Appendix M

Current Airport Operations Analyiss

CURRENT AIRPORT OPERATIONS ANALYSIS

Hartford-Brainard Airport Property Study

July 2023

QED

Airport & Aviation Consultants

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INTRODUCTION

The Hartford Brainard Airport Master Plan Update completed in 2014 is the most recent study of the planned improvement of the facility. The sections below update certain sections of that document in order to focus on those key aspects relevant to addressing the future use of the Airport property. These analyses are not intended to result in a new master plan for the Airport, but rather succinctly address:

- Aviation activity demand forecasts
- Runway wind coverage
- Runway length
- Airfield design standards
- Terminal area facilities
- Capital improvement plan
- Financial status
- Airline service prospect
- Advanced air mobility and vertiport potential

Resulting deficiencies in facility needs are then assessed to present a logical and reasoned plan for a potential Airport development program through a 20-year period.

AVIATION ACTIVITY DEMAND FORECASTS

The potential demand for aviation activity at Hartford Brainard Airport (Airport) takes into consideration its socioeconomic setting, competitive position with regard to area airports, available activity data, and anticipated national and regional general aviation demand indicators.

Historical aviation activity at the Airport is available from records maintained by the Connecticut Airport Authority (CAA), the owner and designated sponsor of the Airport, and the Federal Aviation Administration (FAA) with respect to the number and type of based aircraft and the air traffic control tower maintains records of aircraft movements on a daily basis during those hours in which it is operating. This data was utilized in generating the forecast of aviation activity demand at the Airport and took into account the considerations mentioned above on a qualitative basis. This enabled a reasoned opinion as to the prospects for the growth in aviation demand at the Airport, whether positive or negative, and presented in a demand forecast.

It is important to recognize that the forecasts of aviation demand are linked to the requirement for additional facilities at the Airport and not the year to which the forecast is presented. Actual aircraft activity will occur prior to or after a projected demand level. Therefore, it is incumbent on the CAA to monitor activity levels and be prepared to implement the associated facilities when the projected demand level is to be reached.

The forecast was prepared after an unprecedented slowdown of economic activity in the United States due to the COVID-19 virus, which peaked during 2020. Aviation activity levels have since recovered to around 2019 levels, which will serve as the base year for the demand forecasts. The forecasts are intended to indicate the need for key Airport airside and terminal area facilities. These include number of runways, runway length and aircraft tiedown and storage requirements through the 20-year forecast horizon. Further, the projections are considered unconstrained by facilities currently available at the Airport.

Socioeconomic Setting

The Airport is located within the limits of the City of Hartford, some two miles from its central business district. The majority of its based tenants are located in the users are located with towns and cities within the Hartford-East Hartford-Middletown Metropolitan Statistical Area (MSA) as defined by the U.S. Census Bureau. Key demographic indicators are highlighted below:

- Between 1990 and 2021 (estimate), the total population has increased slightly from 1,123,678 and 1,211,906, or an average annual growth rate of 0.24 percent. Comparatively, the State of Connecticut experienced an annual growth rate of 0.31 percent and the nation as whole gained at an average rate of 0.91 percent. Population projections for the MSA and the state prepared by Connecticut Data Collaborative indicated that between 2020 and 2040, the average annual growth rate is 0.07 percent and 0.10 percent, respectively. These rates compare to 0.58 percent for the nation as projected by the U.S. Census Bureau. These data suggest that the MSA and, to a lesser extent the State, have been and are expected to continue to lose population to other areas of the country.

- Eliminating the COVID impact, total civilian employment in the MSA grew at an average rate of 3.07 percent between 2021 through 2022, which compares favorably with that for the state (3.02 percent) and nearly equivalent in the country (3.08 percent). Thus, the MSA is able to generate a positive labor participation rate for its residents.

- Median household income in the MSA is $82,258 and some 29.4 percent of households have median incomes of between $100,000 and $200,000, a level that suggests a potential to use discretionary funds to engage in higher priced activities such as personal aviation. By comparison, this percentage at the state and national levels is 28.0 percent and 24.2 percent, respectively.

Overall, the MSA economy has the potential to maintain a demand for general aviation activity that should be on par with that anticipated in the state, but less than that nationally due to a lower growth rate in population.

Competitive Setting

Aircraft owners and pilots typically base at an airport convenient to their residence or business unless that Airport lacks the facilities and services available at other regional airports. Table 1 provides a comparative listing of key features of general aviation airports that may compete for based aircraft with the Airport. Of those, the Danielson and Meriden Markham airports have runway lengths that are less than that available at the Airport. This limits their attractiveness to certain of the larger general aviation aircraft based at the Airport, particularly those that are turbine-powered. Otherwise, the remaining competing airports offer generally comparable basic facilities and services to aircraft based at the Airport. The relatively more active airports offer specialized services such as avionics sales and support, and three other airports have served with a staffed air traffic control tower facility. A key takeaway from Table 1 is that nearly all the airports, including Hartford Brainard, have a waiting list for hangar storage, but all have the ability to construct more facilities, whether by the airport owner or private investment, when the economics of construction and maintenance are favored with sufficient rental revenue and return on investment.

Table 1

AREA AIRPORTS DATA

Airport	Ownership	Longest Runway Features			ATCT	NPIAS Classification		Services Provided	Current Based Aircraft		Rental Rates ($)		Total Aircraft Operations	Existing Available Unused Capacity		Hangar Wait List	Based Aircraft Planned Total Capacity		Potential Land Acquisition and Purpose	Annual Net Operating Income ($)	5-Year Capital Program Projects and Cost ($)
		Length	Width	Instrument Approach (AAC B)		Service Level	Role		Tiedown	Hangar	Tiedown	Hangar		Tiedown	Hangar		Tiedown	Hangar			
Hartford Brainard	CAA	4417	150	Nonprecision	Yes	Reliever - BDL	Local	Aircraft maintenance, charter, training, avionics, ATCT	55	99	90 - 565	T 400 - 460	66,120	64	1	6	125	143	None	-1,039,682	
				LNAV 443 - 1								Box 731 - 2500									
Bridgeport Sikorsky	City of Bridgeport	4759	150	Precision	Yes	General Aviation	National	Aircraft maintenance, charter, training, avionics, ATCT	56	55	100 - 180	1000 - 7500	60,546	10	0	6	66	110	None	-750,184	
				ILS 250 - ¾																	
Danbury	City of Danbury	4421	150	Nonprecision	Yes	Reliever - HPN	Regional	Aircraft maintenance, charter, training, avionics, ATCT	172	38	110 - 165	Box 600 - 8000	53,523	28	0	14	226	92	None	126,606	
				LOC 643 - 1																	
Danielson	CAA	2700	75	Circling	No	General Aviation	Local	Aircraft maintenance, glider, parachute	7	10	55 - 75	310	24,192	5	0	1	22	10	None	Not Available	
				VOR-A 882-1¼																	
Groton-New London	CAA	5000	150	Precision	Yes	General Aviation	Regional	Aircraft maintenance, charter, training, avionics, ATCT	20	44	140 - 200	T 425 - 625	46,648	31	0		51	64	None	Not Available	
				ILS 200 - ½								Box 15 - 27 / sf									
Meriden Markham	City of Meriden	3100	75	Nonprecision	No	General Aviation	Local	Aircraft maintenance, charter, training	21	50	95 - 118	T 400	53,823	36	0	50	62	80	None	13,744	
				LP 561 - 1								Box 250 - 475									
Robertson	Town of Plainville	3665	75	Nonprecision	No	Reliever - BDL	Local	Aircraft maintenance, charter, training	28	34	102 - 133	Box 6.85 / sf	22,610	18	5	0	46	74	Hangars (4.7 acres)	33,853	
Tweed New Haven	City of New Haven	5600	150	Precision	Yes	Primary	Nonhub	Aircraft maintenance, charter, training	15	12	95 - 120	1.25 / sf	36,029	1	3	0	35	60	None	Not Available	
Waterbury Oxford	CAA	5801	100	Precision	Yes	General Aviation	National	Aircraft maintenance,charter, training, avionics, ATCT	31	95	90 110	2.73 / sf	32,664	8	0	10	60	117	None	Not Available	
				ILS 250 - ¾																	
Westfield Barnes	City of Westfield	9000	150	Precision	Yes	Primary	Nonhub	Aircraft maintenance, charter, training	18	88	45 - 65	T 350 - 500	47,815	1	0	15	20	108	None	245,704	Pavements, sound insulation,
				ILS 250 ½								Box 350 - 1000									safety improvements – 22,430,557
Windham	CAA	4271	100	Nonprecision	Yes	General Aviation	Local	Aircraft maintenance	47	14	45 - 75	375 - 400	14,100	15	0	4	50	26	None	Not Available	
				LP 401 - 1																	

Notes: Hangar rentals are for those rented out to others by the owner of the hangar facility. Some hangars are privately-owned and pay only a ground rent to the airport owner. Such ground rents are not shown.

Hangar rental rates vary based on the size of the hangar and the size of the aircraft. The range of rates are indicated.

Based Aircraft

The Airport currently bases 132 aircraft, the majority of which are single- and multi-engine aircraft. Other aircraft in the based fleet include 1 business jet, and 3 single-engine and 2 rotary wing aircraft assigned to the State Police Department. There are 3 flight schools located at the Airport that own and operate a total of 19 aircraft (3 multi-engine piston and 16 single-engine) and 1 single-engine aircraft that is operated on a leaseback basis from another based aircraft owner. One eVTOL (electric vertical takeoff and landing) aircraft is based at the Airport, but is not yet certified as airworthy and, therefore, not included in the total. Of note is that the FAA Aircraft Registry indicates there are a total of 357 aircraft registered to aircraft owners in Hartford County. This infers that about 37 percent of these pilots/aircraft are using the Airport

Growth in the number of based aircraft at the Airport will be dependent on increases in the resident population by persons with adequate levels of discretionary income and an imbalance in the demand and capacity for aircraft facilities, primarily hangar storage.

Privately-funded hangar development has been the major source of hangar facilities at the Airport and the competing airports, as the demand is high and weather conditions favor the need for storage. Of the competing airports, only Westfield-Barnes is in the process of implementing new privately-funded hangar projects and, in this case, it is to support entry of another fixed base operator. Land areas are available at all the airports to support new hangar construction, although the extent of such facilities may be limited due to property boundaries and terrain conditions.

A review of FAA projections released in March 2022 related to the national general aviation segment of the air transportation market offers a perspective on future demand levels. Figure 1 and Figure 2 below highlight the anticipated growth in active general aviation aircraft and active pilots between 2020 and 2040. The charts illustrate that the single-engine piston aircraft will continue to dominate the market. However, overall there is a near constant level of activity with changes primarily in the types of aircraft operated, favoring the use of turbine-powered aircraft, and a growing percentage of pilots holding air transport ratings, the highest level that can be held by a pilot. One primary cause for the higher rate of increase in the number of air transport pilots is federal legislation that requires all pilots operating Federal Aviation Regulation Part 121 aircraft (scheduled airline) must hold this rating as opposed to commercial pilot rating. Notwithstanding these statistics and projections, more recently there has been an increased focus on training new pilots as required pilot retirements of those operating aircraft in commercial service are nearing a major threshold. All scheduled airline pilots must retire when reaching the age of 65 years. In response to this pending pilot shortage, several airlines have initiated flight training programs with colleges and universities as a means to ensure an adequate supply of qualified pilots to support their existing and planned fleet programs. Additionally, fixed base operators have strengthened their participation in training new pilots. The longevity of such flight training programs is not certain inasmuch as future pilot retirements should lessen after the current demand scenario is addressed. The likely short-term increase in the number of private pilots is anticipated to maintain the number of pilots in this certificate category in the long-term.

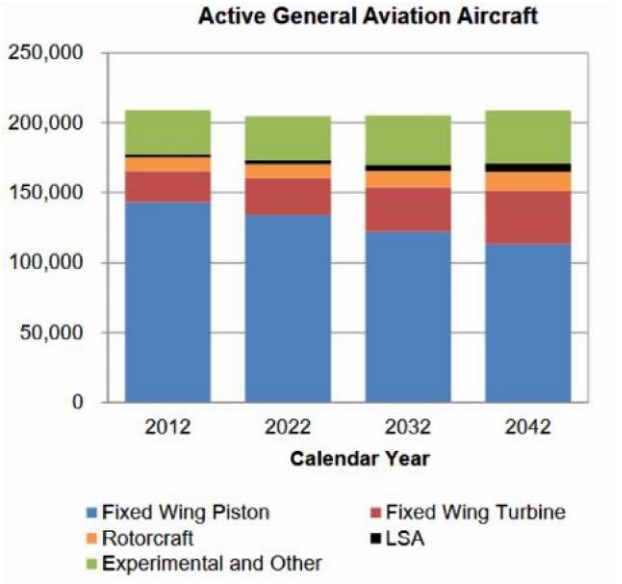

Figure 1

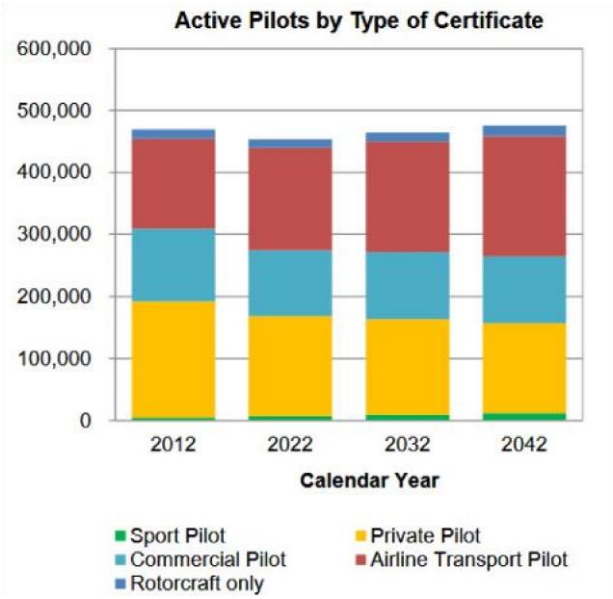

Figure 2

Given the foregoing, a forecast of based aircraft at the Airport is shown in Table 2 below. The growth by category of aircraft type at the Airport follows the national trend, but a lower rate of annual growth reflecting the socioeconomic features of the MSA. Contrary to the FAA projection of a decrease in the number of fixed wing piston aircraft, the forecast reflects a near constant number of these aircraft given the more recently reported industry data related to aircraft deliveries. During the forecast horizon, it is expected that e-VTOL aircraft will enter the market as they become FAA-certified, replacing the light piston and turboprop segments of the general aviation fleet.

The forecast does not provide an allowance for aircraft repositioning to another airport due to the potential closure of the Airport or the availability of terminal area facilities for aircraft tiedown and storage hangars or the available runway lengths. Additionally, new facility development has been postponed, owing in part to the current uncertain future status of the Airport. The forecast presents an unconstrained demand that is to be accommodated at the Airport.

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Table 2
BASED AIRCRAFT FORECAST

Aircraft Type	Year 2023	2028	2033	2038	2043
Single-Engine Piston	128	129	130	131	132
Multi-Engine Piston	3	3	3	3	3
Multi-Engine Turboprop	2	2	3	4	5
Jet	1	2	4	6	9
Helicopter	4	4	4	4	4
Total	**138**	**140**	**144**	**148**	**153**

Note: e-VTOL aircraft may enter the market as they become certified replacing the light aircraft types

These forecasts indicate that the single-engine piston aircraft will comprise the majority of the based fleet at the Airport and account for nearly 93 percent of the total and decreasing to about 86 percent through the forecast horizon. The number of based aircraft fleet shows an increasing trend of nearly 11 percent over the 20-year horizon.

This projection may be compared with others for the Airport. Among these are those provided by the FAA in its 2021 Terminal Area Forecast, the 2014 Airport Master Plan Update and the 2016 Connecticut Statewide Airport System Plan (CSASP). The former has been discounted as reliable given that it is premised on a total of 64 aircraft at the Airport in 2023, or about one-half of the current total, increasing by nearly double to 129 by 2043. No explanation for the base year level or the relatively high rate of growth is provided.

Interpolation of the 2014 Airport Master Plan Update forecast yields 165 based aircraft in 2023 increasing to 172 by 2030; an increase of some 4 percent. The base year for that forecast is 2010 with 154 aircraft, a level that suggests that between 2010 and 2023, the based aircraft count at the Airport remained generally constant. The lower growth rate is consistent with that anticipated nationally at the time these projections were made, particularly in the small general aviation fleet that comprises the majority of the aircraft based at the Airport.

The 2016 CSASP base year for forecasts is 2013 for which the Airport is shown to have a total of 155 based aircraft, increasing to 173 based aircraft by 2035, assuming an extension of Runway 2-20 to 5000'. This represents an increase of nearly 12 percent, which is generally consistent with projections now offered. This suggests that future levels of based aircraft have regained to that experienced during the more robust economy prior to the COVID pandemic.

Taken as a whole, the forecast of based aircraft as presented in Table 2 may be considered appropriate for the purposes of the Hartford Brainard Airport Property Study as it presents a reasoned potential market demand for the facility.

Aircraft Operations

The Airport is served with an air traffic control tower (ATCT) that operates daily between 0600 hours and 0000 hours (midnight). Records of aircraft operations reported by the ATCT have been provided for FY 2019 through FY 2022. The ATCT records include local and itinerant aircraft operations under visual and instrument flight rules (VFR and IFR). The ATCT records were not adjusted for other aircraft operations occurring when the ATCT is closed, as the number of such movements is likely relatively low.

Table 3
HISTORICAL AIRCRAFT OPERATIONS

	Year			
Type	**2019**	**2020**	**2021**	**2022**
Itinerant	26,862	24,700	30,063	32,111
Local	21,301	24,992	31,245	35,156
Total	**48,163**	**49,692**	**61,308**	**67,267**

Table 3 suggests that overall aircraft activity at the Airport has generally increased in the past few years. The growth in local aircraft operations (those conducted primarily for flight training) has experienced a faster growth rate, particularly post-COVID. This is likely due to the increased interest in pilot careers and the consequent activity conducted by the flight schools at the Airport. Local operations account for about 52 percent of total aircraft movements.

The FAA projects that total general aviation aircraft operations will increase at an average annual rate of about 0.70 percent over the next 20 years. Given the socioeconomic conditions of the MSA, an average annual growth rate of 0.65 percent was applied to generate the forecast of local and itinerant aircraft operations. Over time, the ratio of local to total aircraft operations is anticipated to decrease slightly as the relatively recent spurt in flight training activity tends to subside. Table 4 presents the forecast of general aviation aircraft operations at the Airport.

Table 4
GENERAL AVIATION AIRCRAFT OPERATIONS FORECAST

	Year				
Type	**2022**	**2028**	**2033**	**2038**	**2043**
Itinerant	32,111	34,300	36,100	38,100	40,100
Local	35,156	35,600	36,100	36,500	37,000
Total	**67,267**	**69,900**	**72,200**	**74,600**	**77,100**

By comparison, the forecasts presented in the 2014 Airport Master Plan Update identified a then current level of aircraft operations of 79,600 increasing to 85,600 over a 20-year period ending in 2030, or an average annual rate of 0.36 percent. The 2016 Connecticut State Airport System Plan presented forecasts of aircraft activity at the Airport increasing from 80,817 in 2015 to 87,660 by 2035; an average annual growth rate of 0.41 percent. Aside from the base year activity level in each projection being much higher than that now experienced at the Airport, the growth rates reflect a period of time during which the smaller aircraft segment of the general aviation fleet was slowing nationally and in Connecticut. Since then, and excluding 2020 during the height of the COVID pandemic, there has been a resurgence in the use of general aviation aircraft, particularly in the medium to large cabin business jet segment and more recently light aircraft flight training. These conditions now favor a higher average annual rate of growth than that applied in earlier forecasts.

Current hourly aircraft demand levels during visual flight rule (VFR) and instrument flight rule (IFR) conditions are estimated at 40 aircraft operations and 20 aircraft operations, respectively. Through the 20-year planning horizon, these activity levels can be expected to remain constant as peak periods of activity tend to spread into other portions of the day.

Aircraft operations may also be classified by mix as highlighted in Table 5 below. Single-engine piston aircraft operations will continue to account for a majority of the activity, decreasing over time as higher performance aircraft enter the Hartford market. Beginning between now and 2028, e-VTOL (electric vertical takeoff and landing) aircraft may be anticipated to operate at the Airport.

Table 5
MIX OF GENERAL AVIATION AIRCRAFT OPERATIONS FOREC \ST

	Year				
Aircraft Type	**2022**	**2028**	**2033**	**2038**	**2043**
Single-engine	59,370	60,800	62,100	62,700	62,400
Multi-engine	6,054	6,300	6,500	6,700	6,900
Jet turbine	498	700	1,400	2,200	3,900
Rotary*	2,054	2,100	2,200	3,000	3,900
Total	**67,267**	**69,900**	**72,200**	**74,600**	**77,100**

* Note: Includes e-VTOL aircraft beginning in 2028

Critical Design Aircraft

The critical design aircraft is a determinant of the appropriate facility design standards for an airport and has been defined by the FAA as the most demanding aircraft type in terms of approach speed and wingspan that generates at least 500 annual operations. Different airport reference codes may be assigned at airports with more than one runway based on runway length. There are two runways at the Airport with lengths of 4417' (Runway 2-20), and 2,314' (Runway 11-29).

FAA air traffic data for calendar year 2021 indicates that the Airport accommodated a total of 498 operations by aircraft meeting the B-II airport reference code (ARC); in 2022 that level decreased to 362 aircraft operations. These aircraft were assigned to Runway 2-20 due to its runway length and instrument approach capability. Aircraft using Runway 11-29 are those meeting airport reference code A/B-1 Small (less than 12,500 maximum takeoff weight).

ARC B-II aircraft have approach speeds of between 91 knots and 120 knots and wing spans between 49' and 78'. Most light and medium sized business jets are within the ARC B-II airport reference code. Representative aircraft include:

- Cessna Citation Jet series I through VII
- Falcon 900
- Falcon 2000
- King Air 200
- King Air 350

ARC A/B-I Small aircraft have approach speeds less than 91 knots and wing spans of up to 48' and include most light single-engine piston aircraft such as the

- Beech 55 Baron
- Beech Bonanza
- Cessna 150
- Cessna Centurion
- Piper Cherokee Arrow

These airport reference codes are anticipated to remain appropriate for the forecast horizon

Implications for Airport Facility Requirements

The aviation demand forecast is an informed opinion as to the potential volume of activity that may be anticipated to occur at the Airport over a 20-year forecast horizon. These forecasts can be compared to existing capacity levels to identify future capital investment program for the airfield, terminal and landside areas. Actual demand levels experienced will likely fall below or rise above the forecast for any given year. Thus, the aviation activity demand forecast is viewed more as a trend and through its linkage to capacity levels, serves to suggest when capital projects should be operational. Some projects require longer lead times than others and this is factored into the capital investment program that is developed and updated on an annual basis.

Additionally, the forecasts can be related to airfield and terminal area design standards that are established by the FAA based on the ARC and other factors as presented in the following sections.

AIRFIELD FACILITY REQUIREMENTS

The primary airfield facility requirements focus on the runways in terms of their alignment with prevailing winds and length.

Runway Wind Coverage

Wind conditions typically indicate which runway end is favored for use as aircraft can maneuver at slower airspeeds as the wind generates lift. Table 6 presents the crosswind coverage (90º) to the true runway heading when winds are less than 10.5 knots. This crosswind limit is recommended by the FAA for light aircraft, the dominant user of the Airport. Higher crosswind limits are prescribed for heavier and faster aircraft. Because wind velocity is reported in true degrees, the runway wind coverage is based on the true heading of each runway end.

Wind data for the Airport was obtained for the period 2013 through 2022 from records generated by the automated surface observing system (ASOS) and defined for visual (VFR), instrument (IFR) and all-weather (All WX) operating conditions. An FAA-provided program calculates the crosswind coverage limits.

Table 6
RUNWAY CROSSWIND COVERAGE

	10.5 Knot Crosswind Limit Coverage (%)		
Runway End and Combinations	**VFR**	**IFR**	**All WX**
2	56.43	74.51	60.13
20	54.44	56.39	54.76
2-20	94.72	93.71	94.52
11	53.64	63.33	55.48
29	59.07	59.40	59.27
11-29	92.88	92.19	92.75
2-20 & 11-29	96.18	99.75	94.89
2 & 11 90º	74.99	91.34	81.81
20 & 29 90º	87.42	81.79	86.31.

From a practical perspective, Runway 2-20 is the preferred runway at the Airport given its longer runway length and published instrument approach procedures. Runway 2-20 provides 94.52 percent crosswind coverage under all-weather conditions, which very nearly equals the minimum level (95 percent) established by the FAA for a single-runway airport. The crosswind coverage increases to 94.72 under VFR conditions. The addition of Runway 11-29 contributes 0.37 percent and 1.46 percent crosswind coverage under all-weather and VFR conditions, respectively.

As a point of information, the FAA model for crosswind coverage calculations tends to underreport the actual levels. The model assumes that the occurrence of wind speeds within a specific direction is evenly distributed within each speed range. In fact, higher occurrences are found at the lower speeds within a speed range. Thus, it is appropriate to consider that the crosswind coverage levels by runway end and runway end combinations in Table 6 are actually slightly higher than those indicated.

Air traffic controllers at the Airport confirm that Runway 11-29 has the following use characteristics:

- A runway length of 2,314', which is only suitable for the lightest of aircraft
- Used more frequently between late summer to early November
- When winds favor its use, the majority of the pilots, estimated at 80 percent, continue to prefer accepting the crosswinds on Runway 2-20
- Runway 11 is used very infrequently, perhaps less than one percent of the time

- Runway 29 is used much more frequently when peak activity is focused on Runway 20, estimated at 5 percent of the time on an annual basis to enable a dual runway use operation
- The lack of an instrument approach

On an annual basis, both ends of Runway 11-29 may be in operation about 3 percent of the time.

A prepared turf runway generally paralleling Runway 2-20 to the east is used occasionally by light aircraft. The area is reported as being 2300' long and 150' wide. The need for this turf runway is useful for training short field landing and takeoff training, and to relieve the use of Runway 2-20 during peak periods of activity.

Airfield Capacity

Aircraft activity demand levels at the Airport do not exceed the airfield capacity of a single runway (Runway 2-20) with on-site air traffic control of about 220,000 annual aircraft operations. The Airport is operating at about 30 percent of its annual service volume. Hourly capacity during VFR conditions is 90 aircraft operations and during IFR conditions the hourly capacity is 40 aircraft operations. These hourly capacities exceed the current and anticipated demand levels.

Runway Length

The FAA has developed charts for categories of aircraft in its Advisory Circular 150-5325-4B, "Runway Length Requirements for Airport Design," that provide guidance in establishing required runway lengths. A number of factors contribute to the determination of the length of runway for takeoff and landing. Key factors for the Airport include:

- Airport elevation (18.3' MSL)
- Mean maximum temperature during the hottest month of year (83ºF)
- Effective runway gradient (Runway 2-20 = 0.17%, Runway 11-29 = 0.08%)
- Runway surface condition (dry or wet/contaminated)
- Zero wind conditions
- Payload of passengers and cargo (industry practice is to use full payload)

A review of these analyses is presented in the sections that follow and addresses those segments of the general aviation fleet currently or are anticipated to operate at the Airport on a frequent basis, which is typically those conducing at least 500 annual itinerant operations or 250 annual departures.

FAA Generalized Charts for Small Aircraft with Fewer Than 10 Passenger Seats

Representative aircraft include single-engine piston aircraft such as the Cessna C-172 and Piper Arrow.

- 95 Percent of the Fleet -- 3,000'
- 100 Percent of the Fleet -- 3550'

FAA Generalized Chart for Small Aircraft with10 or More Passenger Seats

Representative aircraft include the King Air 200 and Mitsubishi MU-2

- 4,050'

FAA Generalized Charts for Aircraft with Maximum Takeoff Weights Greater Than 12,500 Pounds and Up to 60,000 Pounds

These FAA charts are developed to consider both takeoff and landing runway lengths and apply to the range of small to medium size business jets such as the Cessna Citation III, Cessna Citation VII, Falcon 900 and Hawker 600.

Adjustments are then made to the results for the runway gradient and surface conditions; the latter apply to turbojet-powered aircraft and incorporate a factor for wet runway surface conditions when landing. These results illustrate a range of results that are dependent on the extent to which the runway is intended to serve a percent of the general aviation fleet and operate at a variable useful load. The useful load is defined as the weight of the passengers, cargo and usable fuel.

- 75% Fleet, 60% Useful Load: 4,600' (takeoff) 5,300' (landing wet)
- 75% Fleet, 90% Useful Load: 6,200' (takeoff) 7,000' (landing wet)

Conclusion

The physical length of Runway 11-29 (2314') is much less than that suggested (3000' to 3550') for the types of aircraft that would likely utilize this runway. Extension of the runway is considered infeasible given the physical constraints and land area available. In particular, extension to the east on the Runway 29 end would result in an unfavorable coupling with the existing Runway 2 threshold and the associated runway safety area for each runway end, which are likely the primary bases for the current placement of the Runway 29 threshold. The 2014 Airport Master Plan considered closure of the runway as an option, although it was ultimately retained in response to pilot requests when westerly winds are gusting, particularly those made by student pilots. The runway pavement condition is good, but over time, the cost to maintain the pavement associated with Runway 11-29 will likely not justify its retention given its limited utility.

Runway 2-20 (4417' full length of available pavement) is assessed as satisfactory to accommodate the range of light piston and turboprop aircraft that use the Airport. However, the

runway faces expansion challenges (land area available) to better serve business jet traffic. Operators of these aircraft have opted to use another area airport because of takeoff weight restrictions or when landing on wet runway conditions. Although trees have recently been removed in the approach to Runway 2 and Runway 20, the Clark Dike serves to retain the current 560' displaced landing threshold location. Aircraft departing on Runway 20 have the full 4417' available, but landing aircraft are restricted to a landing length of 4179'. Departures on Runway 2 also have the full 4417' available, but the landing threshold is displaced 411' due to obstructions in its approach path, leaving 4006' for landing. The 2014 Airport Master Plan Update suggests the potential to extend the Runway 2 end by 583' to the south in order to yield a takeoff length of 5000'. This is a desirable outcome, if feasible, as it could adequately serve at least 75 percent of the fleet at a 60 percent useful load for departures. The landing length would remain at 4006'. Such action requires acquisition of the two lagoons owned by the Metropolitan District Commission (MDC) at the Runway 2 end.

Attempts to realign Runway 2-20 within the existing Airport property were found to provide minimal gains in runway length, but had negative impacts on the land area available for terminal area facilities. These options were not considered viable or cost-justifiable.

Airfield Design Standards

The FAA has established a series of facility design standards to ensure the safety of flight activity as well as its interaction with aircraft ground movements. Chief among these standards are the runway safety area (RSA) and the runway object free area (ROFA) as they pertain to the Airport. These standards vary depending on the types of aircraft in use on a particular airport operating surface.

A review of these standards indicates that the RSA and ROFA for Runway 2-20 is not provided at either end of the runway. The MDC lagoons are located within these applicable design standard dimensions at the south end of the runway (Runway 2 end) and beyond the Airport property boundary. The Clark Dike at the northern end (Runway 20 end) is also outside the Airport limits and restricts the ability to meet the RSA and ROFA design standards. These are major safety considerations inasmuch as the RSA is intended to support the weight of the aircraft in the event it departs the runway surface. The ROFA is to be free of any objects.

Currently, the Airport is utilizing the length of the runway beyond the Runway 2 and Runway 20 ends (the physical length of the runway less the displaced threshold distance) at each end to comply with the applicable RSA and ROFA design standards. Because the runway is now used by a sufficient number of turbine-powered engine aircraft the use of declared distances is required, which will modify the landing length and other operating runway length dimensions. Although there are not similarly stringent operating rules applicable to aircraft powered by piston engines, declared distances are useful as advisory information to all pilots. The application of declared distances is an interim measure ensuring flight safety until the Airport implements improvements to meet the RSA and ROFA standards.

Absent the ability to assume control of the lagoons and/or relocate the dike, the Airport will be required to implement the concept of declared distances, which serves to reduce the available runway length for landing and takeoff for the existing Runway 2 and Runway 20 ends as indicated in Table 7.

Table 7 DECLARED DISTANCES - EXISTING 4417' RUNWAY 2 AND RUNWAY 20				
Runway End	**TORA**	**TODA**	**ASDA**	**LDA**
2	4417	4417	3917	3506
20	4417	4417	4417	3556
TORA -- Takeoff Runway Available				
TODA -- Takeoff Distance Available				
ASDA -- Accelerate Stop Distance Available				
LDA -- Landing Distance Available				

Should Runway 2-20 be extended to a physical length of 5000' adding pavement to the Runway 2 end, there will be a continue need to implement declared distances as a means to comply with the applicable facility design standards as presented in Table 8. The Runway 2 landing threshold would remain in its present position as the Clark Dike controls its location and thus the displacement is 992'. The existing 560' threshold displacement at the Runway 20 will remain in place.

Table 8 DECLARED DISTANCES - FUTURE 5000' RUNWAY 2 AND RUNWAY 20				
Runway End	**TORA**	**TODA**	**ASDA**	**LDA**
2	5000	5000	4500	3506
20	5000	5000	4460	3900
TORA -- Takeoff Runway Available				
TODA -- Takeoff Distance Available				
ASDA -- Accelerate Stop Distance Available				
LDA -- Landing Distance Available				

Condition Assessment

The overall condition of the pavements in the airfield area is assessed as fair to good and serviceable. The reconstruction of Runway 2-20 is planned for 2025 and rehabilitation of Taxiway A that parallels Runway 2-20 is targeted for 2028. It is anticipated that crack and seal projects will be implemented to other airfield pavement areas on an as needed basis until such time as their reconstruction is required.

Runway 11-29 Benefit / Cost Analysis

A benefit/cost analysis was prepared related to the retention of Runway 11-29 in the long-term status of the Airport. The runway provides marginal operational benefit in terms of crosswind coverage; however, it is recognized that when the primary runway 2-20 is subject to strong gusty winds the utility of Runway 11-29 is enhanced, particularly for student pilots.

The benefits consider the forecast of annual aircraft landings (one-half of the operations) by all but the jet turbine and rotary aircraft activity presented in Table 5 and the improved safety attributable to landing on either Runway 11 or Runway 29 during those wind conditions that favor their use. Although a strict interpretation of the crosswind data shown in Table 6 suggests that Runway 11-29 offers an additional 1.46 percent wind coverage, this value has been increased to 3 percent to account for the use characteristics described previously. This is a conservative estimate of the 'true' demand for Runway 11-29 and also takes into consideration that most student flights will not depart if excessive crosswind conditions on Runway 2-20 are anticipated at the time of arrival.

The safety operational benefit was based on the unit value developed from FAA-derived estimates for general aviation aircraft and adjusted for inflation since their initial determination and applied to the 20-year forecast horizon. A 7 percent discount factor, as presently recommended by the U.S. Office of Management and Budget for constant dollar benefit/cost analyses, was utilized as this rate approximates the marginal pretax rate of return on an average investment in the private sector in recent years. This yields a net present value benefit of nearly $1,400,000 when applied to the forecast 20-year period, or about an average of $70,000 annually.

If the total present value, life-cycle cost for the Airport to continue to maintain Runway 11-29 over a 20-year period does not exceed $1,400,000, it may be concluded that the expenditure is cost-justified. That is, the life-cycle benefit/cost ratio is at least 1.00. A net present value estimate for routine maintenance of the runway and its parallel taxiway (crack and seal in 2023 and every five years through 2043) and a complete reconstruction in year 2033 is about $2,700,000. This yields a life-cycle benefit/cost ratio of 0.52, which implies that the long-term retention of Runway 11-29 and its parallel taxiway is not cost justifiable. It may be expected that when a full reconstruction of Runway 11-29 and its parallel taxiway is required, such action will not be undertaken and the facility will be closed to air traffic.

INSTRUMENT APPROACH CAPABILITY

The Airport is a designated reliever airport to Bradley International Airport. This service role is especially important during instrument flight rule operations when airfield hourly capacities are reduced at that Airport. Runway 2 at the Airport is served with two published instrument approach procedures that may be flown by approach category A, B, C and D aircraft. These categories encompass nearly the full range of aircraft that are used by general aviation and air carrier aircraft. Table 9 presents the approach minimums for the two procedures. Additionally, the FAA has published a River Visual approach to Runway 2. Runway 11-29 is not of sufficient length to publish an instrument approach procedure.

Table 9 **INSTRUMENT APPROACH PROCEDURES**				
	Instrument Approach Minimums by Aircraft Approach Category			
Instrument Approach	**A**	**B**	**C**	**D**
RNAV (GPS) LNAV 2	443 - 1	443 - 1	443 - 1 3/8	443 - 1 3/8
LDA 2	663 - 1	663 - 1	663 - 1 7/8	663 - 1 7/8
VOR-A	1182 - 1¼	1182 - 1½	1182 - 3	1182 - 3

To better serve its reliever status, the Airport would be better served with an approach procedure that can achieve lower straight-in approach minimums on Runway 2 and an instrument approach to Runway 20. This may best be accomplished by upgrading the RNAV (GPS) LNAV on Runway 2 procedure to provide LP and LPV minimums. A similar RNAV (GPS) instrument approach to Runway 20 can be similarly implemented so that this runway end may be utilized in IFR conditions. The installation of an approach lighting system at either runway end could lower the visibility minimum by ¼-statute mile; however, this is not considered viable given the location of the Clark Dike.

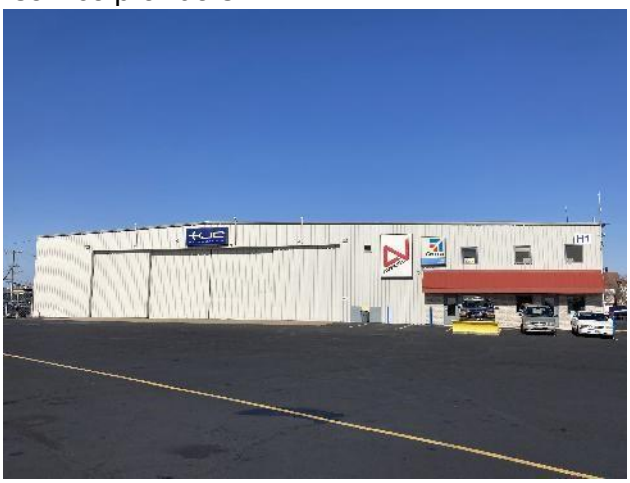
A preliminary assessment of the potential for an improved instrument approach procedure to Runway 2 indicated that after the ongoing tree clearing and topping in the approach is completed, the opportunity to achieve a lower ceiling minimum may be feasible and would likely be in the range of 300' to 400'; a marginal improvement. An instrument approach to Runway 20 is expected to yield higher approach minimums given the obstruction environment in the final approach segment.

TERMINAL AREA FACILITY REQUIREMENTS

The land area west of Runway 2-20 and north of Runway 11-29 is reserved for terminal area facilities that include tiedowns for based and transient aircraft, hangar storage, and structures used for aircraft maintenance, avionics services, flight instruction and general office activity. Terminal facilities located at the far northern end of the Airport are assigned to state and federal agency activities. There are undeveloped land areas within the terminal area that are reserved to accommodate new tenants. As the based aircraft demand level increases over time, there is more than adequate undeveloped land area to absorb that demand as indicated on the current Airport Layout Plan and reflected in Table 1.

The Airport has leased the terminal area to a variety of tenants. These include:

- Hartford Jet Center, LLC
  - Several parcels with and without hangars for aircraft tiedown and storage, and office space
  - Lease expires on December 31, 2042 with 2, 5-year extension options
  - Subleases facilities to other aviation service providers



- The Hartford Tees, Inc
  - 30 T-hangar units
  - Lease expires on March 31, 2025

- Hartford T-Hangar Association
  - 34 T -hangar units, individually owned
  - Lease expires August 31, 2031 with 2, 5-year extension options

- Federal Aviation Administration
  - Construct and operate an air traffic control tower
  - Lease expires November 30, 2037

- CT Aero Tech School for Maintenance Technicians

- CAA, City and Federal Agencies
  - Facilities located at north end of the Airport used by the CAA for maintenance and fire/emergency response, City of Hartford Police Department, Connecticut State Police, Connecticut Department of Emergency Management and Homeland Security, Federal Bureau of Investigation, and United States Department of Homeland Security

- Hartford South Hangars, LLC
  - Undeveloped land (A and B) intended to construct 2 sets of T-hangars with 12 units each, 1 set of T-hangars with 16 units, and 2, 10,000 sf box hangars
  - Lease expires November 30, 2052 with 2, 5-year extension options
  - Lessee may be in default as no construction has been initiated within the required start period for land area A

- Aircraft Tiedown Positions
  - North End, Midfield and South End Ramps
  - Owned by the CAA

Based Aircraft Facility Requirements

Aircraft based at the Airport are either positioned in tiedown spaces or in hangars. The latter include T-hangars that may be nested or consecutive box structures, and traditional box hangars that house one or more aircraft. As the capital investment in aircraft increases, the demand for hangar storage is greater given the weather conditions in the Hartford region. Over time, aircraft in tiedowns are expected to transition to hangar storage. The allocation of based aircraft to tiedown and hangar storage is presented in Table 10.

Table 10
BASED AIRCRAFT TIEDOWN AND HANGAR STORAGE REQUIREMENTS

Number of Spaces	Year				
	2022	**2028**	**2033**	**2038**	**2043**
Tiedown	51	50	48	45	43
Hangar	87	90	96	103	110
Total	**138**	**140**	**144**	**148**	**153**

* Note: Includes e-VTOL aircraft beginning in 2028

Comparison of the based aircraft tiedown and hangar storage demand with the available and planned capacity as presented in Table 1 indicates that the Airport has sufficient land area to accommodate these requirements.

Transient aircraft are positioned nearest to their intended service provider at the Airport and there are some 20 spaces allocated for this purpose. The demand for transient aircraft tiedown is based on the number of itinerant aircraft operations, which are discounted to account for that conducted by aircraft that are based at the Airport. Transient aircraft may remain at the Airport for variable periods of time. Experience at this and other airports suggest that there will be a requirement for nearly 30 tiedown positions. These may be accommodated within the existing terminal apron areas as based aircraft transition to hangar storage. Overnight transient aircraft hangar storage can usually be arranged by the fixed base operator using their own hangar facilities, however, for planning purposes it is useful to allow for the private investment in one such hangar facility.

Condition Assessment

The condition of the terminal area facilities ranges from fair to good and most paved areas will require crack and seal projects on a periodic basis and in later years reconstruction. The T-hangars owned by The Hartford Tees, Inc. are about 60 years old and nearing the end of their useful lives and likely going to remain until the expiration of the lease and its extension option. Should the Hartford Tees opt to construct new hangars, the lease term will likely be extended at that time.

CAPITAL INVESTMENT REQUIREMENTS

Airport facilities are in continuing need of repair, rehabilitation and reconstruction and the Airport is no exception. The CAA prepares and updates capital improvement plans annually and has provided the following input for the Airport (Table 11) to which other projects have been added that could be expected over time. Tenants of structures leased from the CAA are required to maintain those facilities. Federal funds are available through the FAA Airport Improvement Plan and recent legislation such as the Bipartisan Infrastructure Law grants. Hangar facilities are anticipated to be funded by the private sector with some financial support from the CAA. Private investors are expected to be provided with lease terms and conditions that allow for the appropriate amortization of the investments. The projects listed in Table 11 should be considered the minimal requirements to improve the Airport over the next 20 years.

Table 11
AIRPORT CAPITAL IMPROVEMENT PROGRAM

		Project Cost ($)			
Project	**Year**	**Total**	**Federal**	**CAA**	**Private Sector**
Obstruction Removal*	2023	1,589,309	1,430,378	158,931	0
Easement Acquisition*	--	347,764	312,988	34,776	0
Reconstruct Runway 2-20*	2025	10,000,000	9,000,000	1,000,000	0
Construct Airfield Vault*	2026	530,000	477,000	53,000	0
Crack and Seal Runway 11-29 and taxiway	2023 - 2043	80,000	72,000	8,000	0
Rehabilitate Taxiway A South*	2028	2,000,000	1,800,000	200,000	0
Crack and Seal Apron Pavements	2030 - 2043	500,000	450,000	50,000	0
Rehabilitate Airfield Lighting Systems	2030 - 2043	1,500,000	1,350,000	150,000	0
Construct New Based Aircraft Hangars Phase 1 (12 spaces)**	2033	900,000	0	90,000	810,000
Reconstruct Runway 11-29 and taxiway	2033	5,000.000	4,500,000	500,000	0
Construct New Based Aircraft Hangars Phase 2 (20 spaces)**	2043	1,500,000	0	150,000	1,350,000
	Total	**22,010,000**	**19,392,366**	**2,394,701**	**2,160,000**

* Current CAA Program

** CAA to construct common use taxi lane and apron pavements

FINANCIAL STATUS

Financial records are maintained by the CAA for the Airport and the latest income statements are presented in Table 12.

Table 12
AIRPORT OPERATING REVENUE AND EXPENSES

	Fiscal Year (July 1 - June 30) ($)		
Operating Financials	**2021**	**2022**	**2023 budget**
Revenue			
Land and Facility Rents	545,301	484,809	478,900
Aircraft Tiedown Rents	46,710	44,460	43,200
Aircraft Landing Fees	12,322	17,340	16,333
Share of FBO Rents	30,618	33,048	31,915
Fuel Flowage Fees	23,458	32,958	31,608
Car Rental Fees	517	1,711	1,303
Total	**658,926**	**614,326**	**603,259**
Expenses			
Personnel Costs*	680,933	863,235	908,716
Security Services	16,800	16,800	17,717
Administrative Costs	84,575	63,422	118,329
Repairs and Maintenance	96,197	203,044	186,137
Utilities	64,592	79,393	80,822
Equipment	10,648	42,327	0
Miscellaneous	6,491	8,916	0
Total	**960,236**	**1,277,137**	**1,311,721**
Payment to Connecticut State Employees Retirement System*	227,356	274,468	323,767
Net Operating Income (Loss)	**(301,310)**	**(662,811)**	**(708,462)**
Net-Net Operating Income (Loss)	**(73,954)**	**(388,343)**	**(384,695)**

***** Includes payment to Connecticut State Employees Retirement System.

Airport operating revenue, which is comprised of land and facility rents from tenants, fuel flowage and other fees has generally remained constant, but has not exceeded total operating expenses in the past. This is the budgeted outcome for fiscal year 2023. Land and facility rents for most tenants were renegotiated beginning in March 2023, which is the latter quarter of the fiscal year and included in the FY 2023 budget. These include a long-term lease with a primary tenant that extends to the year 2052, which term includes 2, 5-year extension options. Rate adjustments for inflation in accordance with changes in the published consumer price index and/or appraised land value are made on a scheduled basis. Fuel flowage fees, at the rate of $0.13 per gallon of avgas (100LL) and Jet-A delivered for sale, are currently earned from all aviation fuel and lubricants sold by tenants at the Airport. Landing fees are collected by the fixed base operator from commercial aircraft not based at the Airport and known to be operating for-hire.

The Airport incurs operating expenses for assigned personnel, which includes salaries, wages, fringe benefits, other salary costs, and pension payments. The latter is applicable as a share of the Connecticut State Employees Retirement System (SERS) for all public employees in the State, not just those employed at the Airport. The SERS payments are not been considered applicable when assessing the operating expenses at the Airport. This adjustment is accounted in the net-net operating income (loss) value for each fiscal year. Excluding the SERS payments, personnel costs continue to account for the majority of the Airport operating costs. Repairs and maintenance of the airfield and terminal area pavements and facilities represents the second largest operating expense. Administrative costs include support from the CAA main office staff and related equipment. The Airport can be expected to continue to operate at a net loss and net-net loss for the foreseeable future, depending on the extent of escalations in current lease rates based on consumer price increases and land appraisal values, and potential new tenant leases. The current financial status of the Airport and that anticipated in future years is typical at most general aviation airports across the country, especially those that do not have high use by the relatively more sophisticated aircraft that purchase larger volumes of fuel.

SCHEDULED AND NONSCHEDULED AIRLINE SERVICE PROSPECTS

The Airport accommodates nonscheduled (charter) aircraft operations on a periodic basis. These are conducted by such operators as NetJets, VistaJet, and Wheels Up Partners, that provide airport-to-airport connectivity based on the travel time demands of their clients. One such operator, Pegasus Air Charter, is based at the Airport through an affiliation with the Hartford Jet Center that operates a multi-engine turboprop aircraft to provide on-demand service. The frequency of such aircraft activity is not monitored by air traffic control or others.

Scheduled airline service such as that offered by such companies as Cape Air, based in Hyannis, that in this region of the Northeast provides seasonal service at airports serving principally resort areas, e.g., Cape Cod, Nantucket, Martha's Vineyard and Provincetown. Tradewind Aviation, based at the Waterbury Oxford Airport provides similar services.

Given the runway length at the Airport and relatively high instrument procedure approach minimums, nonscheduled airline service is generally limited to light business jets and turboprop aircraft. Scheduled airline service has a similar limitation and the Airport lacks a focal point (passenger terminal facility with security screening capability) to provide the services and amenities that passengers expect to be available. The proximity of Bradley International Airport and Tweed-New Haven Airport also deters the introduction of scheduled airline service at the Airport. Additionally, the Airport is not certified under Federal Aviation Regulations Part 139. This

regulation requires that the Airport meet certain requirements related to the safety of scheduled and nonscheduled airline operations with aircraft having more than 30 seats and less stringent requirements for scheduled airlines with more than 9 seats but less than 31 seats. FAR Part 139 does not apply to nonscheduled airline service with aircraft having less than 31 seats.

Based on the above factors, the potential for significant levels of scheduled or nonscheduled airline service at the Airport is considered minimal, with the greater opportunity found in the latter.

ADVANCED AIR MOBILITY AND VERTIPORTS

An emerging sector in the aviation market is termed advanced air mobility (AAM) and is premised on the introduction of electric vertical takeoff and landing (eVTOL) aircraft. Several aircraft manufacturers are in varying stages of receiving certification by the Federal Aviation Administration (FAA) to deploy these aircraft throughout the country. Facilities to service these aircraft are referred to vertiports. The term vertiport may be confused with heliport, but each is different in their design features. Heliport design is based on helicopters with single, tandem (front and rear) or dual (side by side) rotors. The emerging eVTOL aircraft are not proven to perform like conventional helicopters and, consequently, the FAA has issued interim guidance on the design of vertiport facilities. These design standards can likely be accommodated at the Airport.

The demand for a vertiport is primarily envisioned as a means to transport passengers and cargo between city centers or other origin-destinations for which travel time benefits are maximized. Vertiports may also be co-located with existing ground transportation services to facilitate the "last mile" movement of passengers and cargo. Passenger-carrying trips to other areas of high demand such as between airports is also a distinct application of eVTOL aircraft. Flight distances of less than 100 n.m. are particularly applicable based on the electrical power source of the eVTOL aircraft. The Airport is within this range to several airports (Boston Logan, T.F. Green International, Albany, New York LaGuardia, John F. Kennedy International, Newark Liberty International, and Teterboro) as well as seasonal markets (Martha's Vineyard and possibly Nantucket and Provincetown).

The widespread application of AAM at airports across the country is gaining momentum with some vertiports expected to be operational in the next two to three years, such as the facility at Lake Nona near Orlando, Florida. The development of the AAM market is presently focused on partnerships between the eVTOL aircraft manufacturers and private sector land development companies. Public-private partnerships are likely to emerge over time. This opportunity may be realized at the Airport and will require the active participation and engagement of the Connecticut Airport Authority.

CONCLUSIONS -- HARTFORD BRAINARD AIRPORT AT PRESENT

Based on the above evaluations, it may be concluded that:

1. The Airport is anticipated to experience moderate growth in the number of based aircraft and aircraft operations.

2. The airfield area provides adequate capacity for aircraft operations, with or without the availability of Runway 11-29.

3. Runway 2-20, the primary runway, does not meet current airfield design standards for the aircraft that frequently use the facility due to Clark Dike at each runway end and lagoons at its southern end. Consequently, displaced landing thresholds are required that shorten the physical length of the runway for such operations.

4. Runway 2-20 can offer a higher level of service to higher performance aircraft such as business jets if its length was longer. The maximum potential runway length is 5,000' should the lagoons at the Runway 2 end be acquired and declared distances are implemented.

5. Runway 11-29 provides limited operational utility and its continued availability will likely be halted at such time as full reconstruction of the pavement is required.

6. Future based aircraft and aircraft activity will require additional investment in hangar facilities, and there is adequate open land resource available to meet these demand levels. Some existing terminal area facilities will reach the end of their useful lives during the forecast horizon and will be replaced by private sector investment.

7. Over a 20-year period, the Airport is expected to require a total investment of about $22 million, of which some $2.2 million will be funded by the CAA and about $2.16 from the private sector. CAA funding requirements may increase depending on the extent of federal grant funding available in any year.

8. The Airport has been and is expected to continue to operate at a net loss and net-net loss through the long-term.

9. Continuation of nonscheduled (charter) is expected using aircraft that can operate without restriction on the available and potential longer Runway 2-20 length.

10. The introduction of scheduled airline service at the Airport is not anticipated given nearby air carrier airports that currently provide and are expected to continue to offer this service.

11. There is a potential to establish a vertiport facility in concert with industry initiatives to develop and expand the AAM concept. Service to major city centers and airports within a 100-n.m. range of the Airport can be targeted. The introduction of a vertiport can involve public-private partnerships to include the CAA.

AIRCRAFT REPOSITIONING POTENTIAL

In the event the decision is made to close the Airport, the aircraft based at the field will need to reposition to other area airports. Aircraft owned and operated by the Hartford Jet Center (1), three flight schools (19 fixed wing aircraft), Civil Air Patrol (2 fixed wing aircraft) and Connecticut State Police (3 fixed wing and 2 rotary wing aircraft) can reposition to other area airports to continue to fulfill their flight missions. Relocation of the 19 flight school aircraft is expected to be based on market demand, competitive factors, and a host of other matters taken into consideration by their owners. Due to the wide variability in outcomes, these 19 flight training aircraft have not been allocated to other area airports. The repositioning of the Connecticut State Police air mission fleet is particularly noteworthy. The airspace operating environment at the Airport (Class D) and the State-central location of the Airport favored its earlier selection to meet State Police rapid response requirements. This decision suggests that the repositioning of these aircraft would likely be to either the Windam Airport (IJD) or Robertson Field (4B8) may be appropriate. Of the two, Windham Airport may be preferred due to its two-runway system. Nonetheless, depending on how the Airport land resource is repurposed, it may be possible to retain rotary wing aircraft operated by the Connecticut State Police and other government agencies that utilize such aircraft for emergency response and other mission needs. Lastly, it is possible that some of the private aircraft owners will opt not to reposition for any number of reasons -- owner's age, health, financial status, unwillingness to reposition and take action to sell their aircraft, cost of hangar space at the area airports, decision to move out of the area, or just lose interest in flying, among others.

Figure 3 highlights the density location of the aircraft owners based on addresses provided by those receiving rent payments. Aircraft owners as far north as Enfield and Somers, as east as Lebanon and Mansfield, as south as Stratford and as west as Roxbury choose to base at the Airport. Driving times and distances from these cities and towns to the Airport are presented in Table 13 as an indication of the Airport's service area. The area airports are denoted with a green pin icon and its FAA identifier code. The location of based aircraft owners is shown by a yellow icon identifying the city or town name followed by the number of owners at that location. Hartford Brainard Airport is assigned a red pin icon and there are 8 aircraft, excluding the 19 owned by the 3 flight schools, based at the Airport for reasons of flight mission. The airport identifier codes are as follows:

- 4B8 Robertson Field (Plainville)
- BAF Westfield Barnes Regional Airport
- BDR Bridgeport Sikorsky Airport
- BDL Bradley International Airport
- DXR Danbury Municipal Airport
- GON Groton New London Airport
- HFD Hartford Brainard Airport
- HVN Tweed New Haven Airport
- IJD Windham Airport
- LZD Danielson Airport
- MMK Meriden-Markham Municipal Airport
- OXC Waterbury Oxford Airport

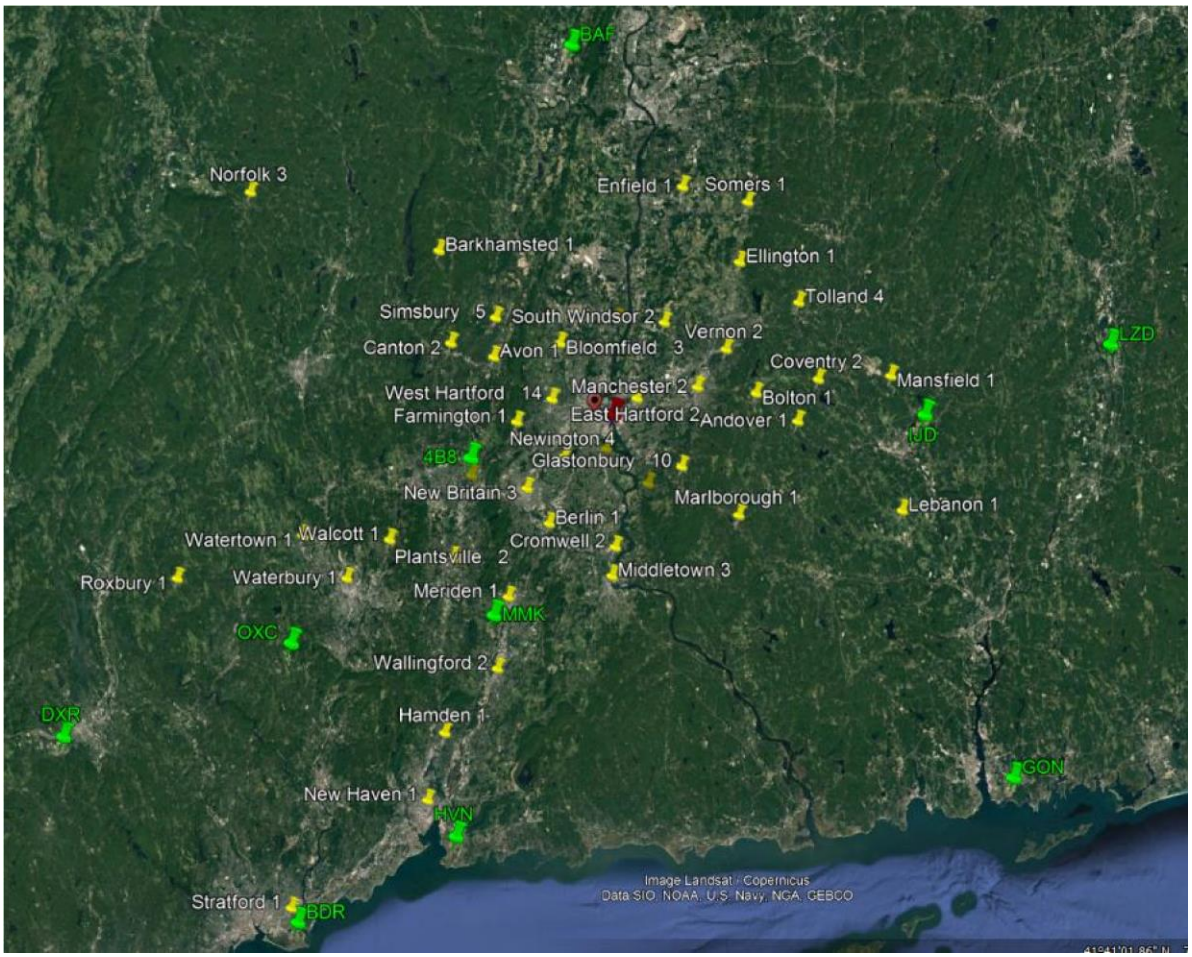


Figure 3 -- Aircraft Owner Locations

Table 13 BASED AIRCRAFT OWNER DRIVING DISTANCES AND TIMES			
Shortest Distance from Listed City/Town to Airport (HFD) (miles)		**Peak-Hour Drive Time (minutes)**	**Off-Peak-Hour Drive Time (minutes)**
Enfield	22	32	27
Somers	25	35	33
Lebanon	32	39	37
Mansfield	26	36	34
Norfolk	39	73	58
Stratford	52	54	51
Roxbury	52	60	56

Table 13 suggests that based aircraft owners are willing to drive some 50 miles for almost an hour during peak travel periods to the Airport. Their choice of the Airport may be due to the facilities and services at the Airport and otherwise unavailable at an airport located more in proximity to their point of origin. Notwithstanding, Figure 3 highlights that the majority of the based aircraft owners are located within a 30-minute drive of the Airport, which user characteristic is shared by most general aviation airports located in an urban setting in the country.

The allocation of aircraft currently based at the Airport to each of the area airports was unconstrained by the extent of airfield or terminal area facilities available. If a sufficient demand for basing at an area airport could be demonstrated, the ability of that airport to accommodate that demand was evaluated and the requisite improvements noted including an estimated implementation cost. No based aircraft were allocated to Bradley International Airport (BDL) because of its airline service role in the region and its defined requirement for a general aviation reliever airport. Additionally, only those area airports owned by a public entity were considered to accommodate the repositioned aircraft. Each of these airports are grant-obligated to remain open for considerable periods of time, most about 20 years. Conversely, the longevity of privately-owned airports cannot be assured. Nonetheless, it is possible that some of the owners of the repositioned aircraft may choose to base at a privately-owned airport.

Nearly all of the aircraft based at the Airport have runway length requirements that can be met at any of the area airports with the possible exception of Danielson Airport, which would be chosen for repositioning only by the lightest category of aircraft. However, given its location within the region with respect to that of the based aircraft owners, the Danielson Airport is not expected to be a target for aircraft repositioning. It is unlikely that based aircraft would reposition to Danbury Municipal Airport (DXR) and Groton New London Airport (GON) given their distances from the points of origin. Notwithstanding the above factors, based business jets and multi-engine aircraft can be expected to prefer to reposition to Waterbury Oxford Airport (OXC), Groton New London Airport (GON), or Westfield Barnes Regional Airport (BAF) regardless of the driving distance and time requirements for reasons of runway length and instrument approach procedure availability.

Figure 4 illustrates a possible repositioning of the aircraft based at the Airport to the area airports. Figure 5 through Figure 11 present these allocations by individual airport. These are not definitive allocations as there are many reasons why an aircraft owner may choose one airport over another. However, it presents a reasonable allocation of based aircraft for planning purposes. The 5 Connecticut State Police helicopters and fixed wing aircraft could reposition to Robertson Field (4B8) or Windham Airport (IJD) given their more central Connecticut location, although Windham may be preferred because it offers a dual runway system. The 2 Civil Air Patrol aircraft could reposition to most any airport and are assigned to the Windham Airport (IJD) in this allocation scenario.

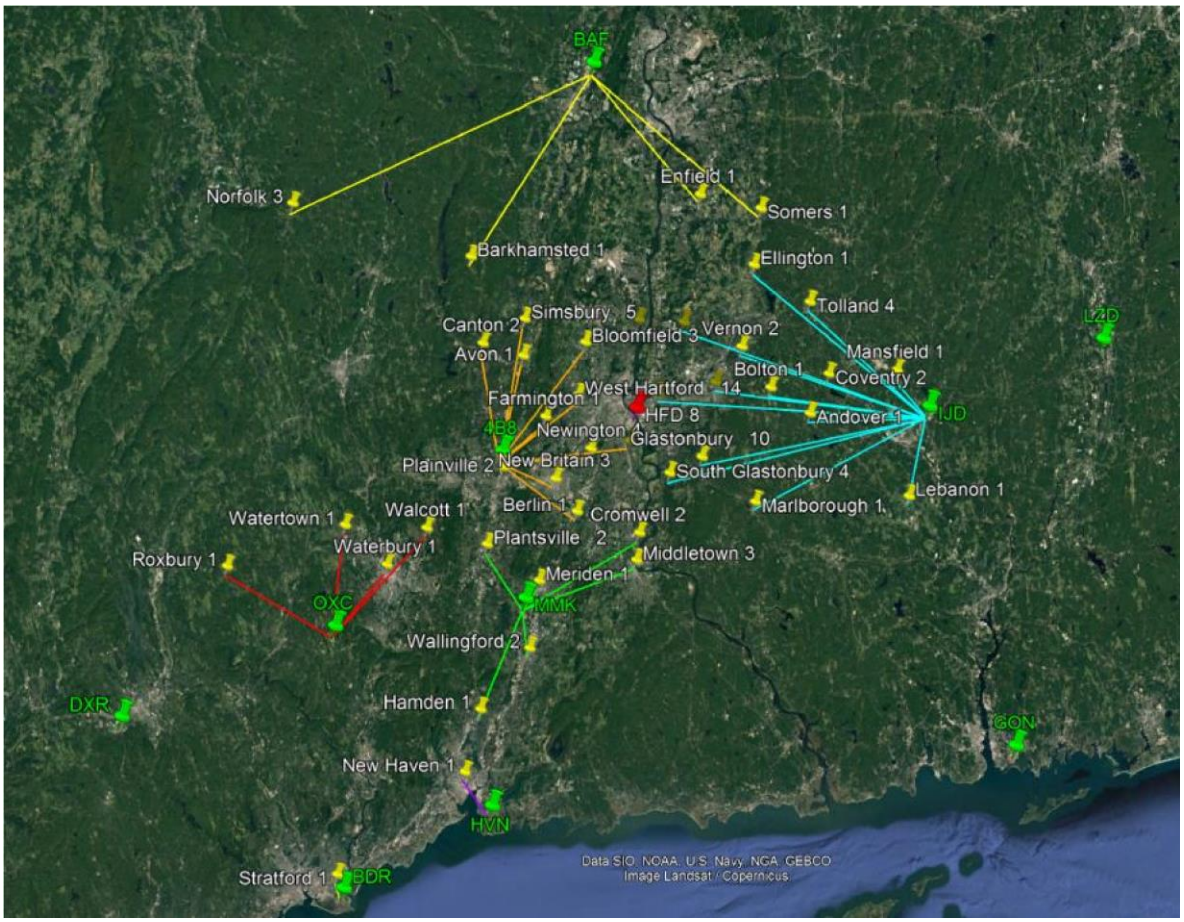


Figure 4 -- HFD Based Aircraft Allocation to Area Airports

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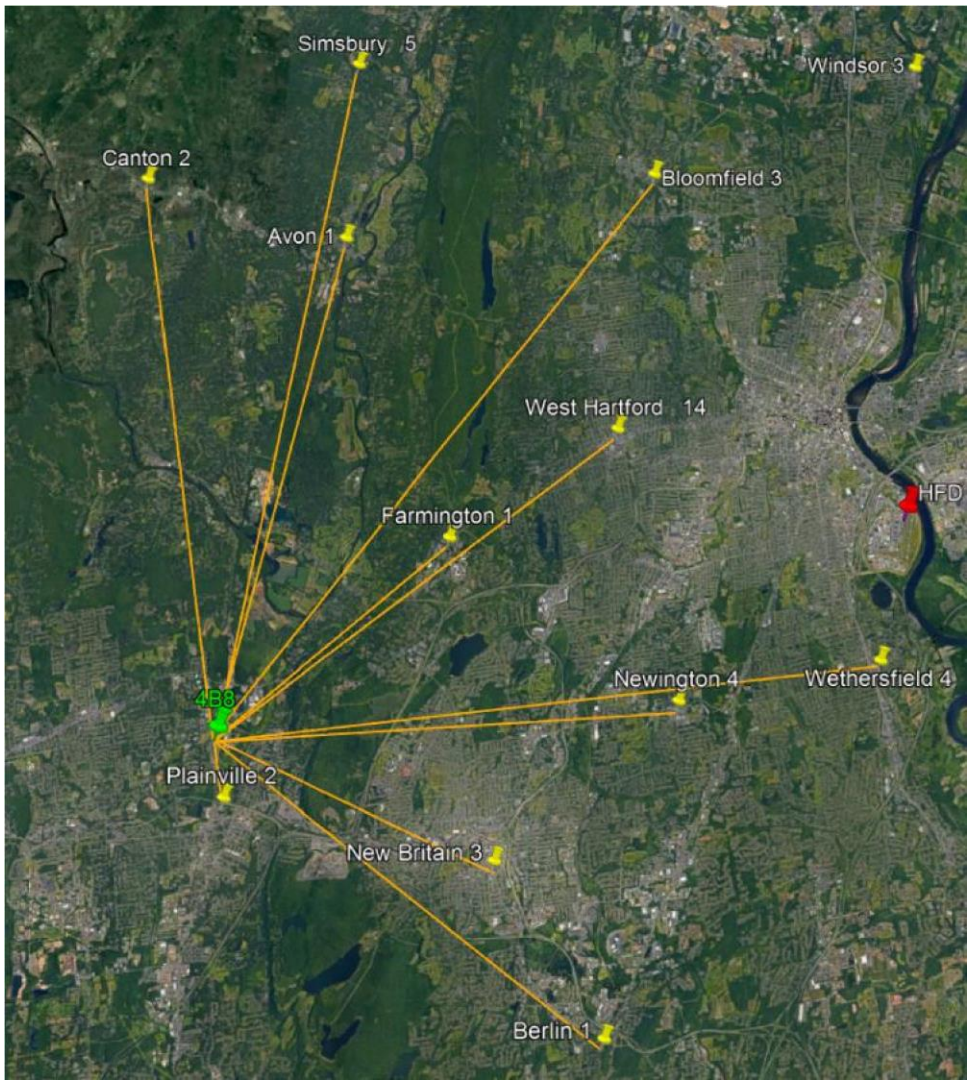

Figure 5 -- Aircraft Allocation to Robertson Field (4B8)

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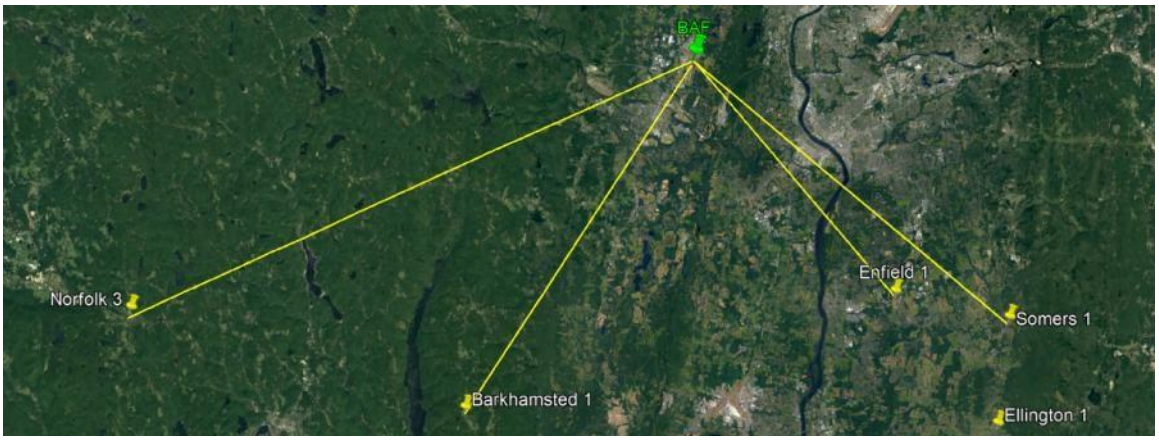

Figure 6 -- Aircraft Allocation to Westfield Barnes Airport (BAF)

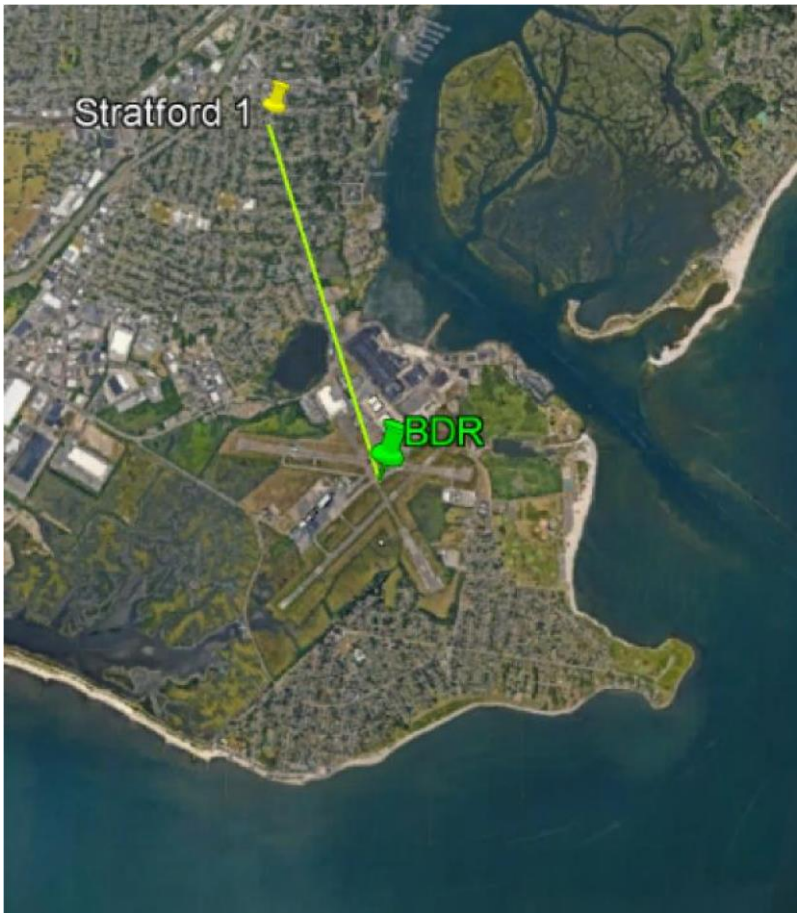

Figure 7 -- Aircraft Allocation to Bridgeport Sikorsky Airport (BDR)

Figure 8 -- Aircraft Allocation to Tweed New Haven Airport (HVN)

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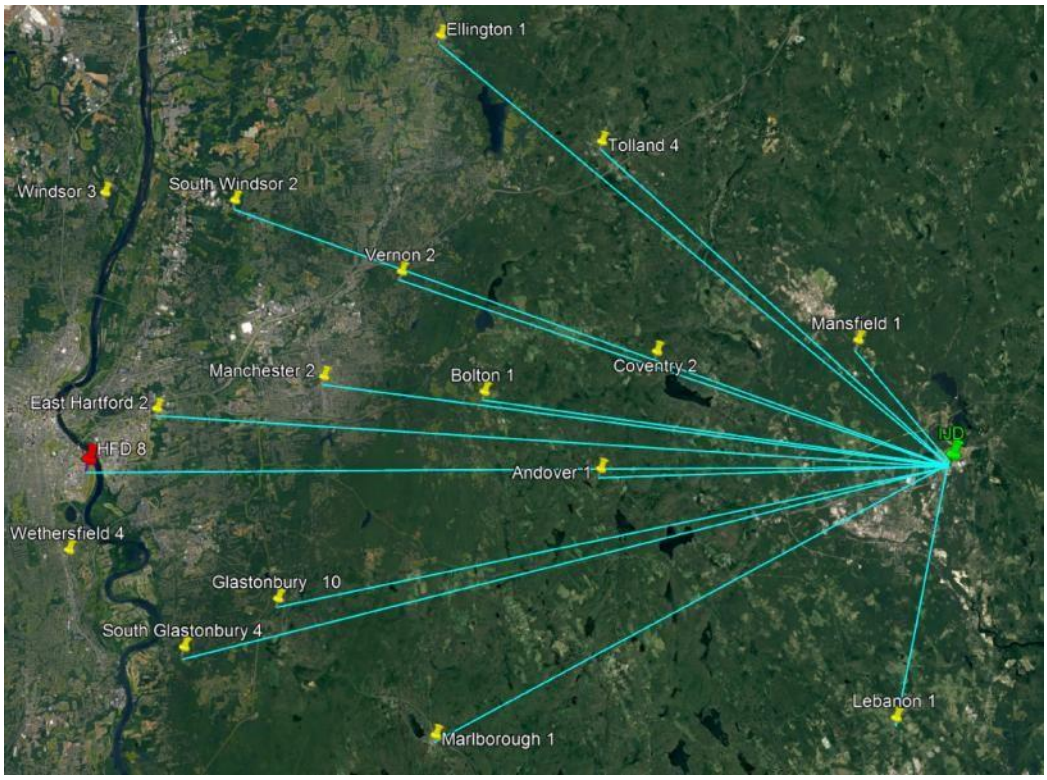


Figure 9 -- Aircraft Allocation to Windham Airport (IJD)

Figure 10 -- Aircraft Allocation to Meriden Markham Airport (MMK)

Figure 11 -- Aircraft Allocation to Waterbury Oxford Airport (OXC)

Table 14 presents the potential number of aircraft that could be repositioned to each of the area airports and the planned capacity for based aircraft at those airports. An assumption is made that all repositioned aircraft will require hangar storage to the extent possible within the planned capacity of each area airport.

Table 14
POTENTIAL ALLOCATION OF REPOSITIONED AIRCRAFT BASED AT HARTFORD BRAINARD

Receiving Airport	Based Aircraft (Tiedown / Hangar)						
	Current Based Aircraft*		Repositioned Aircraft Demand*		Planned Capacity		Shortfall
Robertson Field (4B8)	28	34	0	40	46	74	None
Westfield Barnes (BAF)	18	88	0	6	20	108	None
Bridgeport Sikorsky (BDR)	56	55	0	1	66	110	None
Tweed New Haven (HVN)	15	12	0	1	35	60	None
Windham (IJD)	47	14	30***	12***	50	26	12 tiedowns****
Meriden Markham (MMK)	21	50	0	11	62	80	None
Waterbury Oxford (OXC)	31	95	0	4	60	117	None
* Excludes 19 flight school aircraft							
** All existing hangar spaces are filled							
*** Includes 8 aircraft to be repositioned from Hartford Brainard							
**** Of the 27 tiedown spaces required, 15 spaces are currently vacant							

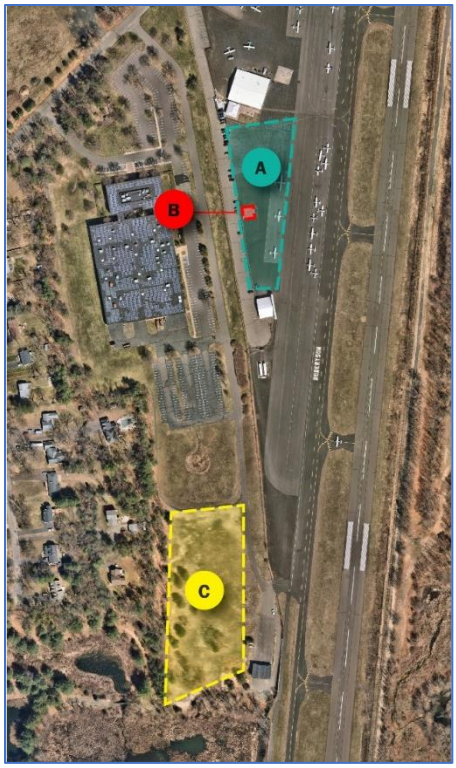
Table 14 also highlights that the repositioning of based aircraft to the Windham Airport (IJD) will require the use of tiedown spaces because the airport is physically unable to meet the total hangar space demand. The remaining airports have excess planned capacity to meet the repositioning aircraft demand, and some have unused tiedown spaces currently available. This demand/supply situation should self-regulate as some aircraft owners may accept to use another area airport other than the one presented in this allocation scenario. One or more of these airports may be found to be suitable for the flight schools to re-establish their businesses.

Area Airport Capital Improvements and Development Costs

As presented in Table 14, there will be a need to allocate a total of 75 new hangar and 12 tiedown spaces at the area airports. There are various hangar types that can be constructed to accommodate this demand and the final type is governed by the available open space and its integration with the existing terminal area facilities and aircraft ground movement flows.

With the exception of the Windham Airport, the remaining area airports have expansion plans to accommodate the repositioned demand. Because Windham Airport can only accommodate a maximum of 26 hangar spaces, 30 of the repositioned aircraft will need to be in tiedowns, for which there is currently 15 vacant tiedown positions available. The inability to meet the total hangar space demand may 'invite' aircraft owners to consider a different airport to which they reposition their aircraft, and the associated development costs would be assigned to that airport.

Although the majority of the airports have the planned capacity to accommodate these aircraft as noted above, the cost to do so as a result of the closure of the Hartford Brainard Airport should be absorbed. Land areas for development of the terminal area facilities at Robertson Field, Windham Airport and Meriden Markham Airport are presented in Figure 12 through Figure 14 as these facilities are to receive relatively more of the repositioned aircraft than the remaining airports, each of which have existing and vacant land areas readily available.



As illustrated in Figure 12, some 4.7 acres of Town-owned land adjacent to Robertson Field can be developed to meet the increased demand for hangar storage as indicated in Area C.

Area B provides an expanded terminal area for aircraft tiedowns and possible additional T-hangar units. Development of Area A is best facilitated by relocating the planned AWOS installation (Area B) to a more appropriate location.

Figure 12 -- Development Areas at Robertson Field (4B8)

Figure 13 indicates that additional T-hangars (12 units) may be constructed in Area A that is adjacent to a set of similar facilities.

Figure 13 -- Development Area at Meriden Markham Airport (MMK)

Figure 14 highlights the land areas available for T-hangar and aircraft tiedown spaces at the Windham Airport.

Area A may be developed for T-hangars (26 units)

Area B is reserved for new aircraft tiedown spaces to complement those in similar use. This will require the relocation of the segmented circle and wind sock and AWOS that are presently located in Area C to Area D and Area E, respectively on the north side of Runway 9-27.

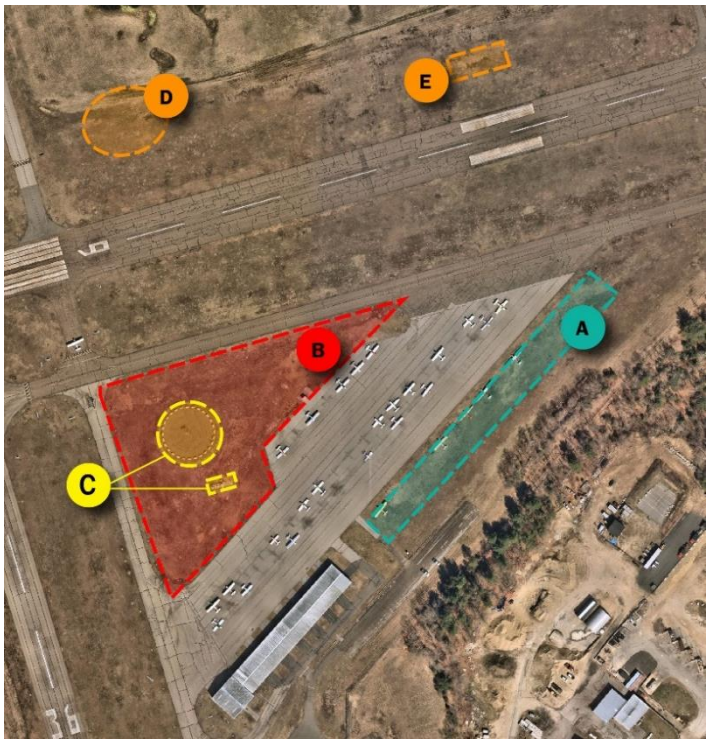


Figure 14 -- Development Areas at Windham Airport (IJD)

On a conservative basis, the development costs assume that new tiedown spaces (pavement) will be required even if existing open space is available or to allow for the possible need to rehabilitate those pavements. Each airport will, however, require new hangar units to store the allocated repositioned aircraft inasmuch as the existing hangar storage status is essentially full.

Table 15 presents the development costs for each of the area airports to receive a portion of the repositioned aircraft. The costs to accommodate the repositioned aircraft are to be paid through the sale of the Hartford Brainard Airport and its physical assets and will not require local matching funds.

Table 15
TERMINAL AREA DEVELOPMENT REQUIREMENTS AND COSTS TO ACCOMMODATE REPOSITIONED AIRCRAFT

Receiving Airport	Required Additional Spaces		Total Development Cost ($)
	Tiedown	Hangars	
Robertson Field (4B8)	0	40	3,450,000
Westfield Barnes (BAF)	0	6	520,000
Bridgeport Sikorsky (BDR)	0	1	90,000
Tweed New Haven (HVN)	0	1	90,000
Windham (IJD)	15	12	1,860,000
Meriden Markham (MMK)	0	11	950,000
Waterbury Oxford (OXC)	0	4	350,000
Total	**15**	**75**	**7,310,000**

There are other costs associated with the repositioning of the aircraft based at the Airport. Among these are those associated with terminating existing leases, business interruption costs, repositioning reimbursement costs incurred by aircraft owners, repayment of the unamortized value of past federal grants for capital projects, and others. All such costs are also to be paid through the sale of the Airport and its physical assets.

Environmental Impact Considerations

Aircraft Noise

The repositioning of aircraft to the area airports can introduce environmental impacts on land uses on and in the vicinity of those airports. The primary impact is associated with potentially increased levels of aircraft noise. Those area airports that may see a relatively large influx of repositioned aircraft include Robertson Field (4B8), Meriden Markham Airport (MMK) and Windham Airport (IJD). When the increase in based aircraft is less than 10 percent, environmental impacts are regarded as de minimis.

Aircraft noise impacts were evaluated using the FAA Area Equivalent Method (AEM). The AEM is a screening tool that identifies the change in the area of an aircraft noise contour due to a change in the number of aircraft operations as defined by a landing-takeoff-cycle (two aircraft operations equal one cycle). The annual 65Ldn (day-night average sound level) contour was evaluated in the analysis, which is the industry-recognized threshold for residential land use. The contour considers daytime and nighttime levels of activity (landing and takeoff cycles -one cycle equals one landing and one takeoff) by aircraft type to account for receivers' reaction to noise during those periods of the day that are relatively quieter. Nighttime is defined as between 10:00 p.m. and 7:00 a.m.

Research by the FAA and the scientific industry has shown that increases to the area of the contour in excess of 17 percent may be considered to represent an annoyance to people on the ground in residential land use. Inputs to the AEM model included the number of landing and takeoff cycles by a mix of single-engine piston aircraft and an allowance for 10 percent of the flight activity to occur during nighttime hours. All aircraft operations were assigned to the primary runway at each airport, which is conservative allocation at Windham Airport that has a two-runway system. Application of the AEM model yielded the results presented in Table 16.

Table 16
AIRCRAFT NOISE IMPACTS REVIEW

	Contour and Airport Property Area (square miles)			
Airport	**Current 65 Ldn**	**Future 65 Ldn**	**Increase (%) ***	**Airport Property**
Robertson Field	0.068	0.076	12.33	0.06
Windham Airport	0.044	0.067	54.04	0.44
Meriden Markham Airport	0.094	0.103	9.57	0.25

* Percentage values are as generated by the model and may not be equivalent to a strict calculation result

The data indicate that Windham Airport will exceed an increase in the area of the 65 Ldn contour in excess of 17 percent. Given the area occupied by Windham Airport, the existing and future noise contours are within the property line. Notwithstanding, land uses to the east and west of the primary Runway 9-27 are in open space and industrial use, respectively. The increase in the 65 Ldn contour areas at Robertson Field and the Meriden Markham Airport do not exceed the 17 percent threshold, in addition to being nearly within their property boundaries.

As a point of comparison, the current aircraft activity at the Hartford Brainard Airport generates a 65 Ldn contour of some 1.53 square miles, when all the landings are made on either Runway 2 or Runway 20. At the 20-year level of aircraft activity, the 65 Ldn contour increases to encompass about 2.41 acres. The Airport has an area of 0.31 square miles, and thus a large portion of the 65 Ldn contours overly areas adjacent to the Airport in the flight path. Of those areas, residential land uses are concentrated to the northeast and southwest of the Airport, which have generated noise complaints from residents in these areas.

Air Quality

Connecticut has persistently been designated nonattainment for national ambient air quality standards (NAAQS) for ozone. Currently each county in the state does not meet the 8-hour standard for ozone. Nonattainment is mainly due to transport of pollutants from the New York metropolitan area reacting to form ozone as they travel to and across Connecticut. Connecticut Department of Energy and Environmental Protection has been working with neighboring states and the U.S. Environmental Protection Agency to reduce local and regional emissions that cause ozone.

The far majority of the aircraft operating at the Hartford Brainard Airport are piston engine driven and fly at low altitudes where their impact on ozone levels are less pronounced than those generated by jet engine aircraft that operate at higher altitudes, typically between 26,000' above mean sea level to 43,000' above mean sea level. It is at these higher altitudes where emission of ozone gases can have an impact on global warming.

The repositioning of aircraft to the area airports in the event that the Hartford Brainard Airport closes is essentially a status quo outcome given that the entire state is classified as nonattainment for ozone.

Water Quality

As aircraft reposition from the Hartford Brainard Airport to the area airports, there will be an increase in impervious ground areas associated with the construction of hangars and tiedown pavements. Should the Airport remain open, expansion of these terminal area facilities has an equivalent impact on surface water runoff volumes. Construction contract specifications can be effective in assuring that impacts to water resource areas are

ADVANCED AIR MOBILITY AND VERTIPORT DEVELOPMENT

Closure of the Airport does not preclude the establishment of a vertiport facility in conjunction with industry initiatives to develop the advanced air mobility (AAM) concept. The siting of the vertiport can be integrated with other uses of the Airport land resource. Similarly, maintaining a helicopter operation in support of emergency response by units of the local, state and federal agencies may also be retained.

FINDINGS AND CONCLUSIONS -- CLOSURE OF THE HARTFORD BRAINARD AIRPORT

In the event that the Hartford Brainard Airport closes, there is a need to reposition 138 based aircraft and relocation of businesses providing aeronautical services. There are several publicly-owned area airports that can accommodate these aircraft and potentially the service providers based on the planned long-term development programs at these airports. In one instance, Robertson Field, there will be need to repurpose some 4.7 acres of undeveloped adjacent land owned by the Town of Plainville, which is also the owner of the Field, to provide the requisite terminal area facilities (aircraft hangar and tiedown spaces).

The aircraft repositioning scenario places the majority at the Robertson Field, Windham Airport and Meriden Markham Municipal Airport. It is recognized that aircraft owners have the ultimate decision making in the repositioning of their aircraft and, thus, the repositioning scenario should be considered as an initial determination for planning purposes.

Major economic and financial impacts will be borne by tenants displaced from the Hartford Brainard Airport. These and other costs will be absorbed through the sale and disposition of the assets of the Airport in accordance with federal guidelines related to grant-obligated airports. The costs for developing new terminal area facilities at the area airports and those receiving a relatively smaller number of repositioned aircraft is estimated at $7.3 million.

Environmental impacts associated with increased air traffic levels at the receiving area airports are assessed as minimal, including that associated with aircraft noise given that the majority of the repositioned aircraft are in the small, single-engine category.

Depending on how the Airport land resource is repurposed, the ability to maintain helicopter operations as well as introduce AAM and vertiport initiatives can be retained.