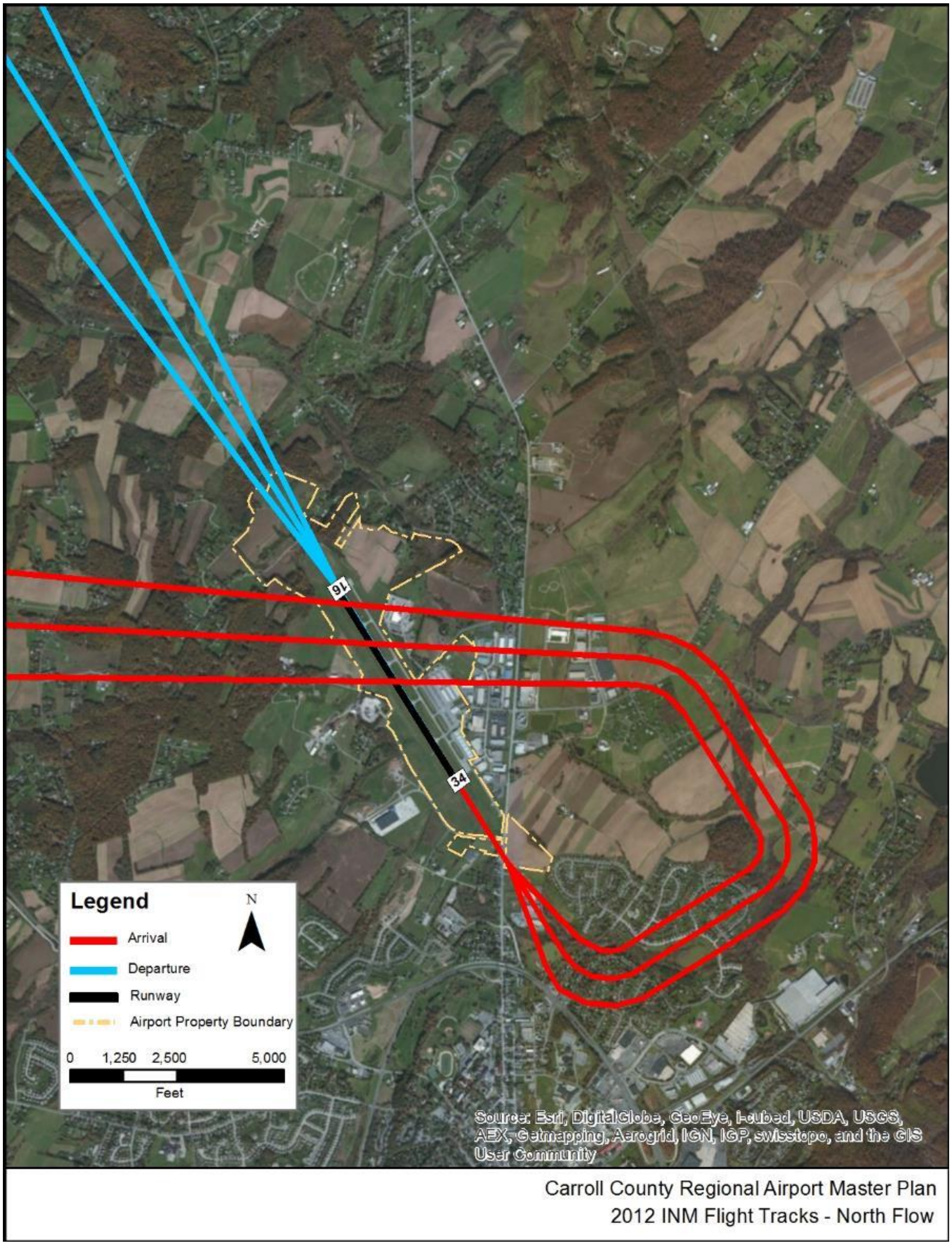


Figure 3-2. 2012 INM Itinerant Flight Tracks – South Flow

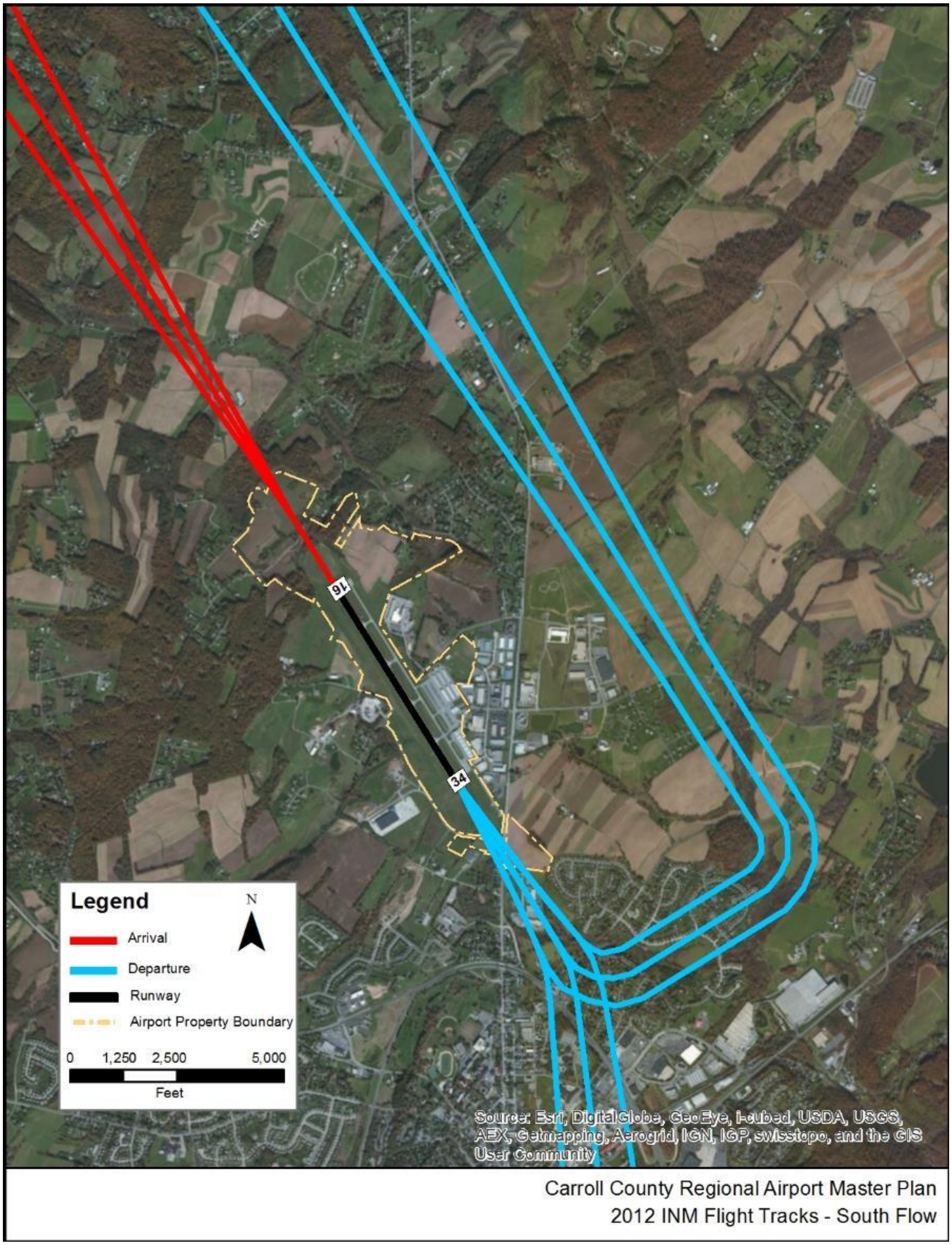


Figure 3-3. 2012 INM Local Touch-and-Go Flight Tracks

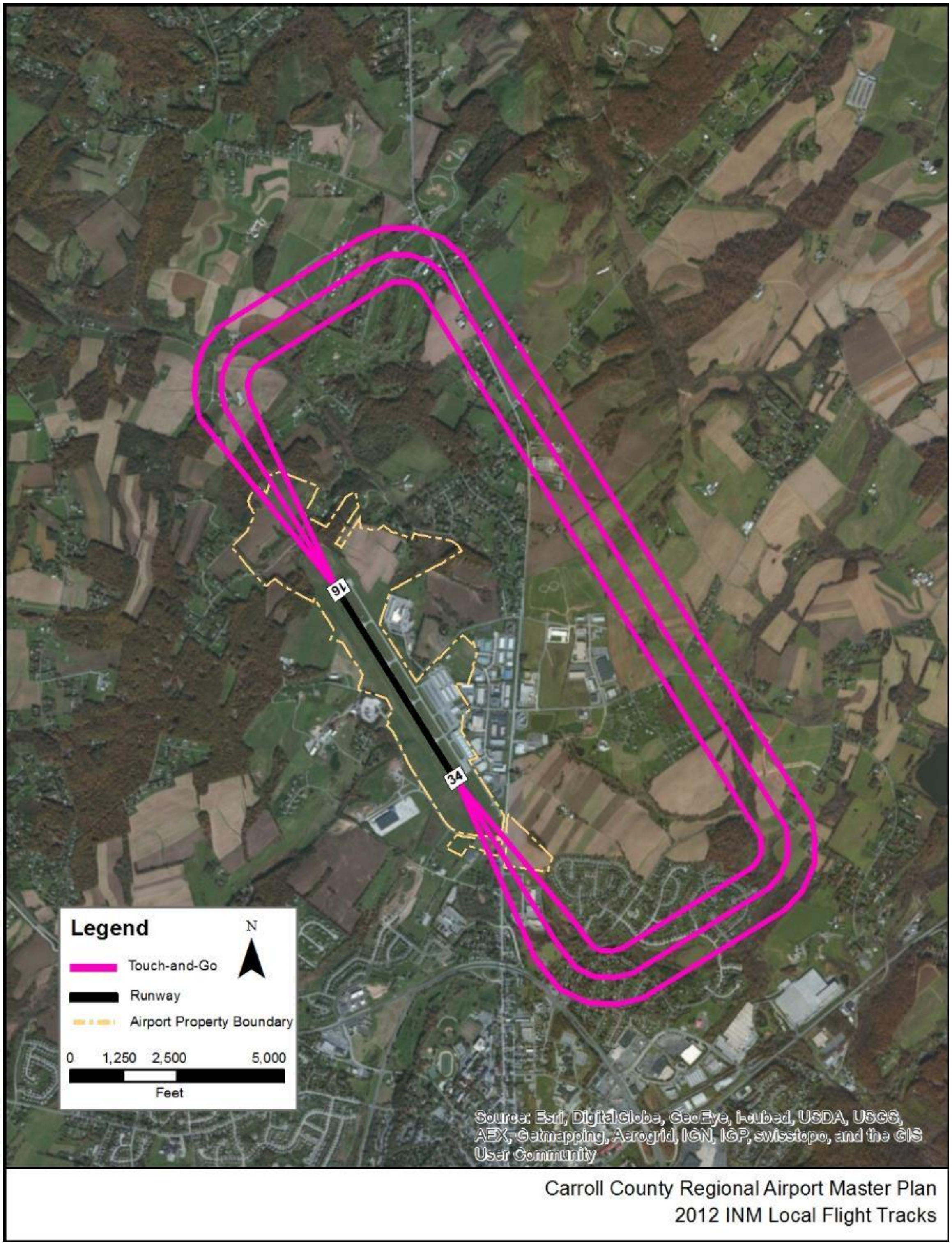
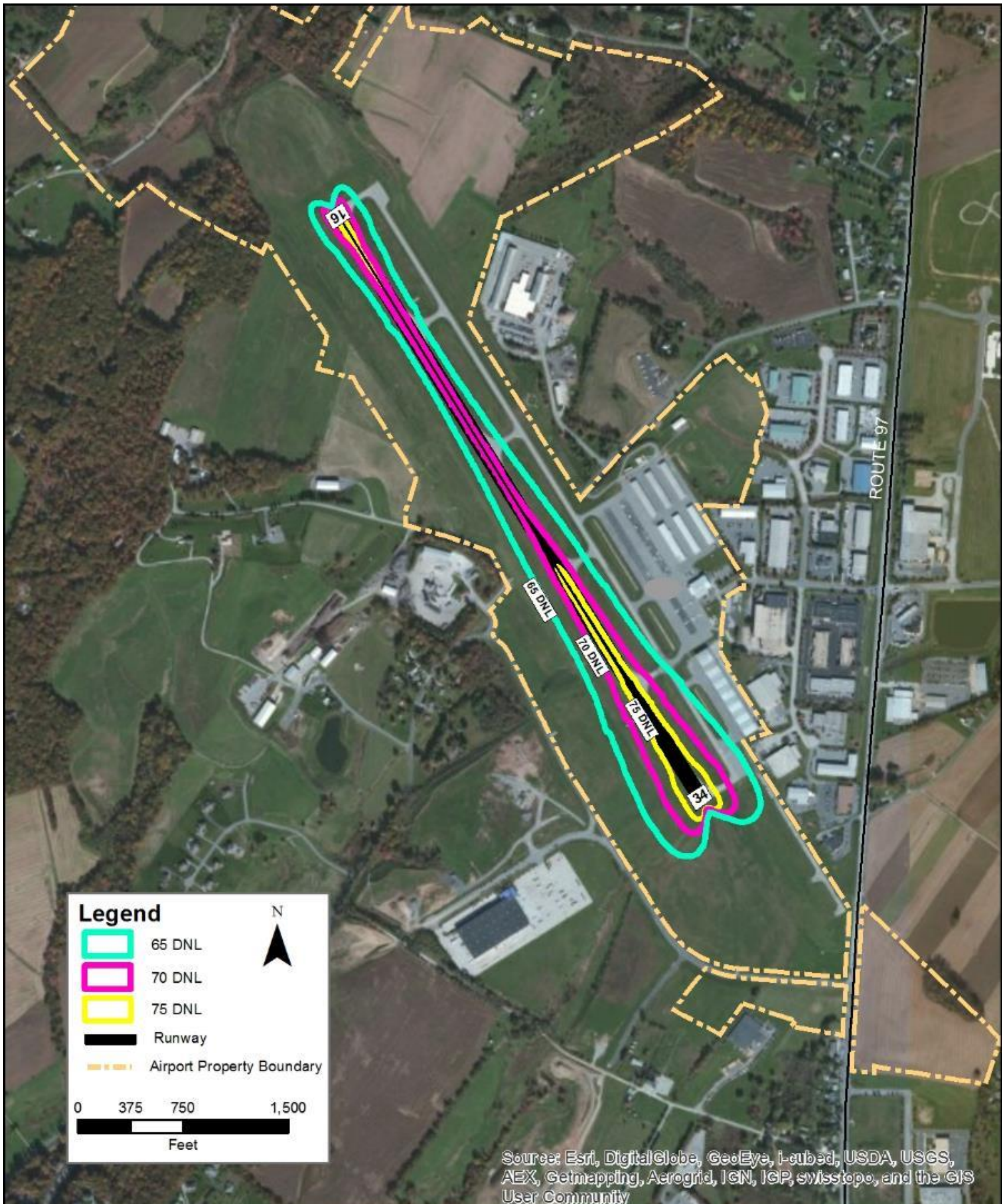


Figure 3-4. 2012 DNL Contours



Carroll County Regional Airport Master Plan
2012 Existing DNL Contours

SECTION 4

Future No Build (2033)

This section discusses the input data developed for the year 2033 No Build scenario and the resulting Noise Exposure Map. The No Build scenario includes the same runway layout and use, flight tracks, and profiles. However, the year 2033 aircraft operations and fleet mix were defined using the aviation activity forecast from the Master Plan Update.

4.1 Runway Layout and Use

The airfield configuration modeled for the 2033 No Build scenario was the same as the Existing Conditions in 2012. Likewise, the runway use for the 2033 No Build scenario was the same as the Existing Conditions in 2012.

4.2 Aircraft Operations

A forecast for DMW was prepared as part of the Master Plan Update. The forecast of operations for the year 2033 by aircraft category is presented in **Table 4-1.** As shown, the 2033 forecast includes 44,407 operations at DMW (an average of approximately 122 operations per day).

Table 4-1. 2033 Aircraft Operations by Category

Aircraft Category	Operations
Single-Engine	33,603
Multi-Engine	6,239
Jet	3,464
Rotorcraft	1,101
Total	**44,407**

Source: 2014 Carroll County Regional Airport Master Plan Update

4.3 Operational Time-of-Day

The percentages of nighttime operations for the 2033 No Build scenario were the same as those for the Existing Conditions 2012.

4.4 Fleet Mix

The 2033 No Build aircraft fleet mix was determined by multiplying the percentages by aircraft type that occurred in 2012 by the total operations forecasted to occur at the airport in 2033. The 2033 No Build INM aircraft operations and fleet mix are provided in **Table 4-2.**

Table 4-2. 2033 No Build Aircraft Operations and INM Fleet Mix

Operation Type	Aircraft Category	INM Aircraft	Annual Operations
Itinerant	Single-Engine Piston	GASEPV	579
		CNA172	81
		CNA182	33
		PA28	25
		CNA206	19
		GASEPF	3
		PA31	2
	Multi-Engine Piston	BEC58P	5,147
	Turbo-Prop	CNA208	556
		CNA441	470
		SD330	52
		1900D	9
		DHC8	3
		HS748A	2
	Jet	CNA560XL	868
		CNA55B	735
		CL600	595
		LEAR35	370
		MU3001	225
		IA1125	177
		F10062	118
		CNA560E	113
		CIT3	70
		CNA525C	64
		CNA510	43
		CNA680	32
		CNA750	32
		EMB145	11
		GIV	11
	Rotorcraft		
		B206L	1,101
		Itinerant Total	*11,546*
Local	Single-Engine Piston		
		CNA172	
		Local Total	*32,861*
		Grand Total	**44,407**

4.5 Flight Tracks

The flight tracks, flight track use, and profiles for the 2033 No Build scenario were the same as those for the Existing Conditions 2012.

4.6 Noise Exposure Map

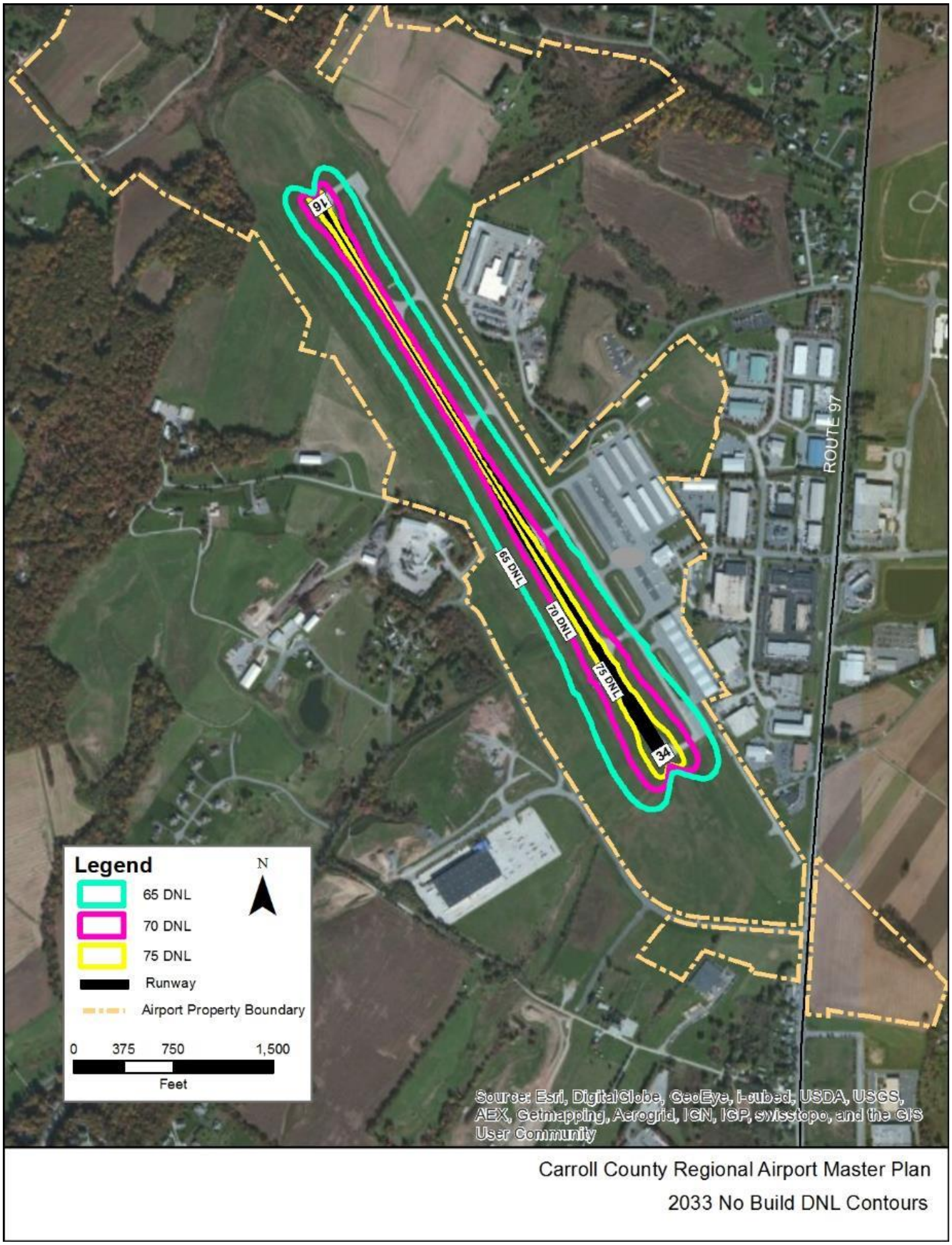
The aircraft noise contours for the 2033 No Build scenario are provided on **Figure 4-1.** **Table 4-3** provides the area, in acres, of each contour interval (i.e., 65-69 DNL, 70-74 DNL, and 75 and greater DNL). As shown, the total area encompassed by the 2033 No Build 65 DNL contour is 63.1 acres. The 2033 No Build 65 DNL contour is slightly larger than the 2012 65 DNL due to the forecasted increase in operations. As with the Existing Conditions, the No Build 65 DNL contour remains within the airport's existing property boundary. There are no residences or other noise sensitive land uses within the 2033 No Build 65 DNL contour.

Table 4-3. 2033 No Build Noise Contour Areas

DNL (dB(A))	Area (Acres)
65 – 69	38.1
70 – 74	16.8
75 +	8.2
Total	**63.1**

Source: INM 7.0d

Figure 4-1. Future 2033 No Build DNL Contours



SECTION 5

Future Build Alternative (2033)

This section discusses the input data developed for the 2033 Build Alternative and the resulting NEM. The 2033 Build Alternative includes the same aircraft operations and fleet mix as the 2033 No Build scenario. However, the runway layout reflects the proposed new runway.

5.1 Runway Layout and Use

The airfield configuration for the 2033 Build Alternative included a proposed new runway which would replace the current runway. The proposed new runway would parallel the existing runway and would therefore maintain the runway-end designations “16” and “34”. The total length of the new runway was proposed to be 5,500 feet. The existing runway would no longer be in service once the new runway is operational.

The runway use percentages for the 2033 Build Alternative were the same as the 2033 No Build scenario.

5.2 Aircraft Operations

The aircraft operations for the 2033 Build Alternative were the same as the 2033 No Build scenario.

5.3 Operational Time-of-Day

The time-of-day operations for the 2033 Build Alternative were the same as the 2033 No Build scenario.

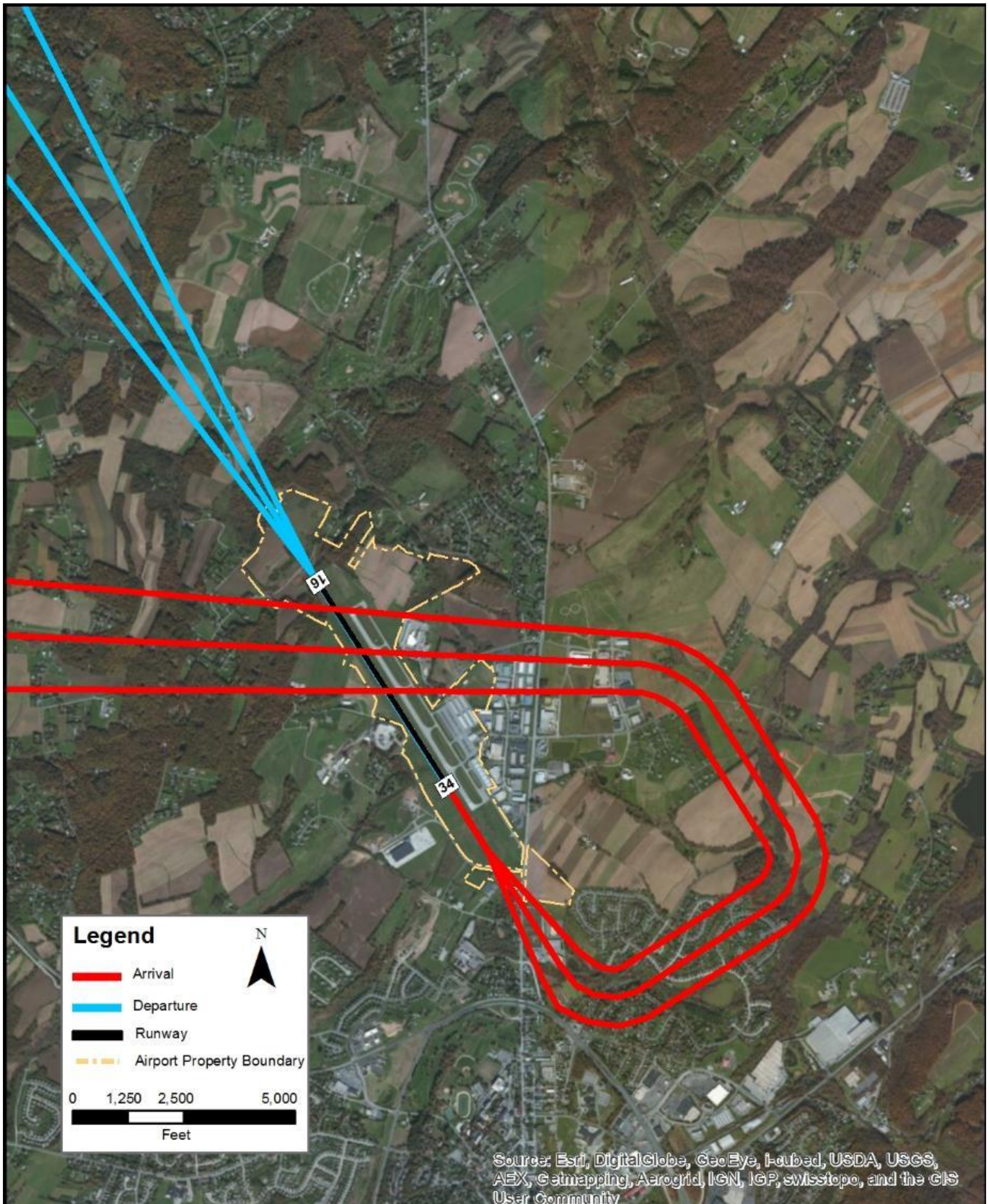
5.4 Fleet Mix

The aircraft fleet mix for the 2033 Build Alternative is the same as the 2033 No Build scenario.

5.5 Flight Tracks

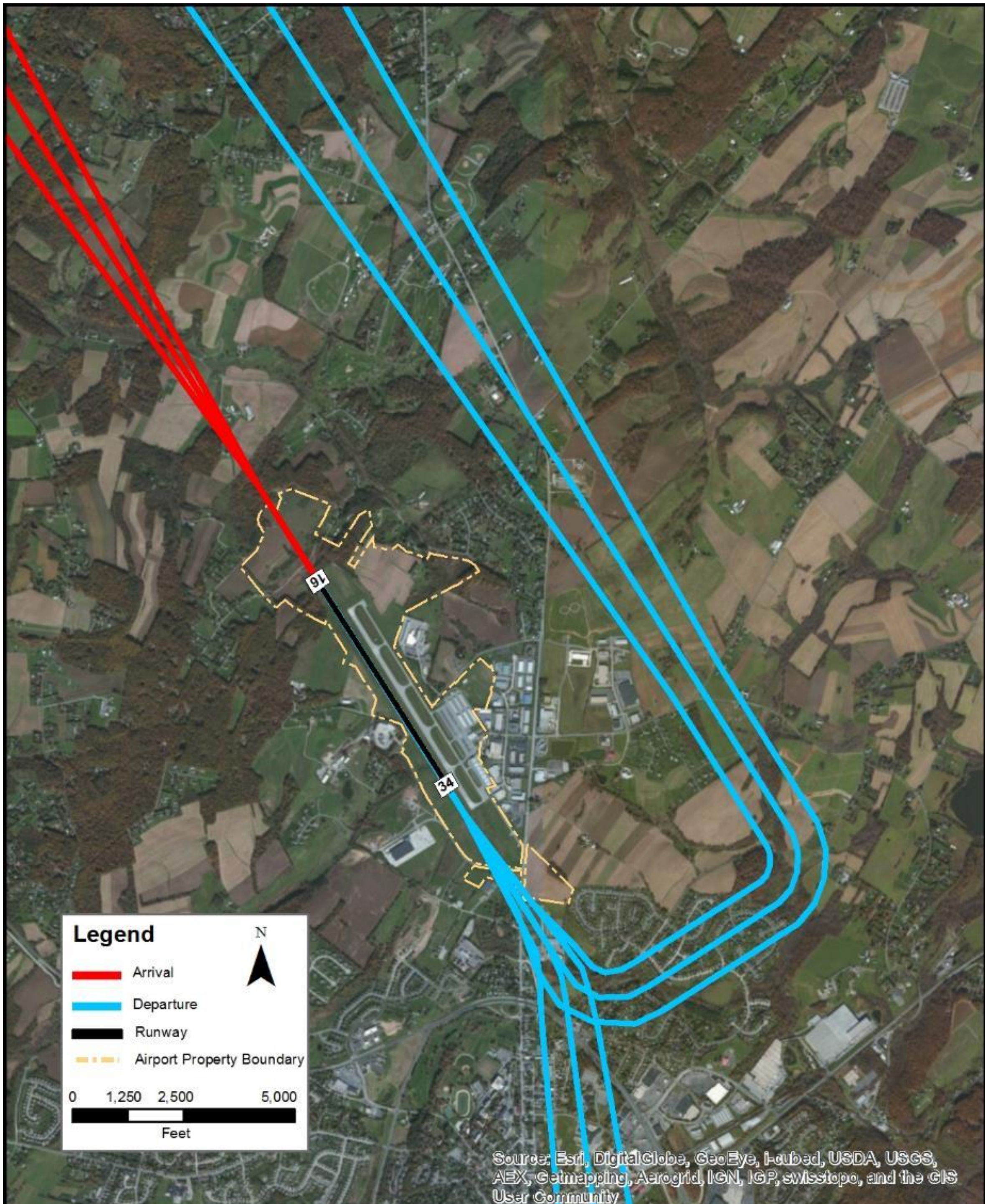
The INM flight tracks for the 2033 Build Alternative were reflective of the new runway location (i.e., the Existing Conditions flight tracks were shifted to align with the proposed runway ends). The 2033 Build Alternative itinerant and local INM flight tracks are shown on **Figures 5-1** through **5-3**.

Figure 5-1. Future 2033 Build Itinerant INM Itinerant Flight Tracks – North Flow



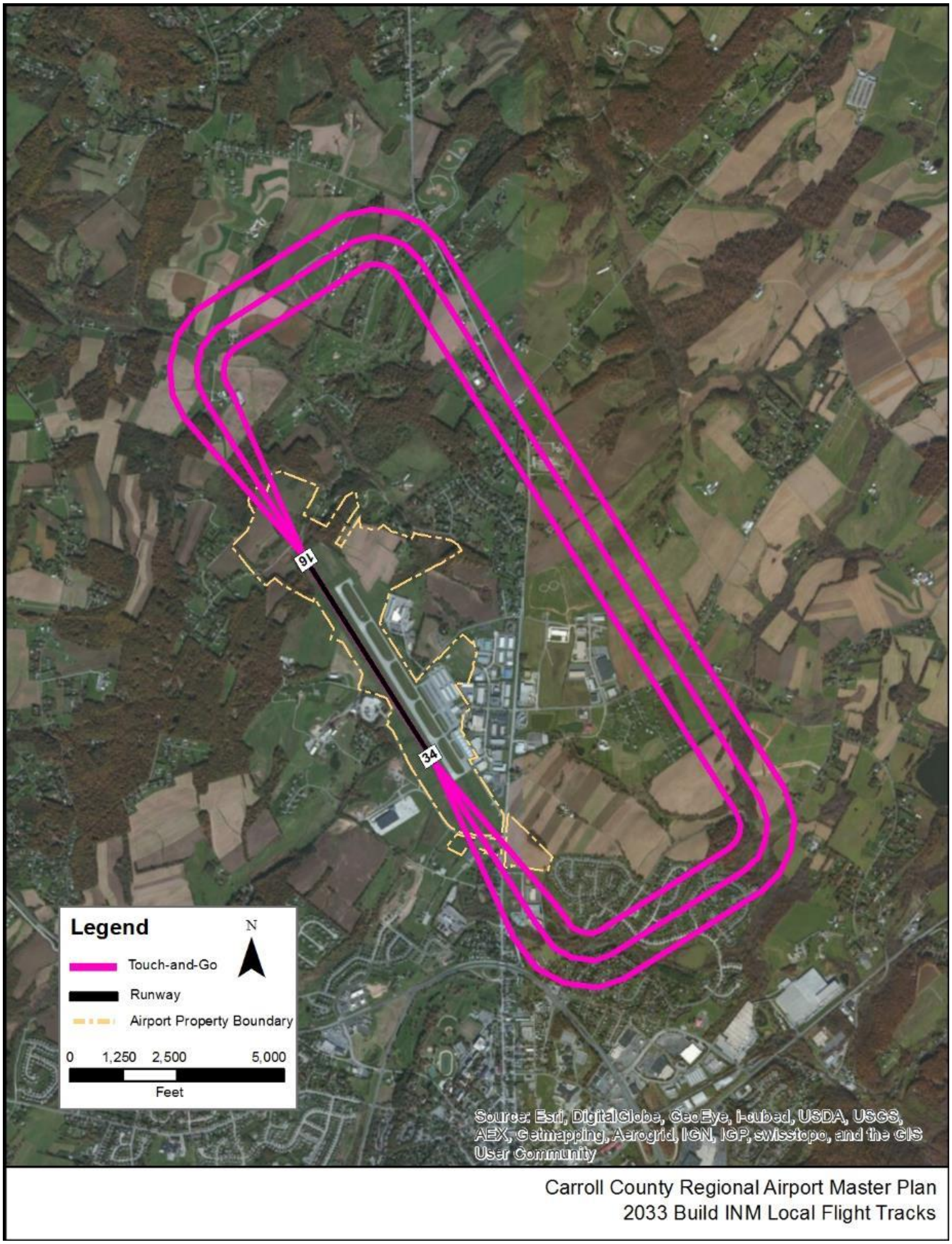
Carroll County Regional Airport Master Plan
2033 Build INM Flight Tracks - North Flow

Figure 5-2. Future 2033 Build Itinerant INM Itinerant Flight Tracks –South Flow



Carroll County Regional Airport Master Plan
2033 Build INM Flight Tracks - South Flow

Figure 5-3. Future 2033 Build INM Local Touch-and-Go Flight Tracks



5.6 Noise Exposure Map

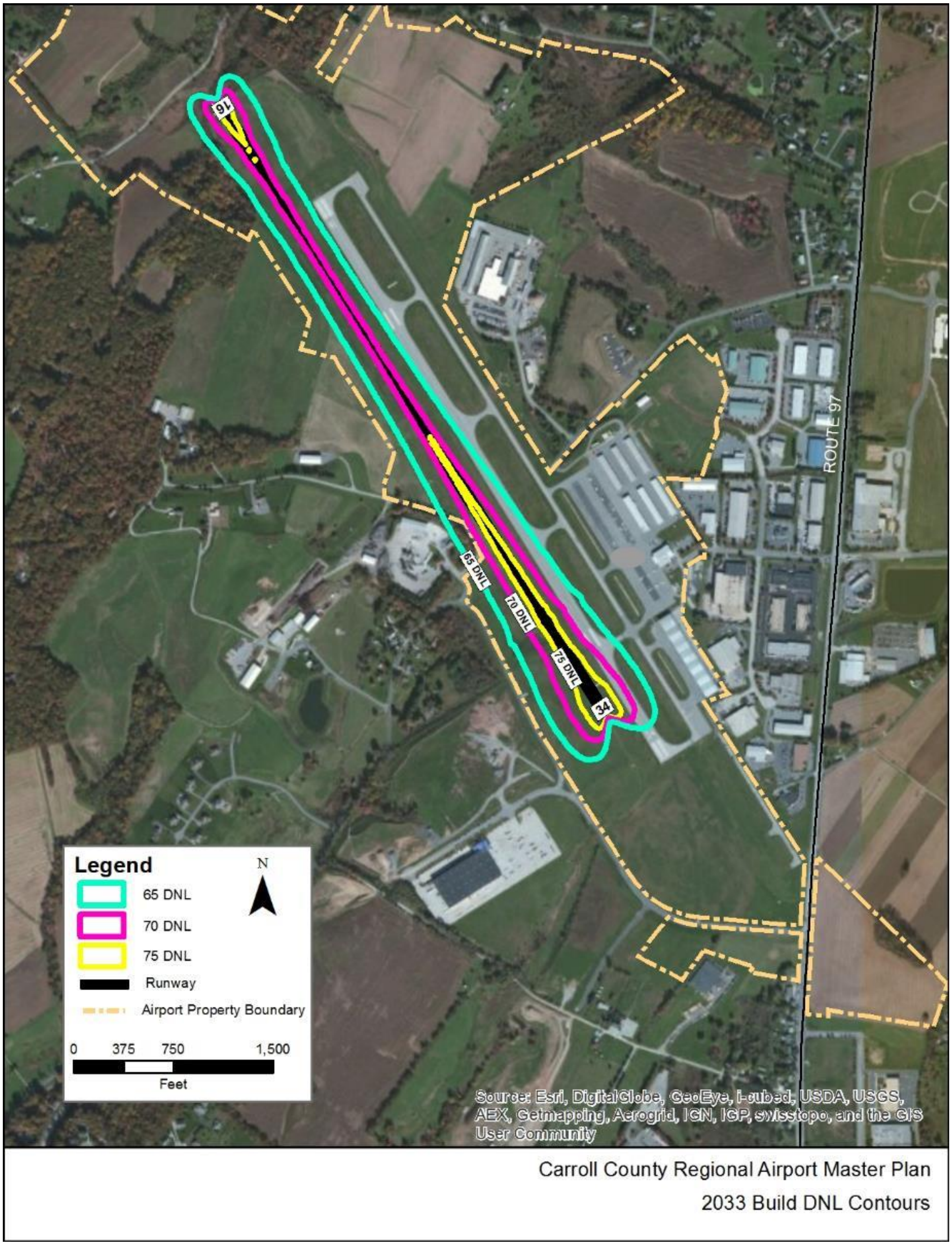
The aircraft noise contours for the 2033 Build Alternative are provided on **Figure 5-4.** **Table 5-1** provides the area, in acres, of each contour interval (i.e., 65-69 DNL, 70-74 DNL, and 75 and greater DNL). As shown, the total area encompassed by the 2033 Build Alternative 65 DNL contour is 63.3 acres. Due to the location of the proposed runway, the 2033 Build Alternative 65 DNL contour extends slightly off airport property, just to the west of the proposed runway, over an area of industrial land use. There are no residences or other incompatible land uses within the 2033 Build Alternative 65 DNL contour.

Table 5-1. 2033 Build Alternative Noise Contour Areas

DNL (dB(A))	Area (Acres)
65 - 69	40.1
70 - 74	16.9
75 +	6.3
Total	**63.3**

Source: INM 7.0d

Figure 5-4. Future 2033 Build Alternative DNL Contours



SECTION 6

Conclusion

Noise Exposure Maps were prepared as part of the airport's Master Plan Update. DNL contours were modeled to identify the changes in noise exposure resulting from proposed airfield improvements at the airport, notably a new runway located northwest of the existing runway. While the 65 DNL contour extended beyond the airport property boundary with the proposed runway, no incompatible land uses (residences, schools, places of worship, etc.) were within the limits of the 65 DNL contour.

APPENDIX C

Agency Correspondence

DELTA AIRPORT CONSULTANTS, INC.

U. S. Department
of Transportation

Federal Aviation
Administration

WASHINGTON AIRPORTS DISTRICT OFFICE
23723 Air Freight Lane, Suite 210
Dulles, Virginia 20166
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RECEIVED
JAN 27 2014

January 23, 2014

Mr. Joseph D. McKelvey
Airport Manager
Carroll County Regional Airport
200 Airport Drive – Box 8
Westminster, Maryland 21157

Reference: Carroll County Regional Airport
AIP 3-24-0028-028
Master Plan Update

Dear Mr. McKelvey:

We have received Working Paper One via email for our review and comment. Based upon that review we have developed some comments (enclosed) which need to be addressed in a revised submittal. If you have any questions please do not hesitate to contact our office.

Sincerely,

Original Signed By
Thomas A. Priscilla

Thomas A. Priscilla, Jr.
Baltimore Metro Engineer

cc: Mr. Solanki, MAA
Mr. Lewis, Delta

Carroll County Regional Airport (DMW)

Master Plan Update

(In response to FAA Comments dated January 23, 2014)

1. Page ii: Some clarification regarding source data for FAA 5010 should be included. FAA publishes the 5010 based upon data supplied by airport owner/manager.
   Response: The text has been revised for clarification.

2. Page 1-1: The FAA policy regarding forecast and TAF permits an airport owner to request changes to the published TAF for that airport provided sufficient justification and rationale is provided.
   Response: The text has been revised for clarification.

3. Page 1-2: The forecast is also used to derive other facility requirements in addition to runway length.
   Response: The text has been edited to incur facility requirements.

4. Page 1-9: The report should consistently use the same term to define the area for the study-the following terms have been interchangeably used-study area, airport services area, market area.
   Response: The text has been revised for consistency.

5. Page 1-13: What was the market share for based aircraft prior to 2012?
   Response: The market share for the based aircraft is listed as follows. Data prior to 2012 was examined and deemed to not be representative of actual activity. With new Airport Manager in place, the data was re-examined and corrected at subsequent Annual 5010 inspections.

Carroll County

Year	Registered	Based Aircraft	Market Share
2004	141	131	92.9%
2005	135	131	97.0%
2006	141	143	101.4%
2007	145	143	98.6%
2008	151	103	68.2%
2009	150	95	63.3%
2010	153	93	60.8%
2011	155	97	62.6%
2012	159	98	61.6%

6. Page 1-18: Provide the Flightwise data cited for “historical turbojet operations. Was it just data from 2012?
   Response: Please see the attached data files representing 2010-2012, and Jan-Sept 2013.

7. Page 1-19: As the facility requirements evaluation has not yet been completed it seems premature to conclude that “many of DMW’s facility needs” are related to peak period activity.
   Response: The text has been revised for clarification.

8. Page 1-19: From what data source were peak month operational percentages obtained when noting “at airports such as DMW”?
   Response: Data in draft text was drawn from prior NYDOT research. Peak period forecast have been revised in accordance with the FAA report “Forecasting Aviation Activity”, July 2001.

9. Page 1-19: From what data source were peak hour operations identified as typically 20-30 percent?
   Response: Data in draft text was drawn from prior NYDOT research. Peak period forecast have been revised in accordance with the FAA report “Forecasting Aviation Activity”, July 2001.

10. Page 1-24: Identify the number of operations for group II and group III separately rather than noting that 50% of business jet operations are group II or greater.
    Response: The text has been revised as requested.

13063

DELTA AIRPORT
CONSULTANTS

MAR 06 2014

RICHMOND, VA

Scanned

U. S. Department
of Transportation

Federal Aviation
Administration

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23723 Air Freight Lane, Suite 210
Dulles, Virginia 20166
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March 5, 2014

Mr. Joseph D. McKelvey
Airport Manager
Carroll County Regional Airport
200 Airport Drive – Box 8
Westminster, Maryland 21157

Reference: Carroll County Regional Airport
AIP 3-24-0028-028
Master Plan Update

Dear Mr. McKelvey:

We have received Working Paper One which includes the proposed forecast for our review and comment. Based on our review the forecast is approved as submitted (see enclosed summary). This forecast shall be used to develop facility requirements for the airport. If you have any questions please do not hesitate to contact our office.

Sincerely,

Original Signed By
Thomas A. Priscilla

Thomas A. Priscilla, Jr.
Baltimore Metro Engineer

cc: Mr. Solanki, MAA
Mr. Lewis, Delta

Carroll County Regional Airport
2014 Forecast of Operations

year	Based AC	Operations
2013		
SE	74	27680
ME	12	4404
TJ	4	946
Helo	1	367
Mil	0	90
2018		
SE	77	29037
ME	13	4771
TJ	6	1424
Helo	2	734
Mil	0	90
2023		
SE	81	30672
ME	14	5138
TJ	8	1991
Helo	2	734
Mil	0	90
2033		
SE	89	33603
ME	17	6239
TJ	12	3464
Helo	3	1101
Mil	0	90

B063

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of Transportation

Federal Aviation
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DELTA AIRPORT
CONSULTANTS

APR 11 2014

RICHMOND, VA

April 3, 2014

Mr. Joseph D. McKelvey
Airport Manager
Carroll County Regional Airport
200 Airport Drive – Box 8
Westminster, Maryland 21157

Reference: Carroll County Regional Airport
AIP 3-24-0028-028
Master Plan Update – Working Paper #2

Dear Mr. McKelvey:

We have received Working Paper Two – Runway Length Analysis for our review and comment. Based on our review we have developed comments (attached) which must be addressed in a revised submittal. If you have any questions please do not hesitate to contact our office.

Sincerely,

Original Signed By
Thomas A. Priscilla

Thomas A. Priscilla, Jr.
Baltimore Metro Engineer

cc: Mr. Solanki, MAA
Mr. Lewis, Delta

Carroll County Regional Airport
Master Plan Update
Working Paper Two
FAA Comments & Responses
(FAA Comments Dated 04/13/14)

(1) The approved scope of work identifies that the proposed runway length will be determined using Figure 3-2 for 100% of the fleet at 60% useful load. The FAA did not concur with using the other means to evaluate proposed runway lengths.

The scope of work also identifies FAA Advisory Circular (AC) 150/5325-4B*, Runway Length Requirements for Airport Design,* as the primary source document. The runway length was established based on the referenced Figure 3-2 and is presented Section 2.3 of the submitted text with the resultant being 5,400 feet. Paragraph 304, Runway Length Adjustments, of the source AC notes that runway lengths obtained from Figure 3-2 is based on no wind, a dry runway surface, and zero effective runway gradient. Paragraph 304 further states that lengths obtained from Figure 3-2 are to be increased to accommodate for the stated factors; the result of these adjustments are presented in Section 2.4 of the text with the resultant being 5,500 feet.

During the Master Plan study, tenants and users that operate and service large business jets at DMW were interviewed regarding their operational needs. These interviews highlighted the need for a runway length greater than 5,500 feet, as a result of actual loads typically exceeding the 60 percent level, stage lengths to accomplish their flight mission, and the fact that many of the jet operators are subject to the 14CFR Part 91K and Part 135 operating restrictions that limit the useable runway, a condition also exacerbated by contaminated runway conditions.

Additionally, Paragraph 306 of the AC recognizes the demand and benefit for adequate runway lengths at General Aviation (GA) airports and notes that GA airports receiving regular usage by large airplanes over 12,500 pounds MTOW, in addition to business jets, should provide a runway length comparable to non-GA airports. The text continues noting that the extension of an existing runway can be justified at an existing GA airport that has a need to accommodate heavier airplanes on a frequent basis.

The County requests the FAA review and consider the demonstrated need for additional runway length (6,400 feet) as supported by written documentation from existing operators of based and transient jet aircraft.

(2) The report must identify how the consultant believes that in DMW's role as one of the five designated reliever airports (MTN, FDK, GAI, DMW, FME) influences a proposed runway length at DMW. Such analysis should also identify the aircraft currently operating or forecast to operate out of BWI which are likely to use DMW if a longer runway length were provided.

Only three of the noted reliever airports offer a runway length greater than 5,000 feet currently, (MTN, FDK, and DMW), which for many of the jet operators is a minimum requirement due to insurance or company operating procedures under Part 91K or 135. Each offers a variety of pros/cons when considered as an operational base; ie: proximity to Baltimore city, drive times to key business districts in the surrounding areas, hangar leasing costs, landing fees or facility 'ramp' fees, etc… Similarly the presence of an air traffic control tower may be seen as pro or con to business jet operators.

What is known, (as documented in the previously submitted letter from Skytech dated January 23, 2014), is that a Baltimore based business operating a Falcon 2000 and a G250 is currently based at MTN and has, and would again, consider relocating to DMW if the runway length was adequate to support their operational mission. This operator makes all passenger pickups at BWI and would likely continue to do so even if they relocate their operations to DMW. Another NetJet client however, that currently uses BWI as their pickup base, has expressed significant interest in DMW for all of their Citation X operations (please see attached email correspondence from client and Skytech). The client has already requested NetJets schedule pickups away from BWI to DMW when weather conditions allow, and flight data records document existing Citation X operations from DMW to San Diego as noted in Table 2-2, as well as other destinations. Table 2-1 highlights the limitations Citation X operators face for both take-off and wet landing operations at DMW.

U. S. Department
of Transportation

Federal Aviation
Administration

WASHINGTON AIRPORTS DISTRICT OFFICE
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May 23, 2014

Mr. Joseph D. McKelvey
Airport Manager
Carroll County Regional Airport
200 Airport Drive – Box 8
Westminster, Maryland 21157

Reference: Carroll County Regional Airport
AIP 3-24-0028-028
Master Plan Update

Dear Mr. McKelvey:

We have received Chapter Two for our review and comment. Based upon that review we have developed some comments (enclosed) which need to be addressed in a revised submittal. If you have any questions please do not hesitate to contact our office.

Sincerely,

Original Signed By
Thomas A. Priscilla

Thomas A. Priscilla, Jr.
Baltimore Metro Engineer

cc: Mr. Solanki, MAA
Mr. Lewis, Delta

MASTER PLAN CHAPTER 2

Carroll County Regional Airport
Westminster, VA
Delta Project No. 13063

FAA Comments & Responses dated 05/23/2014

1. Page 2-1: As the FAA provided for several means to evaluate recommended runway length, the report should identify that the consultant, not necessarily the FAA, has proposed to use the specific process employed in this study as further identified on page 2-3. The scope identified use of the 75% of fleet at 60% useful load method.
   Response: Text has been revised to reflect the recommended runway length based on the 100% fleet with consideration to 60% useful load as specified in the scope.

2. Page 2-6: The FAA guidelines do not "require" the selection of 60% or 90% as noted but rather provide tables which indicate…There is no such thing as an FAA "baseline" runway length. The consultant has chosen to mix several methods to determine runway length into one analysis. The FAA provides for distinct use of the various methods, not necessarily comingling them.
   Response: Text revised for clarity as noted in comment and focus realigned to 100% fleet consideration to 60% useful load as specified in the scope.

3. Page 2-8: This study should validate use of the "insignificant change in runway grade" from the previous master plan in the runway length analysis proposed.
   Response: Text revised as referenced to 'insignificant change' deleted. Delta's preliminary review of the proposed 5,500' length indicates an elevation change of approximately two feet between thresholds; thus the effective gradient is estimated at 0.04 percent and not a factor requiring an adjustment.

4. Page 2-8: The performance charts are produced by aircraft manufacturers, not the FAA.
   Response: References to FAA deleted.

5. Page 2-8: The report must identified the "regulation" which requires increase of runway length by 15% for turbojet powered airplanes.
   Response: The term "By Regulation" is a direct reference from AC 150/5325-4B; however no specific regulation is cited in the AC.

6. Page 2-9 - Table 2-1: Is the Challenger aircraft noted the 605?
   Response: No longer applicable as Table 2-1 deleted in text revision.

7. Page 2-9: The runway length analysis findings were concluded by the consultant, not the FAA.
   Response: Text revised for clarity.

8. Page 2-10: The report did not have the letters of support from Skytech as noted.
   Response: Letters from operators will be resubmitted with revised text.

9. Page 2-10: The report advises that the Gulfstream 450/IV had the greatest demand for use by the NetJets fleet. Please provide the number of operations.
   Response: No further information available from Netjets; text revised for clarity.

10. Page 2-10: List the remaining 14 NetJets aircraft which use the report.
    Response: No further information available from Netjets; text revised for clarity.

11. Page 2-11: The report should identify the percent of the time that the based turbojet aircraft “routinely” require greater than 90% of useful load.
    Response: No longer applicable as 90% useful load reference deleted from text.

12. Page 2-11- Table 2-2: The report must identify the number of annual operations (today and future) for each of the identified critical aircraft.
    Response: No longer applicable as Table 2-2 deleted in text revisions.

13. Page 2-12 – Table 2-3: The report must identify the number annual operations and percent of total operations at those noted haul lengths exceeding 1,800 NM.
    Response: No longer applicable as Table 2-3 deleted in text revisions.

14. Page 2-13: The report should clearly identify whether the consultant for this master plan study recommends minima less than ¾ mile for a runway 16 approach. What proposed minima are meant by the term “lowest possible”?
    Response: Text revised for clarity; recommendations more clearly documented.

15. Page 2-13: The proposed threshold location from the previous master plan results in no incompatible land uses in the RPZ based on FAA guidance at that time. Current FAA guidance now requires a review of land uses including roadways.
    Response: Text revised for clarity and includes reference to the interim the policy for land use compatibility.

16. Page 2-13: The report should clearly identify whether the consultant for this master plan study recommends minima not lower than ¾ mile for a runway 34 approach.
    Response: Text revised for clarity; recommendations more clearly documented.

17. Page 2-14: The 90 percent useful load charts provided by the FAA are not a “requirement” as noted.
    Response: No longer applicable as 90% useful load reference deleted from text.

18. Page 2-14: The report should better quantify what is meant by the "recognition of growing business jet activity" and how that is intangible. Wouldn't the growth of the jet activity be reflected on the forecast?
    Response: Text revised/deleted for clarity.

19. Page 2-14: The report should better clarify how operational safety is enhanced by a longer runway.
    Response: Text revised/deleted for clarity.

20. Page 2-14: The report should better clarify how the operating capability of the airport is increased by a longer runway.
    Response: Text revised/deleted for clarity.

21. Page 2-14: Operational data, performance charts and correspondence from operators were not provided as noted.
    Response: Letters from operators will be resubmitted with revised text.

22. Page 2-15: There are several means to increase the runway-taxiway separation. As alternatives to achieve a given separation have not been evaluated, it would seem to be premature to rule out others such as relocation of the parallel taxiway at this time.
    Response: Relocating the taxiway to the east would diminish the facilities (hangars, tie downs and apron space) available to airport users. Relocating the runway to the west, where the land is largely undeveloped, would preserve the existing facilities while achieving the required 400-foot runway-taxiway separation.

23. The submittal appears to be only a portion of the items required for Working Paper 2. The consultant should review the approved scope of work to provide the other deliverables for Working Paper 2.
    The following elements were not provided:
    a. Noise analysis
    b. Compatible Land Use
    c. Review of FAA design standards
    d. Cost Estimates

    Response: All elements submitted with current revisions.