

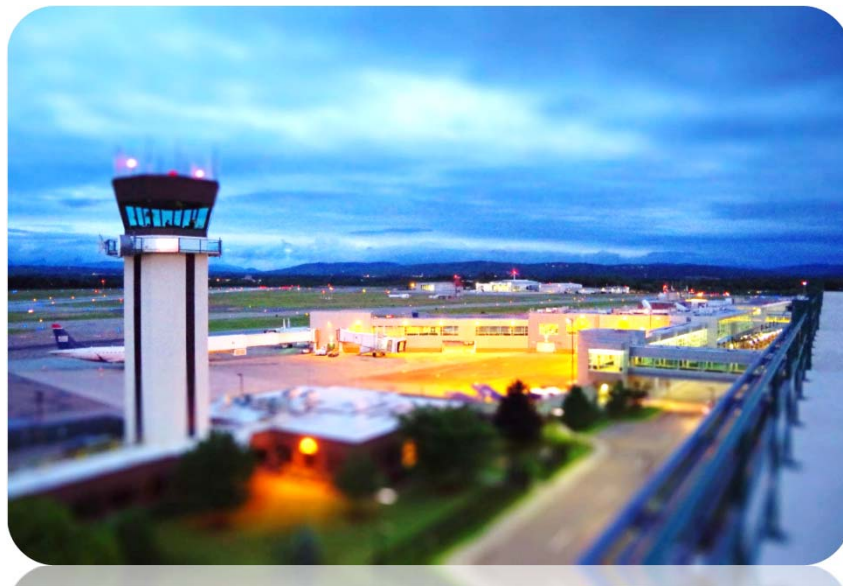
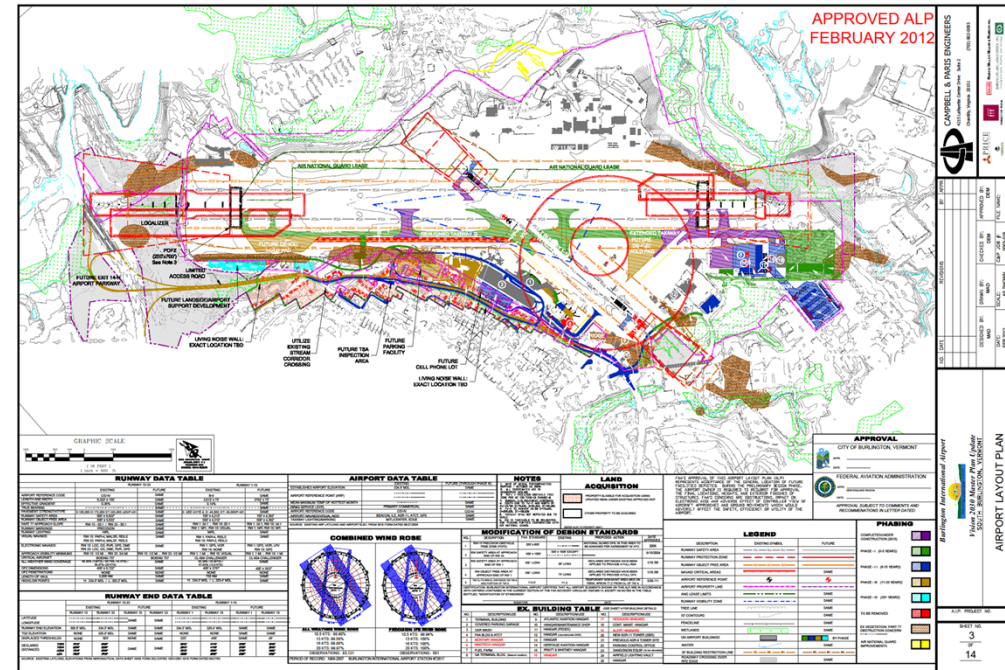


# The Master Plan

## Burlington International Airport Master Plan

### What is a Master Plan?

- Technical document from an airport management and operation perspective to guide future growth and development at the airport
- Provide framework needed to guide future airport development that will cost-effectively satisfy aviation demand, while considering potential environmental and socioeconomic impacts



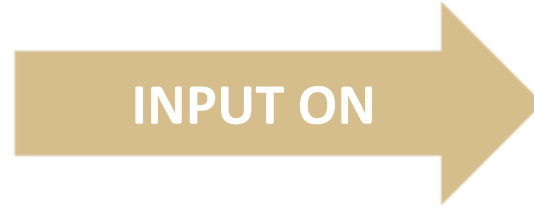
### Why do a Master Plan?

- To have a strategy for completing short-, medium-, and long-term development goals
- To include all stakeholders, including airport users and the public
- To prepare the airport for the future



# SWOT Analysis

## Burlington International Airport Master Plan



Strengths	Weaknesses
Opportunities	Threats



**Existing Airline Service Diversity:** The Airport currently serves four airlines, including American, Delta, JetBlue, and United. Frontier started operating in February 2019 bringing the total number of airlines to five and total number of nonstop destinations to 12.

SWOT Analysis Results	
Strengths	Weaknesses
<ul style="list-style-type: none"> <li>Partnership with VTANG</li> <li>Existing Airline Service Diversity</li> <li>Airport Convenience</li> </ul>	<ul style="list-style-type: none"> <li>Ground Access</li> <li>Tenant Location vs. Taxiway Configuration</li> <li>Terminal Congestion</li> <li>Separate TSA Areas</li> <li>Insufficient Passenger Amenities</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>Community Relations and Communication</li> <li>Separate Cargo Operations Area</li> <li>Governance</li> </ul>	<ul style="list-style-type: none"> <li>Terminal Space/Congestion</li> <li>Rehabilitation of Runway 15-33</li> <li>Anything that threatens VTANG Presence</li> </ul>



# Inventory

## Burlington International Airport Master Plan

### Largest Airport in Vermont

Two Runways

Runway 15-33: 8,319' x 150' – for Commercial/Cargo/VTANG operations

Runway 1-19: 4,112' x 75' – for General Aviation Operations

Serves 600,000+ Passengers

### Diverse User Base

Commercial

Cargo

General Aviation

Vermont Air National Guard (VTANG)

Partnership Saves Region Approximately \$5 Million per year

### Terminal Building

Two Concourses

Two TSA Checkpoints

5 Airlines

Parking Garage





# Demand/ Capacity

## Burlington International Airport Master Plan

### Recommended Forecast Summary

Year	Enplanements	Total Operations					Based Aircraft
		Air Carrier	GA	Cargo	Military	Total	
2017	591,558	21,467	37,332	1,396	8,567	68,762	92
2018	674,944	24,082	37,655	1,422	8,567	71,727	93
2023	695,171	24,480	39,449	1,563	5,954	71,446	97
2028	724,528	24,899	41,263	1,717	5,954	73,832	102
2033	755,124	25,340	43,101	1,886	5,954	76,281	106
2038	787,012	25,804	45,063	2,071	5,954	78,892	111
<b>AAGR 2018-2038</b>	<b>0.8%</b>	<b>0.3%</b>	<b>0.9%</b>	<b>1.9%</b>	<b>-1.8%</b>	<b>0.5%</b>	<b>0.9%</b>
<b>Growth 2018-2038</b>	<b>18.0%</b>	<b>7.1%</b>	<b>19.7%</b>	<b>45.6%</b>	<b>-30.5%</b>	<b>10.0%</b>	<b>19.7%</b>



# Demand/ Capacity

## Burlington International Airport Master Plan

### Airfield Hourly Capacity (Current Airfield Configuration)

Factors	Base VFR / IFR	10 Years VFR / IFR	20 Years VFR / IFR
Hourly Capacity Base	80.0/56.5	79.5/57.0	79.5/57.5
Touch-and-Go Factor	1.0 / 1.0	1.0 / 1.0	1.0 / 1.0
Taxiway Exit Factor	0.92 / 1.00	0.92 / 1.00	0.92 / 1.00
Calculated Hourly Capacity	73.6/56.5	73.1/57.0	73.1/57.5
Peak Hour	<b>23</b>	<b>23</b>	<b>25</b>

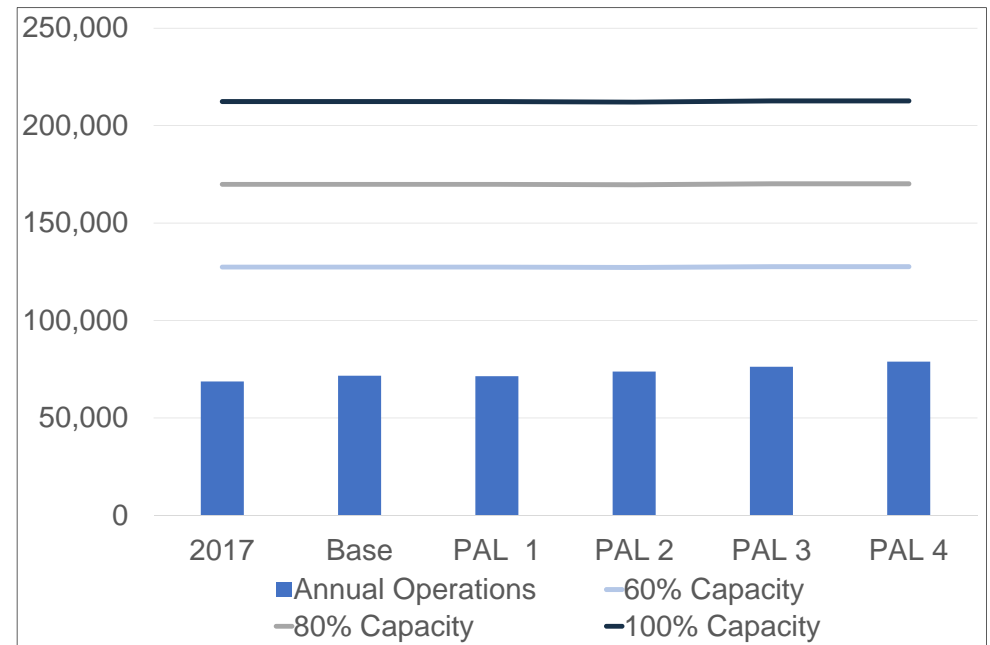


# Demand/ Capacity

## Burlington International Airport Master Plan

### Recommended Forecast Summary

Factor	Base	10 Years	20 Years
Annual Operations	71,727	73,832	78,892
Annual Service Volume	212,345	212,073	212,691
Capacity Level	<b>33.8%</b>	<b>34.8%</b>	<b>37.1%</b>





# Terminal Facility Requirements Overview

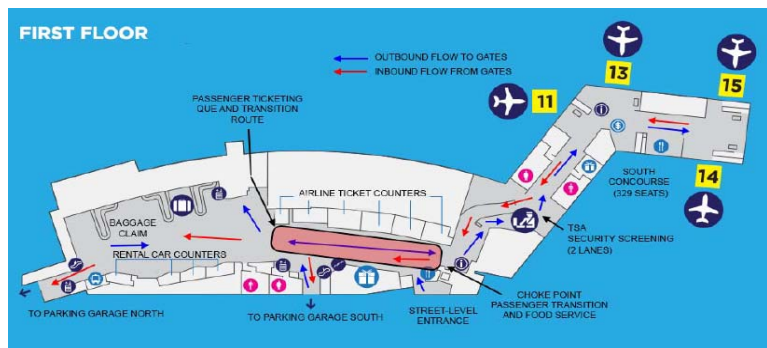
## Burlington International Airport Master Plan

Terminal Functional Area	Existing Terminal Area	Ultimate Requirement	Surplus (Deficit)	%
Passenger Boarding Gates	10	11	(1)	-10.7%
Terminal Curb / Drop-Off/Pick-Up	620	260	360	58.1%
Check-In / Ticketing	7,460	7,527/ 9,544	(67)/(2,084)	-0.9%/-27.9%
Outbound Baggage Screening & Makeup	1,099	8,611	(7,512)	-683.5%
Passenger Security Screening Checkpoint				
North Checkpoint	2,228	7,923	(5,695)	-255.6%
South Checkpoint	3,486	5,119	(1,633)	-46.8%
Security Total	5,714	13,042	(7,328)	-128.2%
Passenger Lounges / Holdrooms				
North Holdrooms	6,124	6,052	72	1.2%
South Holdrooms	4,174	4,947	(773)	-18.5%
Holdroom Total	10,298	10,999	(701)	-6.8%
Baggage Claim and Inbound Baggage Handling	12,656	9,629	3,027	23.9%
Concessions	9,891	14,934	(5,043)	-51.0%
<b>Core Terminal Areas Subtotal</b>	<b>47,118</b>	<b>64,743</b>	<b>(17,625)</b>	<b>-37.4%</b>
Other Functions/Tenants	92,482	25,648	66,834	72.3%
<b>Total Passenger Terminal Area</b>	<b>139,600</b>	<b>90,391*</b>	<b>49,209*</b>	<b>35.3%*</b>

\*This tabulation does not include several non-departmental areas essential to the functioning of a terminal structure including circulation (horizontal and vertical), other support areas, and wall thickness. The actual cumulative tally of these areas will vary depending on the final layout and design intent, but can be assumed to compromise 40% or more of the total terminal gross square footage.

### Key Points

- Circulation areas within the ticketing lobby space is shared by multiple passenger categories (departing/check-in, arriving/outflow, concessions etc.), which constrains the check-in area.
- Co-located baggage screening further constrains check-in ticketing space.
- Separate TSA passenger screening checkpoints are expected to require more total space combined than centralized over time.
- Available holdroom space is not optimized for comfortable use.
- The existing footprint of the terminal is expected to accommodate the majority of future demand, but will likely need to be reconfigured to better optimize core terminal functional areas.





# Terminal Facility Requirements Core Functional Areas

## Burlington International Airport Master Plan

### Check-in and Outbound Baggage

Functional Area	Existing	Baseline Forecast				Surplus (Deficit)
		Base Year	+5	+10	+20	
<b>Check-in and Ticketing</b>						
Check-In/Ticketing Areas	7,460	7,402/ 9,384	7,450/ 9,445	7,348/ 9,317	7,527/ 9,544	(67)/(2,084)
<b>Outbound Baggage Screening and Make-Up</b>						
Baggage Screening	1,099	4,254	4,316	4,316	4,471	(3,372)
Make-up Area	5,412	4,140	4,140	4,140	4,140	1,272

/Secondary number indicates added consideration for shared circulation among various uses (concessions, vertical circulation, arriving passengers, etc.)

### Passenger Screening

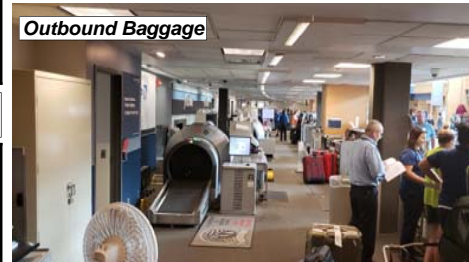
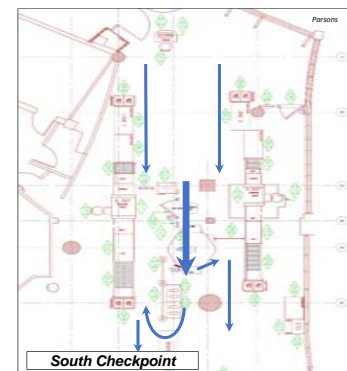
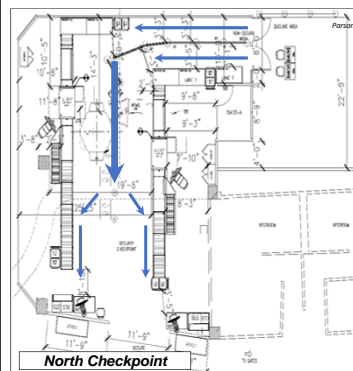
Functional Area	Existing	Baseline Forecast				Surplus (Deficit)
		Base Year	+5	+10	+20	
<b>Passenger Screening Lanes (Including Precheck)</b>						
North Checkpoint	2	5	5	5	5	(3)
South Checkpoint	2	3	3	3	3	(1)
Total (Existing Configuration)	4	8	8	8	8	(4)
Total Centralized Facilities	N/A	6	6	7	7	(3)
<b>Checkpoint Area (SF)</b>						
North Checkpoint	2,228	7,035	7,105	7,180	7,336	(5,108)
South Checkpoint	3,486	4,562	4,604	4,648	4,740	(1,254)
Total (Existing Configuration)	5,714	11,596	11,709	11,827	12,076	(6,362)
Total Centralized Configuration	N/A	9,810	9,923	10,041	10,289	(4,575)
<b>TSA Support Space (SF)</b>						
Total (Existing Configuration)	2,753	928	937	946	966	1,787
Total Centralized Configuration	N/A	785	794	803	823	1,930

### Gates and Holdrooms

Functional Area	Existing	Baseline Forecast				Surplus (Deficit)
		Base Year	+5	+10	+20	
<b>Passenger Gates</b>						
Equivalent Narrowbody Gates*	10	10	10	11	11	(1)
<b>Holdroom Space**</b>						
North Concourse	6,124	5,553	5,670	5,794	6,052	72
South Concourse	4,174	4,418	4,487	4,820	4,947	(773)
Total	10,298	9,972	10,158	10,614	10,999	(701)

### Baggage Claim and Handling

Functional Area	Existing	Baseline Forecast				Surplus (Deficit)
		Base Year	+5	+10	+20	
<b>Baggage Claim</b>						
Claim Linear Frontage (ft.)	249	272	284	295	321	(72)
Baggage Claim Hall Area	8,191	6,859	6,966	7,073	7,317	874
Inbound Baggage Handling Area	4,465	2,312	2,312	2,312	2,312	2,153
Total	12,656	9,171	9,278	9,385	9,629	3,027

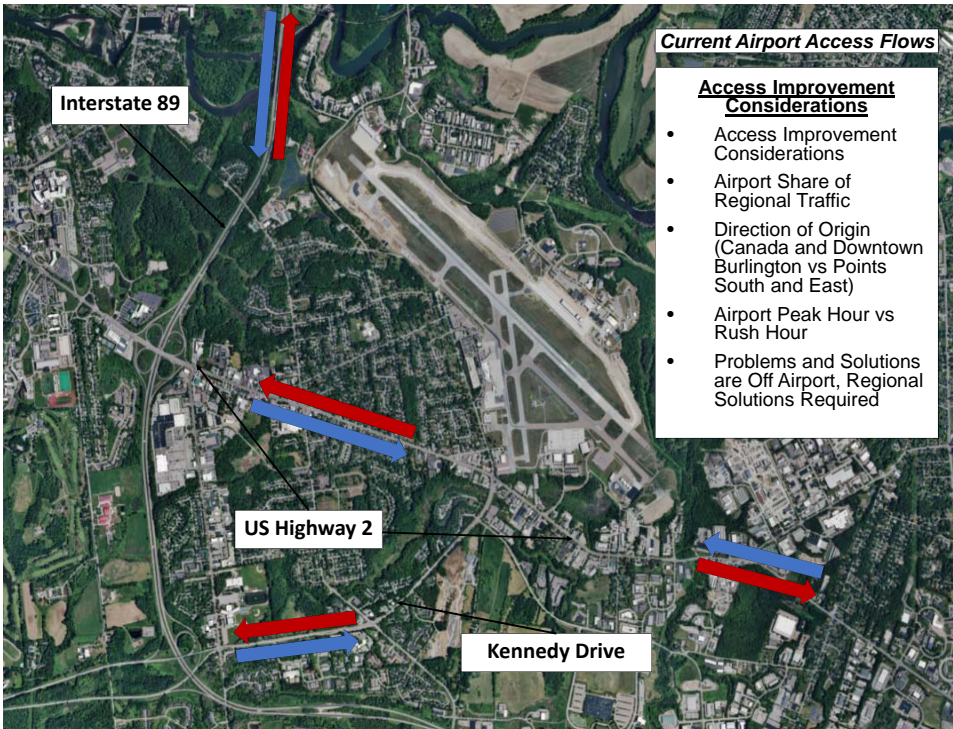
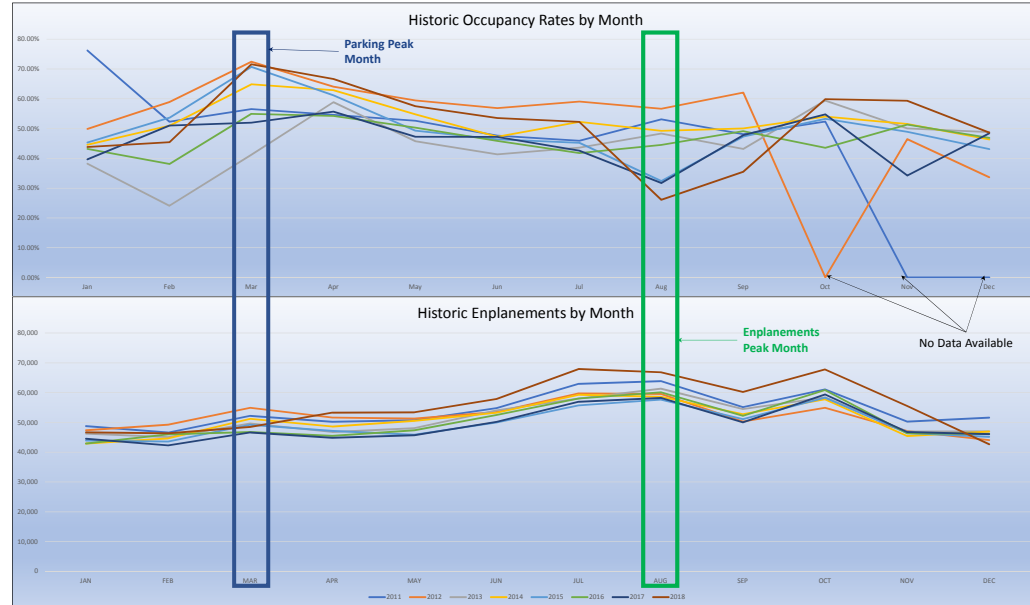
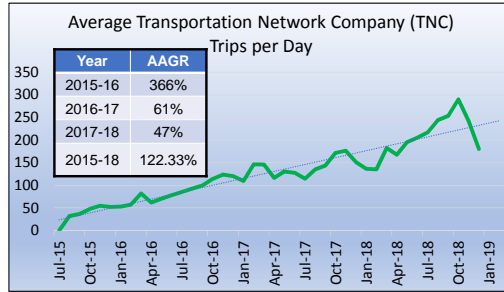




# Landside Facility Requirements Curb, Parking, and Access Roadways

## Burlington International Airport Master Plan

Year	Length Required (LF)	Existing Length (LF)
2018	229	620
2023	230	620
2028	238	620
2028	260	620



Forecast	Baseline	New ULCC	New LCC	Canadian	Loss of LCC	Upgauging
2019	57%	61%	67%	57%	54%	58%
2020	58%	62%	68%	58%	55%	59%
2021	58%	63%	68%	58%	55%	61%
2022	59%	64%	69%	59%	56%	62%
2023	59%	64%	69%	59%	56%	63%
2024	60%	65%	73%	60%	60%	65%
2025	60%	66%	74%	60%	60%	66%
2026	61%	67%	74%	61%	61%	67%
2027	61%	68%	75%	61%	61%	69%
2028	62%	69%	75%	62%	62%	70%
2029	62%	69%	79%	62%	62%	72%
2030	63%	70%	79%	63%	63%	73%
2031	63%	71%	80%	63%	63%	74%
2032	64%	72%	80%	64%	64%	76%
2033	64%	73%	81%	64%	64%	77%
2034	65%	74%	85%	65%	65%	78%
2035	65%	75%	85%	65%	65%	80%
2036	66%	75%	86%	66%	66%	81%
2037	66%	76%	86%	66%	66%	83%
2038	67%	77%	87%	67%	67%	84%

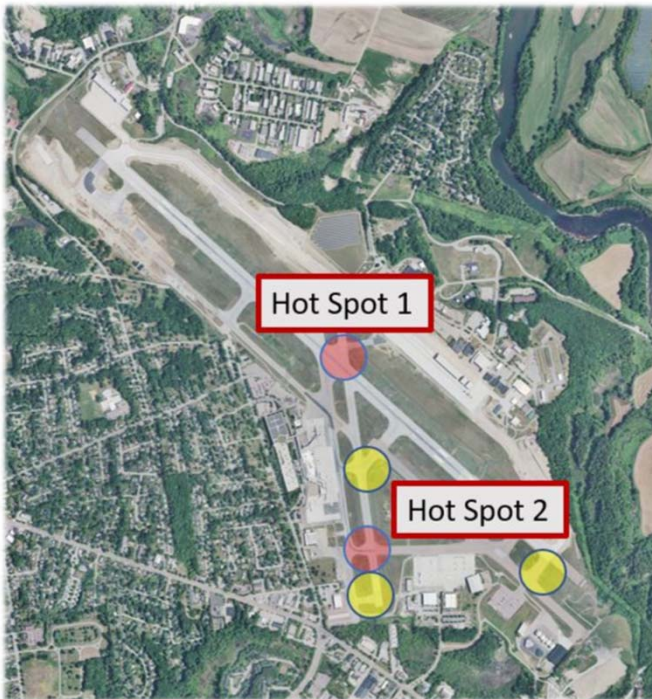


# Airside Facilities

## Burlington International Airport Master Plan

### Runway Length

- **Runway 15-33: 8,319' x 150' (C/D IV)**
  - Existing Length Scenario: FedEx Boeing 757 to Memphis
  - Future Length Scenario: Airbus 320NEO
    - Airbus 320 NEO 90% Range (Las Vegas/Denver)" 6,500' Hot Day, 7,475' Contaminated
- **Runway 1-19: 4,112' x 75' (B-II)**
  - Existing and Future: Embraer 110 Cargo Feeder



### Airfield Geometry

- **Hot Spot 1:** intersection of Runway 15-33 and 1-19 with Taxiways A and E.
  - Three node concept
  - Wide expanse of pavement
  - Taxiway intersecting multiple runways
- **Hot Spot 2:** intersection of Runway 1-19 and Taxiway C
  - Taxiway intersecting multiple runways
  - Y-shaped runway crossing
- **Other Non-Standard Geometry Issues:**
  - Runway crossings
  - High energy crossings
  - Increase visibility
  - Direct Access
  - Multiple taxiway crossings
  - Taxiway stubs



# General Aviation

## Burlington International Airport Master Plan

GA Aircraft Storage Additional Demand Over Existing*		
Year	Conventional Hangar Space (SF)	T-Hangars/Box Units
2018	3,200	0
2023	6,400	1
2028	15,240	1
2038	25,760 (4-5 Conventional Hangars)	2

GA Aircraft Apron Requirements*			
Year	Itinerant Apron Demand (SY)	Existing FBO Ramp Space (SY)	Surplus (Deficit)
2018	11,484	5,333	(6,151)
2023	11,880	5,333	(6,547)
2028	11,880	5,333	(6,547)
2038	12,672	5,333	(7,339)

\* Not including Military demand or facilities or aircraft on wait lists





## Support Facilities/Cargo

## Burlington International Airport Master Plan

### • Fuel Storage

- Existing: 4-25,000 gallon Jet-A tanks and 1-12,000 gallon 100LL tank
- Jet-A Fuel Usage (5-Year Average)
  - Average Month/Average Day: 21,518 gallons
  - Peak Month/Average Day: 26,310 gallons
  - Planning Recommends Maintaining 3-Day Supply
  - Consider inverse relationship between growth and increased fuel efficiency
- **Recommendation: Consider adding an additional Jet-A fuel tank**

### • ARFF

- Vermont Air National Guard (VTANG) provides ARFF Services –Index B
- **Recommendation: None**

### • SRE/Airfield Maintenance

- Equipment stored in 3 locations totaling 46,505 SF
- **Recommendation: Consolidate Facilities Away from GA/Cargo Areas –Full Consolidated Facility?**

### • Cargo

- Plan for Additional Growth (Second Aircraft Position), Dedicated Facility not Shared with GA
- **Recommendation: Identify New Location for Dedicated Air Cargo Operations for two Boeing 757 Sized Aircraft**





# Sustainability Efforts

# Burlington International Airport Master Plan

## Five Sustainability Categories

- Energy & Greenhouse Gas Emissions
- Waste Management
- Ground Transportation
- Water Resources
- Passenger Experience



Guided by the City of Burlington's 2030 vision, as laid out in its *Legacy Action Plan*, BTV strives to make a positive contribution in shaping the region's economic, environmental, and social vitality.

### Energy & Greenhouse Gas Emissions

**↓ 12.4%**

Reduction in utility-sourced electricity consumption between 2013 and 2017

**1,183,000 kWh per year**

Avoided annual electricity use as a result of recent energy-efficiency upgrades at BTV

**\$147,750 annual cost savings**

Cost savings from the approximately 1.2 million kWh saved per year

BTV continues to demonstrate leadership in sustainable energy performance by reducing energy consumption while the Airport's operations continue to expand.

**↓ 23%**

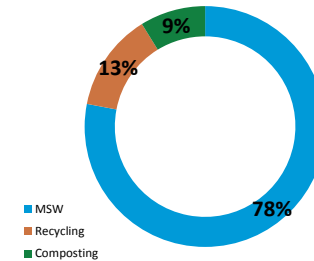
Reduction in GHG emissions between 2010 and 2013

Greenhouse gas emissions at the Airport derive from electricity consumption, natural gas consumption, and vehicle fleet fuel consumption.

### Waste Management

**22%**

diversion rate in CY 2017



- Instituted an office paper recycling program
- Co-locates trash and recycling bins with pictured-based signage to encourage passengers to sort their waste properly
- Installed water bottle filling stations
- The Airport's waste contractor regularly works with the Airport and its tenants to reduce waste and increase the use of products that can be recycled, as well as provides training

### Ground Transportation

- BTV sponsors **Greenride Bikeshare**. A station, along with an e-bike terminal, are outside the Terminal building
- BTV provides free **Green Mountain Transit Bus** passes to all of its direct employees
- The Airport boasts **15 electric vehicle charging stations**, including Tesla Superchargers, in the parking garage



Increasing access to sustainable transportation modes such as public transit and electric vehicles reduces greenhouse gas emissions and improves local/regional air quality.

### Water Resources

**22 Million** gallons

Estimated amount of stormwater treated annually, through a new underground treatment system, to prevent contaminants from discharging into the Winooski River.

**8,000** square feet

Size of the rooftop garden installed on top of the Airport's parking garage in 2011. In addition to providing a place for visitors to relax, this design feature also helps reduce and filter stormwater runoff.



In 2010, BTV won an **Engineering Excellence Award** from the American Council of Engineering Companies/Vermont Section for its runoff treatment system.



### Passenger Experience

- BTV provides walking trails inside and outside the Terminal building
- Educational exhibits and art installations by local artists are located throughout the Airport
- Passenger amenities include a yoga studio, operated by Burlington-based Evolution Physical Therapy + Yoga
- Visitors can take in the views from the Airport's Observation Tower

**674,944** passengers

Number of passengers that departed from BTV in CY 2018



BTV's Wellness Committee is always looking for new ideas to make traveling less stressful around the Airport!

## Regional Coordination

### Local and Regional Sustainability Goals

- Derive **90 percent** of the state's energy needs from renewable energy sources by 2050 (*Vermont Comprehensive Energy Plan*)
- Reduce greenhouse gas emissions in the state by **50 percent by 2028** and **75 percent by 2050** (10. V.S.A. §578)

As a large facility, BTV demonstrates leadership and a commitment to work with local and regional entities to advance common sustainability goals and initiatives.

- Reduce solid waste sent to landfills (Burlington's *Climate Action Plan*) and achieve **a zero waste future** (*Vermont Materials Management Plan*)
- Improve multi-modal transportation to/from and around the Airport (*2018 ECOS Plan*)
- Educate residents of Chittenden County on ways to reduce stormwater pollution (Regional Stormwater Education Program)





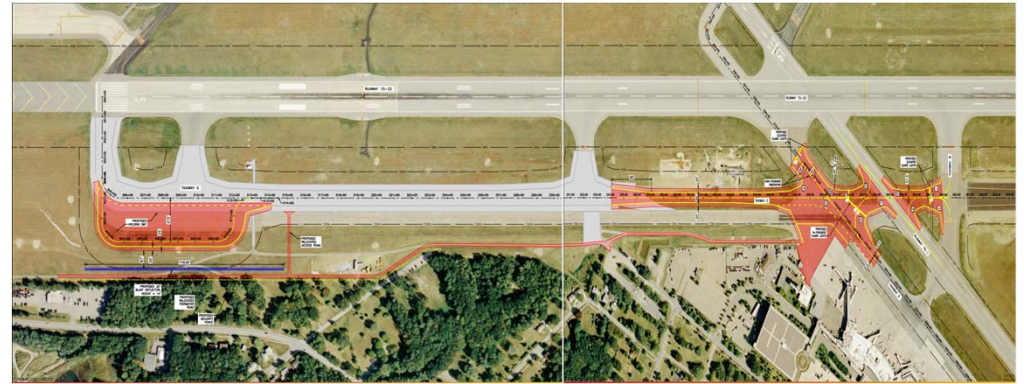
# Upcoming BTV Projects

Burlington International Airport Master Plan

Airport Hotel



Taxiway Gulf



Air Carrier Apron Project



Car Rental Wash Facility

