

NORWOOD MEMORIAL AIRPORT TECHNICAL MASTER PLAN UPDATE

2020



15 Constitution Dr. Suite 1L
Bedford, NH 03110

Contents

Section 1.0 OVERVIEW	1-6
A. Introduction	1-6
B. History	1-7
C. Background	1-7
D. Regional Setting and Land Use	1-12
E. Identified Constraints	1-15
Land Use/Natural Constraints	1-15
Physical Constraints	1-17
F. Opportunities	1-18
Section 2.0 AVIATION OPERATIONS VALIDATION AND COMPARISON	2-20
A. Background	2-20
B. Validate and Compare Prior Forecast	2-21
C. Based Aircraft	2-23
D. Aircraft Apron Parking Demand	2-25
Tie-Downs	2-25
E. Aircraft Flight Operations	2-29
F. Runway Operational Data	2-30
G. Fuel Sales	2-31
H. Summary	2-32
Section 3.0 Facility Needs	3-33
A. FAA Airport Design Standards	3-33
B. Airport Facility Needs	3-33
Runway 10/28 Safety Area Needs	3-34
Runway Operational Length Needs	3-35
Precision Instrument Approach System	3-40
Taxiway C	3-40

Taxilane System	3-42
.....	3-45
Aircraft Tie-Downs	3-45
Hangars	3-46
Helicopter Pads - South	3-46
Airport Fuel Farm	3-47
Major Mark C. Welch Administration Building (Snow Removal Equipment Building)	3-47
Aircraft Wash Area	3-49
MALSF Access Road	3-49
Airport Security & Wildlife Fencing	3-50
Land Acquisition.....	3-51
Automobile Parking	3-52
C. Summary of Facility Needs.....	3-53
Section 4.0 Alternatives	4-56
A. Introduction	4-56
B. Assumptions	4-56
C. Facility Requirements	4-56
Airside	4-57
Landside.....	4-57
D. Airside Alternatives	4-57
Runway 17/35 Alternatives.....	4-57
Runway 17/35 Alternative A - (No build)	4-58
Runway 17/35 Alternative B - (Extend Runway 17 North 993 feet) (previous Master Plan Preferred)	4-60
Runway 17/35 Alternative C - Extend Runway 17/35 600 Feet by Paving Safety Areas (preferred short-term solution)	4-62
Alternatives for Taxiway C	4-64

Taxiway C Alternative A (No Action)	4-64
Taxiway C Alternative B - Realign Taxiway C	4-65
Taxiway C Alternative C -Taxiway C Stub Relocation.....	4-67
Alternatives for Taxilane Reconfiguration.....	4-69
Taxilane Alternative 1 - No Build/Re-mark Centerlines	4-70
Taxilane Alternative 2 - Taxilane 1 - TDG II and Taxilanes 2 & 3 - TDG I.....	4-72
Taxilane Alternative 3 - Taxilane 1 - Eliminated, Taxilane 2 - TDG II, Taxilane 3 - Remain TDG I	4-74
Taxilane Alternative 4: Taxilane 1 - Eliminated, Taxilanes 2 & 3 - TDG II (Preferred Alternative)	4-76
West Apron Alternatives	4-78
West Apron Alternative A: Hangar Development - 1000' Primary Surface Area	4-78
West Apron Alternative B: Hangar Development - 500' Primary Surface.....	4-79
DC-3 Apron Alternatives.....	4-81
DC-3 Apron Alternative A: No Action.....	4-81
DC-3 Apron Alternative B: Aircraft Wet-Wash Area	4-82
Helicopter Pads (South) Alternatives.....	4-84
Helicopter Pads (South) Alternative A: No Action.....	4-84
Helicopter Pads (South) Alternative B: Extend Pads Easterly	4-85
Preferred Airside Alternatives Summary.....	4-87
E. Landside Alternatives/Discussions	4-88
Land Acquisition.....	4-88
Airport Auto Parking Lot	4-89
Option A - Short Term.....	4-89
Option B - Mid-Term.....	4-90
Section 5.0 FINANCIAL AND IMPLEMENTATION PLAN.....	5-92
A. Introduction	5-92

B. Phasing	5-92
C. Project Priorities	5-92
D. Airport Development.....	5-93
Short-Term Program (2019-2023)	5-96
Intermediate-Term Projects (2024-2028).....	5-97
Long-Term Projects (2029-2038).....	5-99
E. Capital Improvement Summary	5-99
Federal Grants.....	5-100
Non-Primary Entitlement (NPE) Funds	5-100
Discretionary Funds.....	5-100
FAA Facilities and Equipment Program	5-101
Project Priority.....	5-101
AIP Grant Obligations.....	5-102
Local Funding.....	5-103
F. Master Plan Implementation.....	5-105
Section 6.0 Public Comment	6-107

Figures

Figure 1-1: Norwood Memorial Airport Locus Map	1-8
Figure 1-2: Airport Diagram, Norwood Memorial Airport	1-9
Figure 1-3: Norwood Regional Setting (image source: Google Earth)	1-12
Figure 1-4: Compiled Lease Area Plan, Norwood Memorial Airport	1-14
Figure 2-1 - Norwood Landside Facilities (photo source: Google Earth)	2-27
Figure 3-1: Runway Operational Length Needs Standard Day (59°F)	3-35
Figure 3-2: Runway Operational Length Needs Hot Day (86°F)	3-36
Figure 3-3: Taxiway C	3-41
Figure 3-4: Existing Taxilane System, Norwood Memorial Airport	3-42
Figure 3-5: Hangar North of Taxilane 2, Norwood Memorial Airport	3-43
Figure 3-6: Existing Aircraft Tie-downs	3-45
Figure 3-7: Parcel 22-9-5 Location (Image Source: Axis GIS)	3-45
Figure 3-8: Southern Helicopter Pads	3-46
Figure 3-9: Existing Fuel Farm Locations	3-47
Figure 3-10: Major Mark C. Welch Administration Building, 2018	3-48
Figure 3-11: MALSF System Location	3-49
Figure 3-12: Existing Landside Parking	3-52
Figure 3-13: Proposed Airport Parking Expansion Plan	3-53
Figure 4-1: No Build Alternative	4-59
Figure 4-2: 17/35 Alternative B - (Extend Runway 17 North 993 feet)	4-62
Figure 4-3: 17/35 Alternative C - Paved Safety Areas	4-63
Figure 4-4: Taxiway C Realignment Alternatives B and C	4-68
Figure 4-5: Taxilane Alternative 1	4-71
Figure 4-6: Taxilane Alternative 2	4-73
Figure 4-7: Taxilane Alternative 3	4-75
Figure 4-8: Taxilane Alternative 4 (Preferred)	4-77
Figure 4-9: West Apron Hangar Development Potential Alternative A	4-80
Figure 4-10: West Apron Hangar Development Potential Alternative B (Preferred)	4-80
Figure 4-11: DC-3 Alternative B - Wet Wash Area (Preferred)	4-83
Figure 4-12: Helicopter Pads South Alternative	4-86
Figure 4-13: Existing Landside Parking Area	4-89
Figure 4-14: Proposed Solar Canopies	4-90
Figure 4-15: Proposed Office and Restaurant Building	4-91

Section 1.0 OVERVIEW

A. Introduction

This document presents the Norwood Memorial Airport Technical Master Plan Update (TMPU). This Technical Master Plan Update will assist the airport in planning for improvements to the Airport's facilities consistent with its current, but expanding, role as the major corporate and general aviation reliever airport serving the southwest Boston Metropolitan Region. Given the location of the Airport within a sensitive wetland area, floodway and floodplain zone, these improvements must enhance aviation safety in an environmentally compatible manner.

The Mission Statement for Norwood Memorial Airport is as follows:

"Norwood Memorial Airport will continue to function as a corporate, business, and recreational reliever airport for the greater Boston region, providing support to local businesses with a safe and community-friendly operating environment."

The previous master plan, dated in 2007, updated the 35-year old airport master plan by examining changes in the aviation industry, changes in the role of the Airport, and changes in the level and type of demand at the Airport. During its development of the document, an inventory of the Airport (airside, landside, environmental) was completed. Key issues such as wetland constraints were identified and discussed relative to airport improvements to meet current and future aviation demand. Several improvement concepts were developed and discussed with the Norwood Airport Commission, the Federal Aviation Administration (FAA), the Massachusetts Aeronautics Commission (MAC), and the Airport's Fixed Base Operators (FBO).

This revision updates the 2007 document further. The purpose of the 2020 TMPU is to update the 2007 Plan to more accurately reflect current on-the-ground conditions and needs, and to recognize changes in aviation forecasts over the past decade.

The capital improvements recommended in this document are consistent with the Airport's Mission Statement, are sensitive to the Airport's environmental setting, and are developed in support of this Technical Master Plan Update.

The following will provide a brief overview of the airport's history and background as well as a discussion regarding its Regional setting. This Section will outline identified land use,

natural and physical constraints and will conclude with potential opportunities that may be explored by the airport. Many of these opportunities will be vetted through the Airport Commission and will be further explored within the Alternatives Section of the TMPU.

B. History

Norwood Memorial Airport, originally Outlying Landing Field Norwood, was used by the US Navy to train Naval student pilots to gain flight experience during WWII (1942-1945). In May of 1946, the town officially voted to take over the airport from the Navy. The primary airport for the surrounding area at the time was Boston Metropolitan Airport, located in nearby Canton. But the construction of I-95 and its greater proximity to Norwood eventually led to a steady transfer of services and facilities from Boston Metropolitan to Norwood, and by 1970 Norwood Memorial Airport was the region's primary airport.

C. Background

Norwood Memorial Airport (FAA designation KOWD) has two runways as shown in the USGS Locus Map in Figure 1-1: Norwood Memorial Airport Locus Map and the FAA Airport Diagram in Figure 1-2: Airport Diagram, Norwood Memorial Airport, below. According to the airport's 2018 Master Record (5010) Runway 17/35 is the primary runway and is 4,008 feet long by 100 feet wide and is grooved to aid in aircraft stopping distance. The runway has a weight bearing capacity, single-wheel of 58,000 pounds, and double-wheel of 69,000 pounds. Runway 17/35 has a Medium Intensity Runway Lighting System (MIRLS) for nighttime and low visibility operations along with 4-light Precision Approach Path Indicators (PAPI) for each runway end. Runway End Identifier Lights (REIL) are not available for either runway end. Runway 35 has a Medium Intensity Approach Lighting System with Sequenced Flashers (MALSF) that supports the RWY 35 Instrument Approach Procedures (IAP) which include a non-precision localizer approach with CAT A/B visibility minimums of $\frac{3}{4}$ mile and a 500-foot Mean Sea Level (MSL) Minimum Descent Altitude (MDA). Runway 35 is also served by an RNAV (GPS) approach with CAT A/B LNAV visibility minimums of $\frac{3}{4}$ mile and a 540-foot MSL MDA, or a LPV with 1-mile visibility and a 344-foot Decision Height (i.e. "295' and 1"). Designed as a B-II runway, the safety area for Runway 17/35 meets the FAA required 300 feet standards, and are groomed and maintained adequately.

Figure 1-1: Norwood Memorial Airport Locus Map

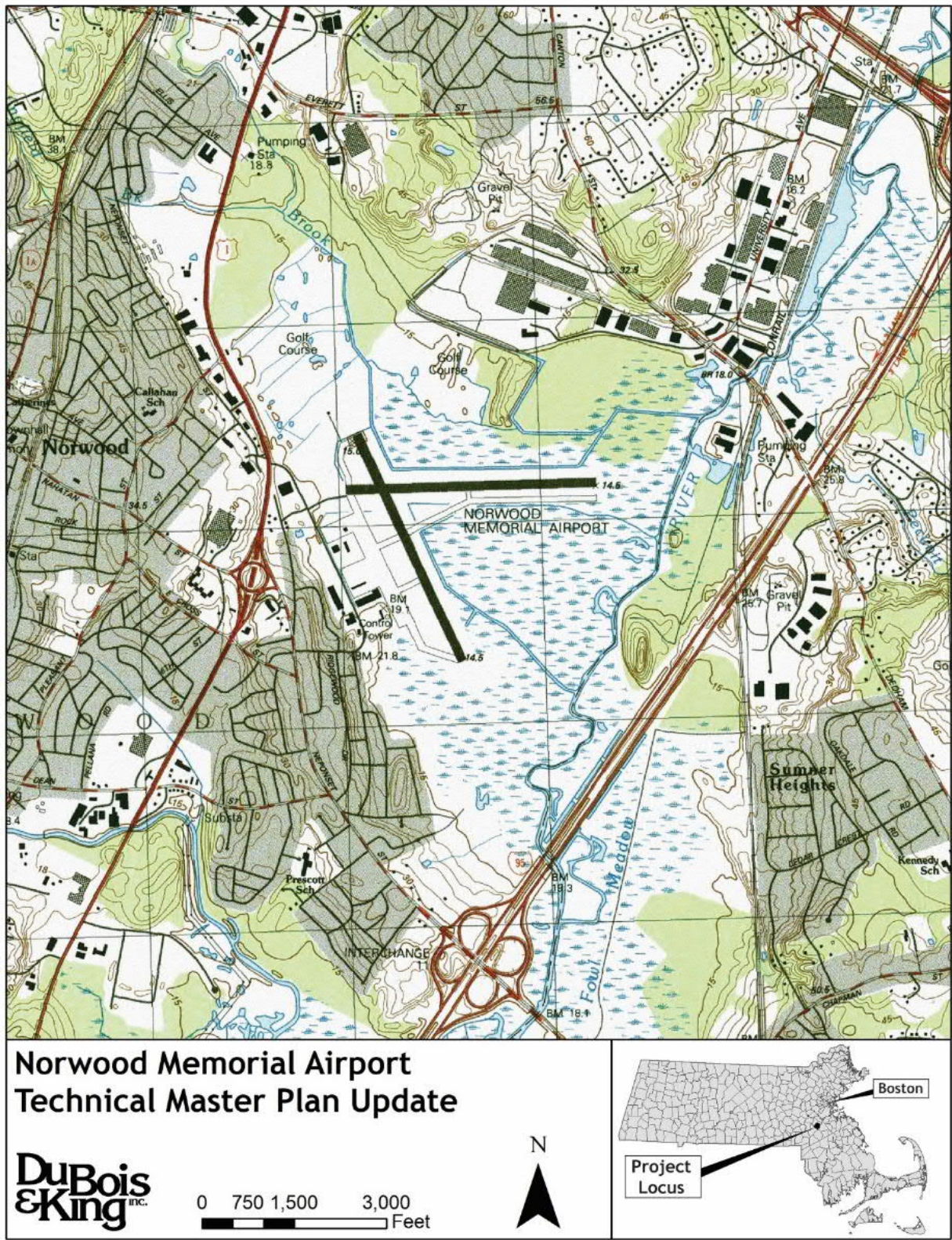
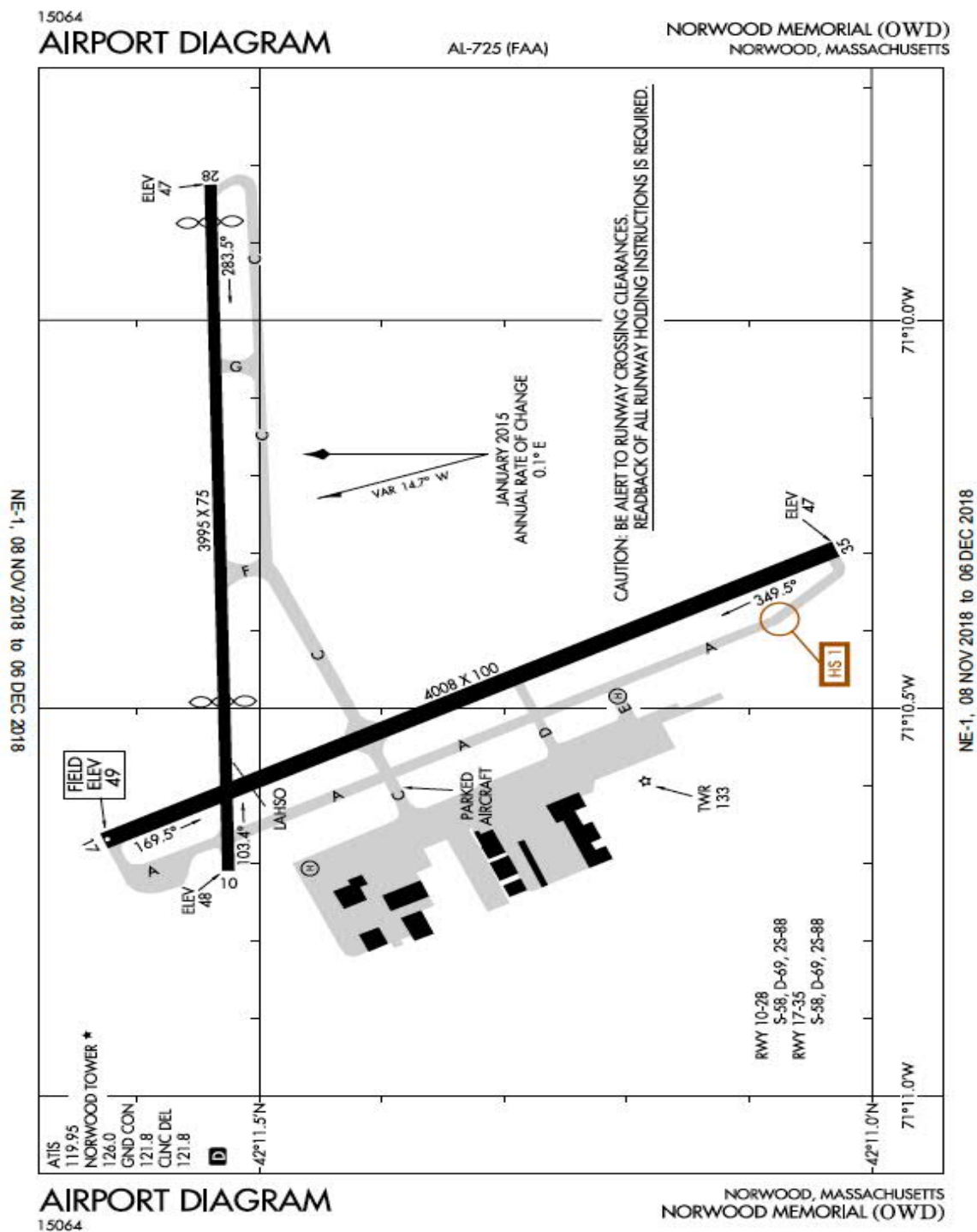


Figure 1-2: Airport Diagram, Norwood Memorial Airport



Runway 10/28 is a daytime use, crosswind runway 3,995 feet long by 75 feet wide. Take off Distance Available (TODA) is 3,995 feet and Landing Distance Available (LDA) for Runway 10 and 28 is 2,795 feet and 3,595 feet, respectively. As the result of industrial and commercial development off-airport, the landing threshold for Runway 10 has been displaced 987 feet,

shortening the Landing Distance Available (LDA) to 2,795 feet. Runway 10/28 has a weight bearing capacity, single-wheel of 58,000 pounds, and double-wheel of 69,000 pounds. There are no runway lights, and therefore operations on this runway are restricted to daytime Visual Flight Rules (VFR) conditions. Runway 10 is served by a 4-light Precision Approach Path Indicator set to a 4.0-degree glide path. Runway End Identifier Lights (REIL) are not available for either runway end. Designed as a B-II runway, the safety areas for Runway 10/28 meets the FAA required 300 feet standards, and are groomed and maintained adequately. It should be noted that the first 500 feet of Runway 28 and its entire runway end safety area is within the mapped FEMA Floodway.

Norwood acts as a reliever airport for Boston Logan International, providing a location for small aircraft when Logan traffic is high. The type of flight operations at the Airport has evolved over the past ten years. Total flight operations, as defined in 14 CFR 170.3 include operations such as landings, touch and go landings, low approaches, simulated instrument approaches, and takeoffs. In 2001, prior to the September 11th attack, the airport realized annual flight operations of 100,000, however, with increased aviation security across the nation, the airport's operations decreased significantly. In 2007, the date of the previous master plan, the Airport's total annual flight operations reached 70,380 while businesses, air taxi, charter and flight schools, worked to restructure. With aeronautical activity on the mend the financial crisis of 2008 took another toll on hope of growth for the Norwood Memorial Airport. In addition, aviation fuel prices significantly increased from 2008 through 2012, further impacting aviation growth. According to the November 30, 2016 Norwood Airport Master Record (5010), total flight operations equaled 58,400. For perspective, this is a 41% decrease in total airport operations since the September 11, 2001 attacks, when the annual operations equaled 100,000.

A large contributor to the total flight operation activity at the Airport is flight training. Flight school activity at the Airport has seen steady growth. East Coast Aero Club, with locations in Bedford, MA, Nashua, NH and Norwood Memorial, provides flight instruction and aircraft rental. Their fleet includes over 40 aircraft, including two multi-engine airplanes and two Robinson helicopters. East Coast offers instruction for Private and Commercial Pilot Certificates, as well as Instrument and Multi-Engine ratings. Blue Hill Helicopters, provides instruction for Private and Commercial Helicopter Pilot Certificates as well as aerial tours. Flight training operations is anticipated to continue in a positive direction. According to

airfield Air Traffic Control, the total flight training operations in 2017 equated to 19,444 or 31% of the total airport operations.

During the last 5 years (2013 - 2018), the Airport has experienced a shift from predominantly flight training activity to a greater percentage of corporate aviation activity. As a center for corporate aircraft the Airport is undergoing a transition in its flight operations that reflects this shift. In 2014, 1%, or 546 of Norwood's total annual operations were attributed to Air Taxi (small private aircraft that offer short on-demand flights) operations. Comparatively in 2017, 7.7%, or 4,650 of Norwood's total annual operations were attributed to Air Taxi operations. This is a significant increase in Air Taxi operations and will be considered when evaluating Alternatives in this document.

As the Norwood area continues to develop into a regional business center, the activity levels of corporate aviation will continue to grow and place unique demands upon the Airport that were not present ten years ago. The airport's Fixed Base Operators (FBO) are servicing more corporate aircraft and have clearly seen increased requests to operate corporate aircraft to and from the Airport.

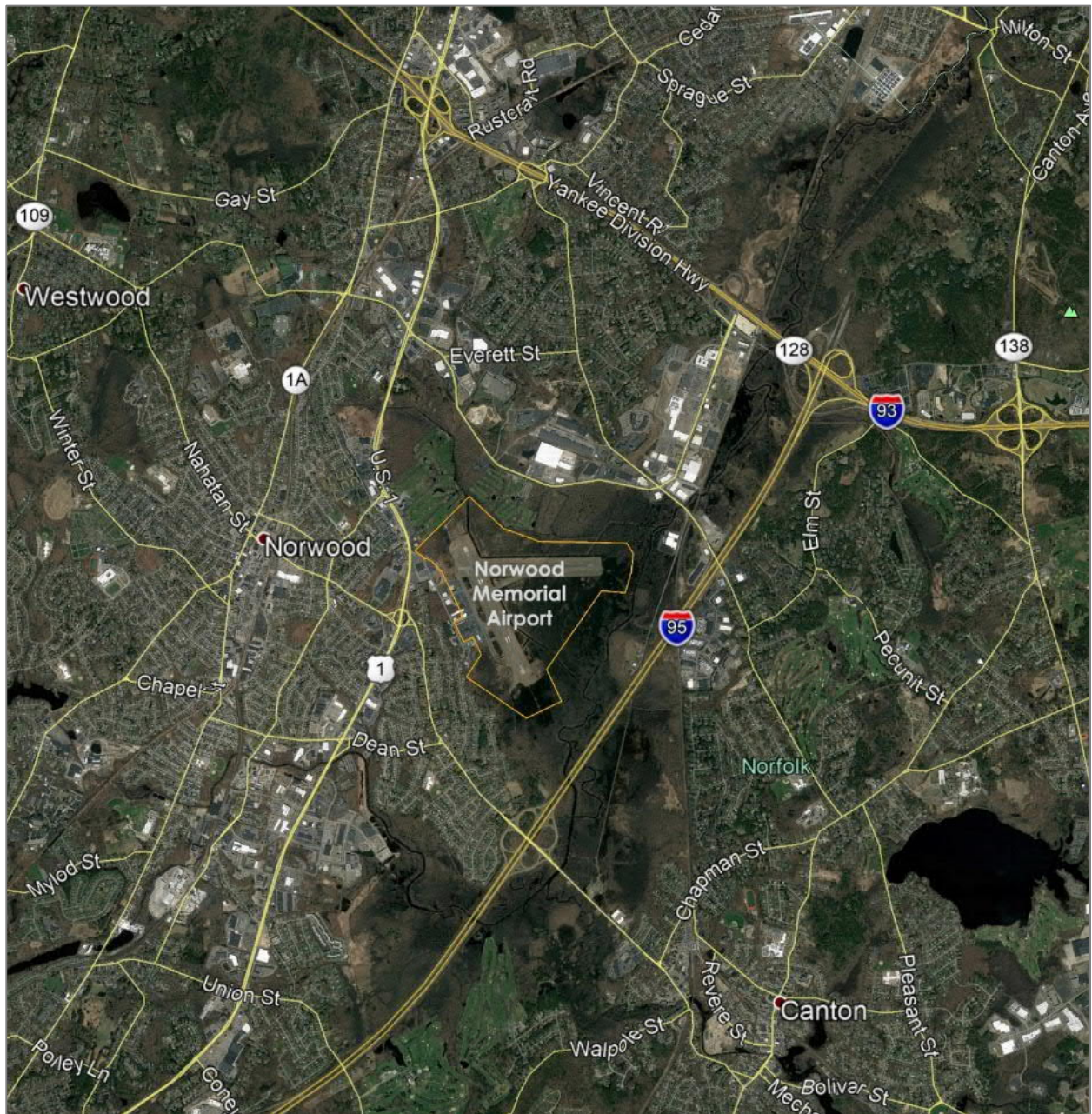
In addition to the increasing corporate activity, helicopter traffic has also increased. There are numerous companies operating fifteen (15) helicopters based at Norwood. The helicopter uses include electronic news gathering, flight training school, charter and aerial tours. The Airport currently has nine (9) dedicated helipad facilities to support the helicopter activity. There are four (4) helipads, located on the north-end of the terminal apron, adjacent to Lots W, X, Y. The north-end helipads have good line of sight with the ATC Tower. There are five (5) helipads, located on the south-end of the north-south taxi-lane, adjacent to Lots A, B & C and are used to stage, launch and recover business helicopters. The airport also utilizes a few of the south-end helipads for transient helicopters. The south-end helipads have limited line of sight for most helipads. The line of sight for many of the south-end helipads are restricted due to vegetation. The airport should plan to remove this vegetation as well as consider the installation of helipad lighting, during an airport project.

While the role of Norwood Memorial Airport has not changed, the type of flight activity at the Airport is transitioning from flight training into high-end corporate use. Section 2 will validate these changes, comparing the 2007 activity to the current and forecasted activity. The activity validated in Section 2 and the facility needs presented in Section 3 reflect the change in activity.

D. Regional Setting and Land Use

Norwood Memorial Airport (KOWD) is conveniently located near two of Massachusetts significant highways, Route 1 and Interstate 95. It is one of 37 public use facilities in MA that offers aviation services. The 672-acre Airport is owned by the Town of Norwood and governed by the Norwood Airport Commission (NAC), which meets regularly to oversee the airport's development, operation and management. Day to day operations are led by the Airport Manager and staff.

Figure 1-3: Norwood Regional Setting (image source: Google Earth)

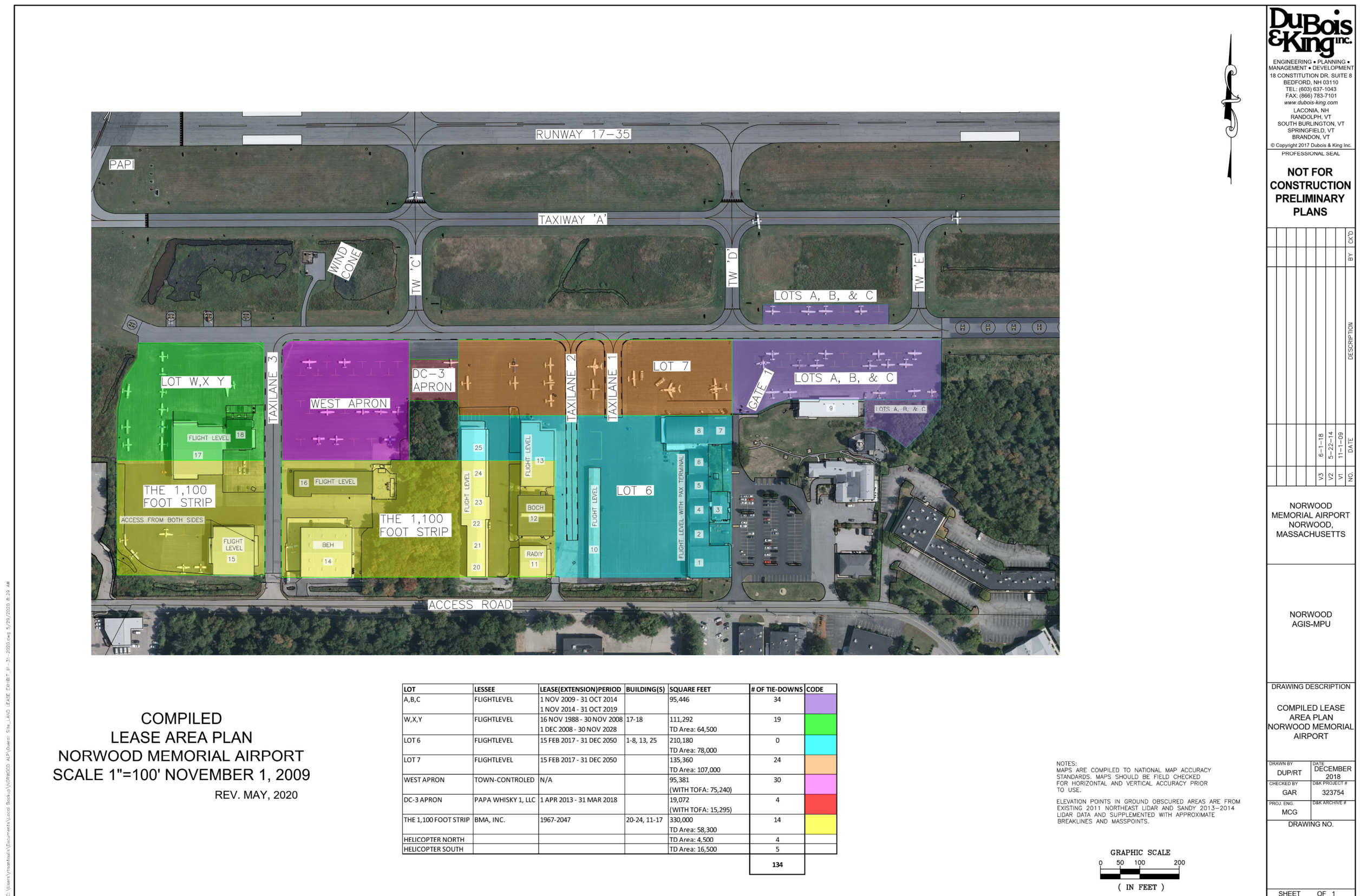


KOWD is the closest general aviation airport to Boston Logan International (KBOS) in the region (13 nautical miles) by air. By highway, KOWD is 25 miles from Boston and 30 miles from Providence, which positions the airport well in terms of utility to private citizens, government agencies and businesses. Norwood is one of the busiest public use airports in the region.

The Town of Norwood is part of the Metropolitan Area Planning Council (MAPC), which provides regional planning for 101 cities and towns around Boston. There are eight sub-regions of MAPC, including the Three Rivers Inter-Local Council, of which Norwood is one of 11 towns. MAPC has a Regional Transportation Plan that focuses primarily on ground transportation. Regional airport planning is addressed by the Massachusetts Department of Transportation (Mass DOT), through the Massachusetts Statewide Airport System Plan (MSASP). As one of 37 Public Use airports in the state, Norwood Memorial Airport is part of the MSASP.

Encroachment of buildings within airport approaches is regulated through Massachusetts General Law (MGL), which sets limitations on building types and heights within designated approach areas unless formal airport approach regulations have been adopted by the Town. All development and municipal approach regulations must conform to FAA requirements. The Town of Norwood does not have municipal approach regulations.

Figure 1-4: Compiled Lease Area Plan, Norwood Memorial Airport



E. Identified Constraints

Land Use/Natural Constraints

Below is a summary of Airport Land Use and Natural Constraints

- Boston Metropolitan Airport, Inc. (BMA) - "1,100 foot strip" - A portion of Norwood Memorial Airport is subject to an easement leased to BMA (Figure 1-4: Compiled Lease Area Plan, Norwood Memorial Airport). The property is leased to the BMA in twenty year increments, with option to renew the lease for subsequent twenty year increments, eventually expiring in 2047. It is the airports intention not to continue this lease beyond 2047. There are no options for amending this lease by 2047. Until its expiration, the BMA may sublease the parcel or portions of the parcel for aeronautical use only, subject to the approval of the Norwood Airport Commission (NAC). Any improvements made to the property must be approved by the NAC. The BMA pays the Town of Norwood an annual rent equal to the amount of property taxes that would be assessed on real estate for the parcel (not including buildings or other structures).

It is unclear as to what the disposition of this parcel will be once the current lease agreement expires, which poses a challenge for long-range planning in this part of the airport. The FAA discourages a long-term lease such as this moving forward and it recommended that the Airport solicit the FAA's review of future leases for this parcel.

- Existing and Future Land Use Patterns - Much of the area surrounding KOWD is built out, however, there are several parcels that represent physical constraints to future airport upgrades or could pose potential issues if fully developed. Most notably, to the north, on the approach end of Runway 17 there is a 93-acre property which currently hosts the Norwood Country Club Golf Course and Driving Range (Norwood Parcel No. 22-9-5). This property immediately abuts land owned by the airport. As a result, any extension of runway 17/35 to the north will require the purchase of the property. It should also be noted that the 93-acre parcel, and undeveloped parcels immediately adjacent to it, are zoned "General Residence" by Norwood's zoning regulations (amended 5/12/14). There is the potential for one and two family residential and institutional uses to be developed at a density of 1 unit per ¼ acre, with a height maximum of 30 feet. The

development of structures within land immediately adjacent to the runway 17 approach, would represent a potential safety hazard and may not be considered compatible land use.

- **Flood Hazards** - Due to its proximity to the Neponset River, a significant portion of the airport's property is located within the FEMA floodplain and floodway. In 2010, three days of significant rain forced the airport to close to all aircraft other than helicopters due to complete inundation of both runways. Flooding of some level occurs every two to three years. While flooding has not reached airport structures, some based aircraft have been impacted by flooding. Any closure due to flooding represents lost revenue for KOWD. It should also be noted that roughly 500ft of the eastern end of Runway 10/28, and the MALSF access road south of Runway 17/35 is in the mapped FEMA floodway. Any future modifications to areas located in the regulatory floodway will require a "no rise" certificate, which means that there can be no change in base flood elevations after work has been completed.
- **Wetlands and other Natural Resources** - A significant portion of the Norwood Memorial Airport property is designated as wetlands. Wetland areas at the southern end of Runway 35 were previously identified as Priority Habitats for Long's Bulrush in the previous master plan update. The specific locations are not documented. No plant surveys or new habitats have been identified in recent years. The wetland areas (Fowl Meadow and Ponkapoag Bog) are designated by the Commonwealth of Massachusetts as Areas of Critical Environmental Concern (ACEC). Any development that occurs within wetland or priority habitat areas will require significant environmental review and permitting.
- **Potential Approach Obstruction** - Roughly 1 mile northwest of the approach to Runway 17, a 125' flagpole has been identified as a potential obstruction. Under current conditions, this flagpole is not an obstruction, however, If the runway is extended to the north and into the golf course, this flagpole will require evaluation through the FAA 7460 process.

Physical Constraints

Below is a summary of physical constraints, which are addressed in greater detail in Chapter 3; Alternatives.

- Limited Taxilane Object Free Area (TOFA) - Several taxilanes have limited Object Free Areas, making movement within existing airport facilities a challenge.
- Runway 17/35 Length - Runway 17/35's weight bearing capacity is designed to accommodate larger aircraft (Single wheel 58.0, double wheel 69.0), however, the length of the runway is 4008 feet, which is insufficient for the design aircraft at those weights.
- Primary Surface Area (PSA) - Runway 17/35 currently has a protected of 1000ft to accommodate the potential for an Instrument Landing System (ILS) precision approach that was proposed in the previous master plan. Changes in use and in technology have made the potential for an ILS less likely. The current protected 1000ft PSA eliminates several potential areas that may be suitable for new tie downs and hangar development.
- Tie Down Space - Overall operations have not increased as projected in the previous plan, and the number of currently based aircraft is 124. Given the limited upland space, the airport must consider the balance between available tie-downs and future hangar development.
- Helicopter Pads - There are currently two sets of helicopter pads, located on the northern and southern ends of the Apron. FAA regulations require the de-confliction of fixed wing and rotary wing aircraft. The south-end helipads are poorly aligned, with a minimal access lane, which can make the staging and recovery of helicopters on the ground challenging.
- Aircraft Wash Area - The airport does not currently have a designated aircraft wash area. Part 135 Operators are required to wet wash their fleet aircraft once per year.
- Tree Cover - In several locations around KOWD facilities tree cover has grown to heights that may eventually be problematic. Visibility from the tower to south-end helicopter pads is restricted.
- MALSF Access Road - The road which is used to access the MALSF is not paved and is subject to consistent flooding.

F. Opportunities

- Extend Runway 17/35 - If additional land can be acquired north of runway 17, the existing runway can be extended to 5,001 feet, allowing the full range of Design Group B-II.
- Paved Safety Areas: A short term solution to be considered is a 600 feet runway extension by way of paving the already constructed and permitted runway safety areas and employ declared distances for landing and takeoff.
- Primary Surface Area (PSA) for Runway 17/35 - An ILS is not feasible, therefore it is recommended that the airport no longer protects for a future ILS condition for Runway 17/35. Therefore, the PSA will be 500 feet for present and future conditions. This will allow for infrastructure improvements such as tie downs and hangars.
- Extend Runway 17/35 - If additional land can be acquired north of runway 17, the existing runway can be extended to 5,001 feet, allowing the full range of Design Group B-II. A short term solution to be considered is a 600 feet runway extension by way of paving the already constructed and permitted runway safety areas and employ declared distances for landing and takeoff.
- Hangar Redevelopment - The elimination of the existing T-hanger and construction of additional conventional box-hangars will provide better quality aircraft storage.
- Expand Airport Amenities - The installation of an aircraft washing station, electric tie-downs and deicing capability would provide additional utilization and revenue for the airport.
- Self-Serve Fueling - KOWD does not currently offer 24/7 self-serve fueling. Self-serve fueling is an important service and provides the opportunity for increased fuel sales revenue.
- De-icing Capability - KOWD does not currently offer aircraft deicing. Deicing is an important service and provides the opportunity for increased airport utilization, deice and fuel sales revenue.
- Install Solar Array - A realignment of Taxiway C, from Taxiway F to Taxiway A, would free up space that would allow for the installation of a solar array which would provide power to the airport, reducing electrical costs.
- Support Vertical Takeoff and Landing (VTOL) facilities such as hangars adjacent to the south end helipads.

- Consider a vehicle access road running north/south, inside the perimeter fence along Access Road.
- Underused Aeronautical Development Areas - Several areas within the airport have lots that are underutilized. Additionally, the nested T-hangar facility is outdated.

Section 2.0 AVIATION OPERATIONS VALIDATION AND COMPARISON

A. Background

Aviation Forecasting was provided in the 2007 Norwood Master Plan Update. Aviation forecasts anticipate potential growth scenarios based upon recent trends and events and is used to provide the airport with a series of benchmarks that can be used to guide future airport improvements. The previous forecast followed the FAA standardized Methodology of developing aviation forecasts and took into consideration both positive and negative factors that may impact the overall results of the formulated forecast.

This Section was put together to first evaluate and validate the operations and based aircraft provided in the 2007 Norwood Master Plan Update and then compare the previous data with the current operations and based aircraft of this 2018 Technical Master Plan Update. Utilizing this data, the Airport will be able to see the rate of change and from this provide reasonable alternatives for the airports development through the remainder of the forecasting period.

Positive factors that have caused actual levels of operations to remain on pace with the 2005 forecast are:

- Economy continues to recover at better than expected rate.
- Airline security delays prompt increased use of air charter, air taxi, and corporate aircraft.
- Absorption of used general aviation aircraft from the market allows an increase in new aircraft sales. More efficient, better equipped, pilot friendly (safer), neighbor friendly (less noise) aircraft replace the aging general aviation fleet.
- New generation of small, Very Light Jets (VLJ) provide effective business air taxi service
- RNAV Global Positioning System instrument approaches became available at the Norwood Memorial Airport, allowing for the commissioning of an instrument approach eliminating the cost of installation and maintenance of ground based equipment associated with other types of approaches. Ex; ILS.
- If the exemption on aircraft storage, sales, and maintenance passed in 2002 remains in force will continue to benefit aircraft and aircraft parts sales.

Negative influences that may have caused forecasted levels to fall below forecast:

- Fuel prices remain high.
- Cost of insurance increases / additional tax increases / additional fuel flowage fees.
- Cost to fly general aviation aircraft exceeds amount of disposable income per capita.
- Airline service and on-time arrival rates improve, allowing air carrier travel to be less expensive than general aviation transport.
- Lack of deicing and wet wash areas and the current runway length create constraints on Fixed Base Operators (FBO) and airport users.
- General industry downturns (e.g., new student start-ups, reduction in general aviation fleet).

B. Validate and Compare Prior Forecast

A number of sources were consulted to obtain current and future flight operations, as well as historical data for the Airport. These sources included:

- FAA Air Traffic Control (ATC) counts
- FAA Form 5010
- GCR Based Aircraft
- 2007 Airport Master Plan

Growth in commercial airline traffic at Boston Logan will continue to push non-commercial corporate and privately owned general aviation aircraft to reliever airports, such as Norwood Airport, which are closer to the business and industry centers that they serve. The Airport is within 13 nautical miles of Boston Logan and 30 miles of T.F. Green airport in Rhode Island. It is one of the few airports within the state that is able to relieve the general aviation traffic from both Logan and T.F. Green.

The use of corporate aircraft has steadily increased over the past ten years with the introduction of fractional share aircraft ownership, which allows businesses to afford efficient air transportation. Many businesses split the costs of a corporate aircraft via the fractional ownership route. Fractional ownership programs allow corporations or individuals to buy a

Table 2-1 - Airport Operations - Actual Vs. Forecasted

Year	Operations	% Change from previous year
2005	70,496	
2006	84,242	19.5%
2007	82,471	-2.1%
2008	81,512	-1.2%
2009	60,587	-25.7%
2010	65,076	7.4%
2011	64,952	-0.2%
2012	68,701	5.8%
2013	65,436	-4.8%
2014	55,261	-15.5%
2015	58,917	6.6%
2016	58,046	-1.5%
2017	60,590	4.4%
Year	Forecasted vs Actual	% Difference (Forecasted - Actual)
2010	Forecasted = 73,960 Actual = 65,076	-12%
2015	Forecasted = 78,351 Actual = 58,917	-25%
2025	Forecasted = 90,929 2017 Actual = 60,590	-33%
Average Annual Operations Decline (2005 - 2017)		-1.2%

share of an aircraft and to have use of that aircraft for an allotted period throughout the year. Benefits of these programs typically include aircraft maintenance, flight scheduling, professional flight crews and food catering services. These programs, the most notable being that of NetJets (the largest fractional ownership program), typically appeal to new users of business aircraft, corporations and individuals. With a high concentration of corporations within the southwest Boston metro area, and over 60 businesses with registered aircraft in the Norwood area, the Airport is located in a prime spot to capture this market.

The availability of newer, less expensive, less noisy, and smaller jets will sustain the trend toward increased corporate activity at the Airport. The significant technical and safety advances in the smaller jet designs will support increased use by owner pilots, small corporations, on-demand air-taxi operators, and

fractional ownership management.

Business and industry in the Norwood area has grown, resulting

in the area becoming a business center for Boston's southwest metropolitan region.

Even with the advent of smaller jets, corporate and business use of the Airport has been stagnant and, in fact, has seen a slight decline over the previous 6 years. This may be a sign that the Airport has not entirely recovered from the 2008 recession however the lack of hangars and services such as deicing, play a part in the Airport's decreased use. As depicted in Table 2-2: Norwood Memorial Airport Fuel Sales, Airport operations have seen an estimated average annual decline of 1.2% since 2007.

Table 2-2: Norwood Memorial Airport Fuel Sales

Year	Gallons Sold (JetA & 100LL)
2012	606,059
2013	580,269
2014	567,374
2015	515,795
2016	502,900
2017	502,895
2018	490,000
Average Annual Fuel Sales Decline (2012 - 2018)	-3.8%
Source: Airport FBO Fuel records	

C. Based Aircraft

The current (2018) Based Aircraft Fleet Mix was compared to the 2005 actual (previous) and 2025 "High Growth" (forecasted) Based Aircraft Fleet Mix. The purpose of this comparison is to allow the airport to determine if they are in line, ahead or behind the 2005 Airport Master Plan forecasted information. The current Based Aircraft Fleet Mix data, for each airplane category, was obtained from the GCR database. Table 2-3: Based Aircraft - Actual vs. Forecast, illustrates the results of these percentage increases when applied to each aircraft category at Norwood.

The FAA high growth projections indicated that aircraft based at the Airport were expected to increase 15% from 204 to 234 over the forecasted twenty-year period. However, between 2005-2017, there was a 32.4% decrease in the total number of based aircraft at Norwood. This is due largely to the cumulative impacts of the 2008 recession, 9/11 and the

high fuel prices that followed. In addition, between 2005 and the present, airport management was required to change its based aircraft manual count to an FAA-sponsored based aircraft database; Basedaircraft.com. In a number of cases, the FAA database does not account for aircraft based primarily at Norwood and are counted as being based at another airport.

Table 2-3: Based Aircraft - Actual vs. Forecast

		Pistons			Turbine			Rotorcraft	Total Based Aircraft
	Year	Total Pistons	SE	ME	Total Turbines	Turbo props	Turbo Jets		
Actual	2005	176	136	40	22	11	11	6	204
FAA Projection	2015	179	140	39	28	12	16	7	215
Actual	2017	112	98	6	11	5	6	15	138
FAA Projection	2025	194	152	43	31	13	17	7	234
% change 2005-2017		-33.5%	-27.9%	-85.0%	-50%	-54.5%	-45.5%	66.7%	-32.4%

The most significant losses in based aircraft are found to be multi-engine piston and turbine. Given these aircraft have longer runway length needs, it is estimated that the reduction in aircraft are attributed to the runway length which, at its current length, makes it difficult for multi-engine and turbine aircraft to operate to and from the Airport. Total Based aircraft at Norwood, as depicted in Table 2-3: Based Aircraft - Actual vs. Forecast, has seen an average annual decline of 2.6%.

D. Aircraft Apron Parking Demand

Tie-Downs

Aircraft parking demand does not currently exceed the available aircraft parking spaces at the airport, however, it was forecasted

that by 2025, the Airport would require 265 total tie-downs; 234-based aircraft and 31 itinerant aircraft. The apron space required

to support 265 tie-downs would equate to 937,800 SF, which is 421,765 SF or 81.7% more than the airport's current apron space of 516,035 SF.

In comparing 2005 (previous), 2017 (current) and 2025 (forecasted) itinerant aircraft apron requirements, the total number of tie-downs do not vary significantly.

Table 2-4: Itinerant Aircraft Apron Requirements shows that the number of itinerant aircraft tie-downs required have decreased and is expected to continue this trend throughout the forecasting period. When considering alternatives, the airport should consider the number of aircraft design group 1 versus the number of design group 2 tie-downs. DG1 tie-downs require 2,700 SF of apron space while DG2 require 3,600 SF of apron space. Apron space requirements provided consideration for the DG1 and DG2 aircraft and in 2017 equal to a total 110,301 SF of apron space. 32 tie-downs should be dedicated to itinerant aircraft.

Table 2-4: Itinerant Aircraft Apron Requirements

Parameters	Planning Year Space Requirements (SF)		
	2005	2017	2025 (Forecasted)
Total Annual Itinerant Operations	18,329	15,753	23,642
Busiest Month (Total Operations)	8,248	7,089	-
Average Day of Busiest Month (1/30th of busy Month)	275	236	-
Busiest Day Operations (110% of average day)	302	260	-
Itinerant Landing Operations (½ of busy day)	151	130	-
# of Itinerant Aircraft Parking Demand (25% of above)	38	32	31
Square Feet per Aircraft (small aircraft) (57%*38*2700)	2,700	2,700	2,700
Square Feet per Aircraft (large aircraft) (43%*38*3600)	3,600	3,600	3,600
Planned Itinerant Aircraft Apron Space (Square Feet)	117,000	110,301	95,400

Table 2-5 - Based Aircraft Apron Requirements

Parameters	Planning Year Space Requirements (SF)		
	2005	2017	2025 (Forecasted)
Based Aircraft	204	138	234
Percent Aircraft Parked on Aprons	-	51%	-
Based Aircraft on Apron Space	82	70	234
Square Feet per Aircraft	3600	3600	3600
Planned Based Aircraft Apron Space (SF)	293,760	252,000	842,400
Total Tie Downs Required Itinerant and Based Aircraft	120	102	265
Total Itinerant and Based Aircraft Apron Space Requirements (SF)	410,459	362,301	937,800

Based aircraft apron space and tie-downs required considered the number of aircraft tie-downs available and the number of aircraft that are hangared. Table 2-5 - Based Aircraft Apron Requirements, shows that the number of based aircraft tie-downs required in 2017 is 70 or 51% of the 138 total based aircraft. With 102 of the total 134 tie-downs being utilized (32 itinerants and 70 based), Norwood currently has a surplus of 32 tie-downs.

As previously mentioned, if the need to increase the current total apron space of 516,035 SF becomes a reality, the upland areas available for apron expansion are severely constrained by the wetlands and floodplains that surround the Airport. Therefore, it will be necessary for the Airport to be creative in trying to meet this unmet demand.

There are various options to meet this demand, such as a terminal area reconfiguration through a lease buyout, apron reconfigurations, taxilane reconfigurations, and land acquisition. In addition, the increase in the number of hangars would reduce the requisite

based aircraft tie-down space. These alternatives are discussed in more detail in Section 4.

Table 2-6: Tie Downs Summary

Year	Based Aircraft	Based T-Downs Required	Itinerant T-Downs Required	Total T-Downs Required	T-Downs Available	Surplus / (Deficit) T-Downs
2005	204	82	38	120	229	109
2017 Actual	138	70	32	102	134	32
<i>2025 (Forecasted)</i>	<i>234</i>	<i>234</i>	<i>31</i>	<i>265</i>	<i>134</i>	<i>-131</i>

Hangared Aircraft

At the time of this writing, Norwood Memorial Airport had recorded 138 based aircraft. Of the total based aircraft, 71 are stored in 20 hangars. The hangar use is divided between private and commercial use and the distribution of the 71 stored aircraft are distributed

Figure 2-1 - Norwood Landside Facilities (photo source: Google Earth)



among the two. Norwood hangared aircraft account for 52% of the total based aircraft as depicted in Table 2-7: Aircraft Hangar Units - Based Aircraft. When reconfiguring apron space and taxi-lanes, hangar alternatives will need to be considered and are discussed in detail in detail in Section 4 Alternatives.

Table 2-7: Aircraft Hangar Units - Based Aircraft

Building Number	Hangar Type	Location	Approximate Size (SF)	Stored Aircraft	Percent of Based Aircraft in Hangar
1	Conventional	Lot 6	3,200 SF	3	2.2%
2	Conventional	Lot 6	3,200 SF	3	2.2%
4	Conventional	Lot 6	3,200 SF	3	2.2%
5	Conventional	Lot 6	3,200 SF	3	2.2%
8	Conventional	Lot 6	4,800 SF	6	4.4%
10	Nested T	Lot 6	8,400 SF	10	7.2%
11	Conventional	1,100' Strip	6,000 SF	4	2.9%
12	Conventional	1,100' Strip	10,000 SF	1	1%
13	Conventional	Lot 6 & 1,100' Strip	12,700 SF	5	3.6%
14	Conventional (BEH)	1,100' Strip	17,700 SF	5	3.6%
15	Conventional (Y2K)	1,100' Strip	12,300 SF	6	4.3%
16	Condo (8 units)	1,100' Strip	12,900 SF	8	5.8%
17	Conventional	1,100' Strip & Lot W, X, Y	7,500 SF	4	2.9%
18	Aircraft Maintenance	Lot W, X, Y	3,500 SF	2	1.5%
20	Conventional	1,100' Strip	2,000 SF	1	1%
21	Conventional	1,100' Strip	2,500 SF	1	1%
22	Conventional	1,100' Strip	2,000 SF	1	1%
23	Conventional	1,100' Strip	3,800 SF	2	1%
24	Conventional	1,100' Strip	3,600 SF	1	1%
25	Conventional	Lot 6	6,600 SF	2	1.5%
		Total Hangared Aircraft		71	52%

E. Aircraft Flight Operations

Operations at Norwood were at their peak in 2006 (84,242 total operations). While 9/11 did impact operations, the more obvious decline occurred in 2009 following the recession, when total operations dropped by over 25%. Since 2009 the average number of operations has been about 62,000 per year, well short of the peak in 2006 and well short of projections.

The FAA National General Aviation Forecast is commonly used to reflect the potential for future corporate and business aviation activity at the Airport. It includes many of the factors that are consistent with regional socioeconomic conditions in the Airport's market area, and yields average annual increases in the fleet mix and based aircraft that reflect the business climate in the market area. The FAA's 2025 growth rate identified in the 2005 forecast is compared to actual growth rates over the same period of time in Table 2-8: Airport Operations - Actual vs Forecasted.

As of 2015, the FAA projections indicate that Norwood's total operations should be 25% higher than actual. As of 2017,

Norwood's total yearly operations would

need to reach an average pace of 4% per year to reach the 2025 projection of 90,929. The FAA growth rates result in an increase from 70,380 in 2005 to 90,929 flight operations by 2025, an increase of almost 30% over the forecast period. From 2005 to present 2017, the average annual operations have decreased at a rate of 1.2%. If the 2025 forecast were to be

Table 2-8: Airport Operations - Actual vs Forecasted

Year	Operations	% Change from previous year
2005	70,496	
2006	84,242	19.5%
2007	82,471	-2.1%
2008	81,512	-1.2%
2009	60,587	-25.7%
2010	65,076	7.4%
2011	64,952	-0.2%
2012	68,701	5.8%
2013	65,436	-4.8%
2014	55,261	-15.5%
2015	58,917	6.6%
2016	58,046	-1.5%
2017	60,590	4.4%
Year	Forecasted vs Actual	% Difference (Actual vs Forecasted)
2010	Forecasted = 73,960 Actual = 65,076	-12%
2015	Forecasted = 78,351 Actual = 58,917	-25%
2025	Forecasted = 90,929 2017 Actual = 60,590	-33%
Average Annual Operations (2005 - 2017)		-1.2%

reached, the implications would be significant for landlocked Norwood, and are used to determine the airport's facility needs, as described in the following section.

F. Runway Operational Data

The dominant runway for Norwood Memorial is Runway 35 meaning that the majority of the air traffic landing and departing the Airport is to the north and south. To determine the percentage of operations between Runway 17/35 and 10/28 the airport's air traffic control tower was consulted. The airport is served by a Non-Federal Air Traffic Control (ATC) facility and this facility is charged with controlling the safe, orderly and expeditious flow of air traffic. Included in their duties is the count of air traffic.

Airport Management noted that the majority of noise concerns come from abutting property owners west of the Airport. The Airport has instituted voluntary noise abatement procedures to address the concerns of the public.

In April 1990, the Airport conducted a formal 14 CFR Part 150 noise study. The study focused on defining an optimum set of noise and land use mitigation measures to improve compatibility between airport operations and community land use. The noise exposure maps showed that most of the land within the Ldn 65 dB was either on airport property or was owned by the airport and was used for airport functions. The immediate surrounding area was suburban in character composed primarily of single family homes. The ambient noise level was low as shown by the calculations in the Noise Exposure Map to be probably less than 50 dB Ldn. The major contributor to ambient noise was the noise from low speed vehicle trips to and from residences.

The fleet mix of aircraft evaluated in the 1991 Part 150 noise study included aircraft with turbojet power plants that produce much higher noise than aircraft in use today. A combination of noise abatement procedures and limitations on aircraft exceeding 87 effective perceived noise level in decibels or 75 decibels, as measured in Part 36, were put in place and exist today.

The noise study further defined the 1991 preferred runway for takeoff, in order of use, to be 17, 10 and 35, and then 28, respectively. The 1991 preferred runway for arrival, in order of use was 35, 17 and 28 and then 10, respectively. 76.3% of the time, runway 17/35 was utilized.

As a part of this Technical Master Plan update Norwood ATC staff was consulted and it was estimated that the average percentage of annual use for Runway 17/35 was 65% while Runway 10/28 average percentage of annual use was 35%. Table 2-9: 5-Year Runway Operations depicts the historical use.

Given the fact that newer aircraft produce far less noise than aircraft used in the 1991 Part 150 noise study and the fact that operations have remained fairly consistent, it is recommended that updated noise modeling be funded when the airport pursues a runway extension.

Table 2-9: 5-Year Runway Operations

Year	Runway 17/35	Runway 10/28	Total Operations
2013	42,533	22,903	65,436
2014	35,920	19,341	55,261
2015	38,296	20,621	58,917
2016	37,730	20,316	58,046
2017	39,384	21,207	60,590
AVG	38,773	20,878	59,650
Source: Norwood ATC Tower records			

G. Fuel Sales

An attribute worth discussing which measures indirect performance of the airport is fuel sales. Given that fuel sales are usually one of the airport's primary sources of revenue, second to hangar and tie-down rental, a brief analysis is provided. Elements attributed to healthy fuel sales include the following:

Properly sized runway

- If the runway is too short, aircraft will need to balance payload and may not purchase fuel.

Responsive FBO

- Providing customer service valued line service;
- Providing aircraft maintenance;
- Providing hangar space;

- Providing services such as rental cars, catered food, power carts and deicing.

Thriving activity

- Based businesses;
- Based aircraft;
- Properly staffed aircraft maintenance shop;
- Flight Training;
- Civil Air Patrol, Experimental Aircraft Association, and other associations;
- Excellent snow removal.

Runways open (Level of Service)

- Snow banks removed - Reduce ponding and ice.

Aircraft fuel sales at Norwood has been trending downward. This could be attributed to any of the elements listed above or the sum total of all. Section 4, Alternatives, will consider each of these elements and explore various alternatives with the intent of reversing any downward trends, increasing the Airport's ability to increase usage and sustainability.

H. Summary

Table 2-10: Summary Based Aircraft, Operations and Fuel Sales

Year	Based Aircraft	Operations	Fuel Sales (gallons)
2005	204	70,496	Not Available
2012	Not Available	68,701	606,000
2017	138	60,590	490,000
2005 - 2017 Avg. annual	-2.6%	-1.2%	-3.8%
Source: Airport Management, Norwood ATC Tower, FBO			

Section 3.0 Facility Needs

A. FAA Airport Design Standards

The FAA sets its Airport Design Standards based upon the size of the aircraft that use, or are expected to be using the airport in the near future. Norwood Memorial Airport has an FAA Airport Reference Code (ARC) of B-II. This includes small aircraft and light jets with approach speeds of less than 121 knots and wingspans less than 79 feet. Based upon the forecasts, it is recommended that the current ARC be retained and that the Airport continue to be designed to B-II standards. This will accommodate the current and future corporate aircraft fleet that is expected to use the facility. It should be noted that B-II standards will accommodate most small and mid-size corporate jets currently in operation, as well as those corporate jets expected to operate at the Airport in the future. This ARC of B-II is used to set the Design Standards for the dimensional layouts of various airport facilities, such as aircraft parking aprons, taxilane and taxiway offsets, and each of their associated safety areas. Taxiway and taxilanes will utilize a Design Standard of Design Group II. Following is a more detailed description for each.

B. Airport Facility Needs

This section outlines the need for airport facilities such as runways, taxiways, taxilanes, aprons and hangars. Airport security should be improved through fencing improvements and, the airport should consider acquiring abutting land.

Facilities evaluated in this section include:

- Runway 10/28 Safety Areas
- Runway 17/35 Length Requirements
- Runway 17/35 Primary Surface Area
- Precision Approach System
- Taxiway C
- Taxilane System
- Deice Pad and Glycol Collection capability
- Hangars
- Helicopter Pads - South

- Fuel Farm (aging fuel farm; 1982 4-12,000 gallon below ground system. 24K JetA, 24K)
- Maintenance Equipment Storage / Administration / GA Terminal Building
- Aircraft Wash area
- MALSF Access Road
- Airport Security / Wildlife Fencing
- Land Acquisition
- Automobile Parking

Runway 10/28 Safety Area Needs

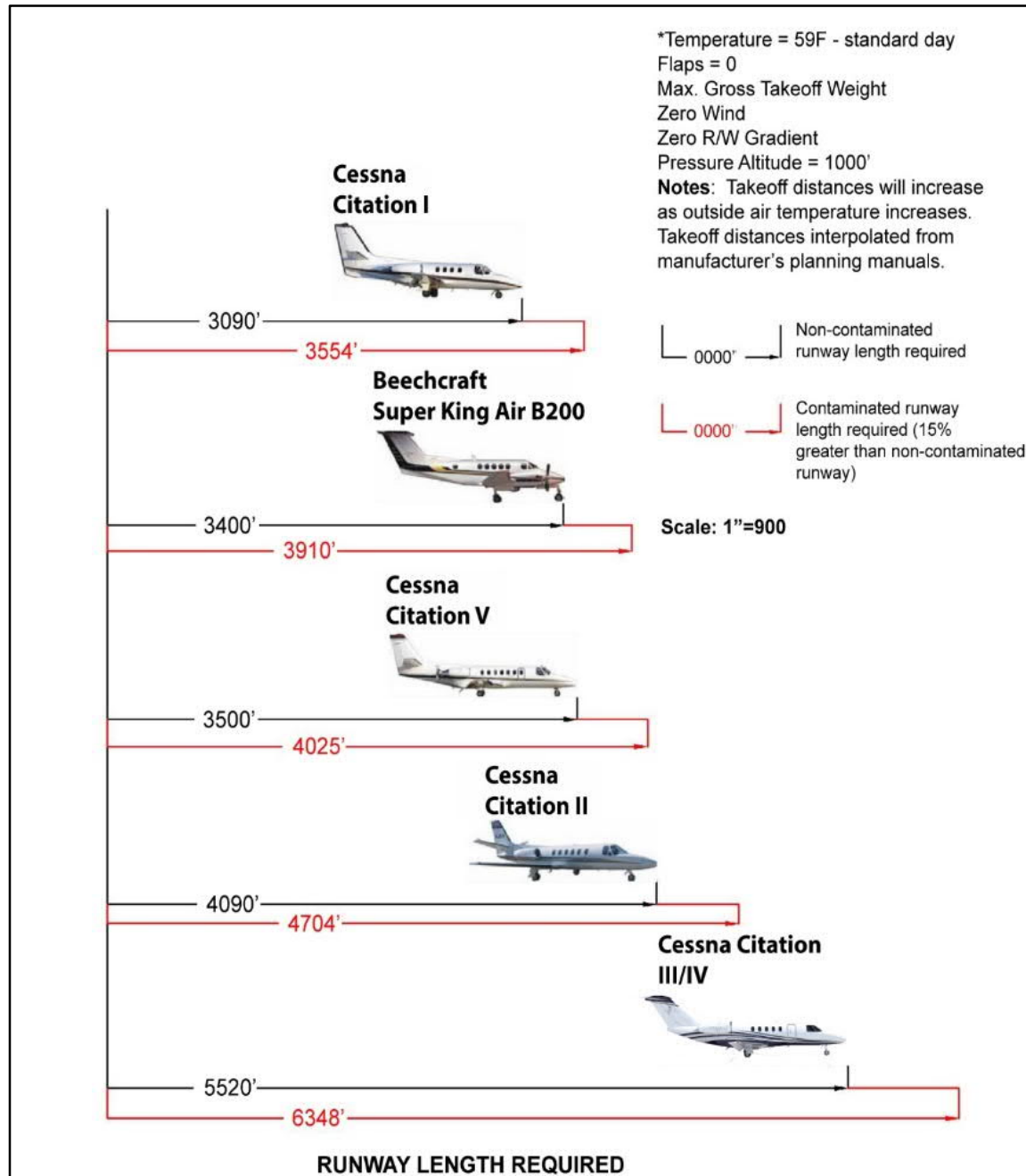
The FAA requires that an Airport's runways meet the FAA's Runway Safety Area (RSA) standards before new improvements can be constructed for that runway. In 2005 the RSAs for Runway 10/28 did not meet FAA standards. The safety area on the Runway 10 end was 113 feet long, or 187 feet shorter than the standard 300-foot length for a VFR runway, and the Runway 28 safety area was 87 feet, or 213 feet shorter than the standard. These issues have since been corrected.

Runway 10/28 is a daytime use only runway, without lighting. It is 3,995 feet long with a 987 feet displaced threshold on the Runway 10 end, shortening the landing distance available for Runway 10 to 2,795 feet. As mentioned in Section 2, this Runway is utilized approximately 35% of the total Airport operations. Data was retrieved from the FAA's Traffic Flow Management System Counts (TFMSC). In 2018, total operations on Runway 10/28, for aircraft in the category of B-II, were 575 which supports the runway being designated as a B-II runway. Industrial development in the Runway 10 approach has caused the displaced threshold on that runway end, which restricts the landing length available for landings on Runway 10. Approaches to Runway 10 and departures from Runway 28 are aligned directly over the Town center. Wetlands and floodplain zones on both runway ends constrict the existing runway length. Although the safety areas from Runway 10/28 are compliant for a B-II runway, it is at the expense of displacing the thresholds, and in effect, decreasing the total useable length of the runway. There is limited potential for the airport to have the unrestricted use of the full-length of this runway without increasing adverse impacts to wetlands, floodplain zones, as well as noise issues over the town center.

Runway Operational Length Needs

The current lengths of both runways are adequate for single-engine aircraft operations, but are marginal for larger twin-engine aircraft and the corporate jets that make up an increasing percentage of the Airport's fleet. This is of concern on hot days or during poor weather when runway takeoff and landing length requirements increase. Runway 10 has an even shorter 3,395-foot takeoff distance and is very marginal for use by these larger aircraft. The takeoff

Figure 3-1: Runway Operational Length Needs Standard Day (59° F)



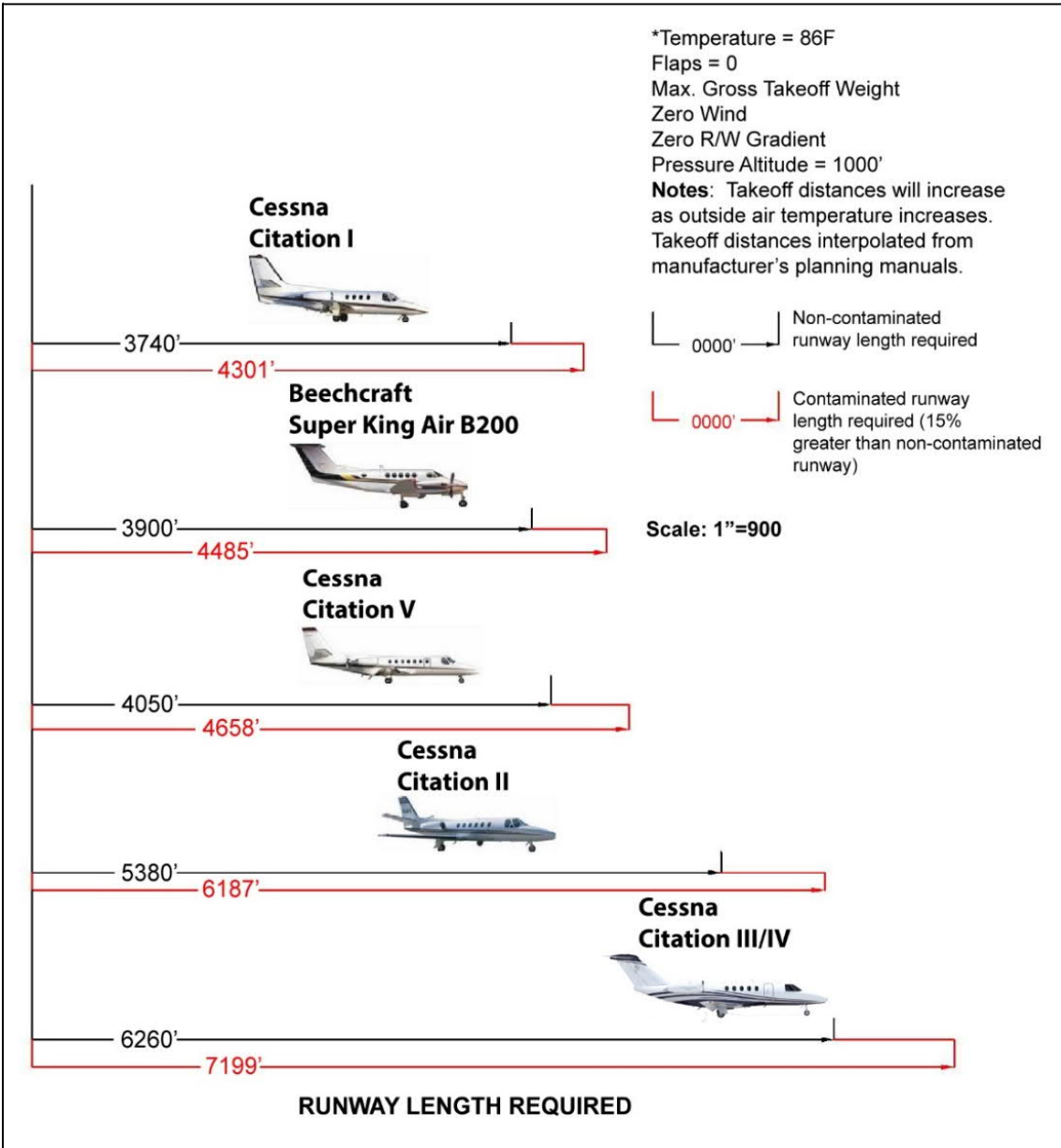
distances required by the aircraft fleet mix using the Airport dictate the runway operational

length needs. The runway operational length needs at Norwood were evaluated previously in the 2005 master plan and are validated in this 2019 technical master plan update.

Representative aircraft were chosen in the following list of aircraft makes and models to accurately depict runway operational length needs at Norwood, as presented in Figure 3-2.

The representative make and models of aircraft from this listing include a family grouping of airplanes, hereinafter considered, the Cessna Citation Composite.

Figure 3-2: Runway Operational Length Needs Hot Day (86°F)



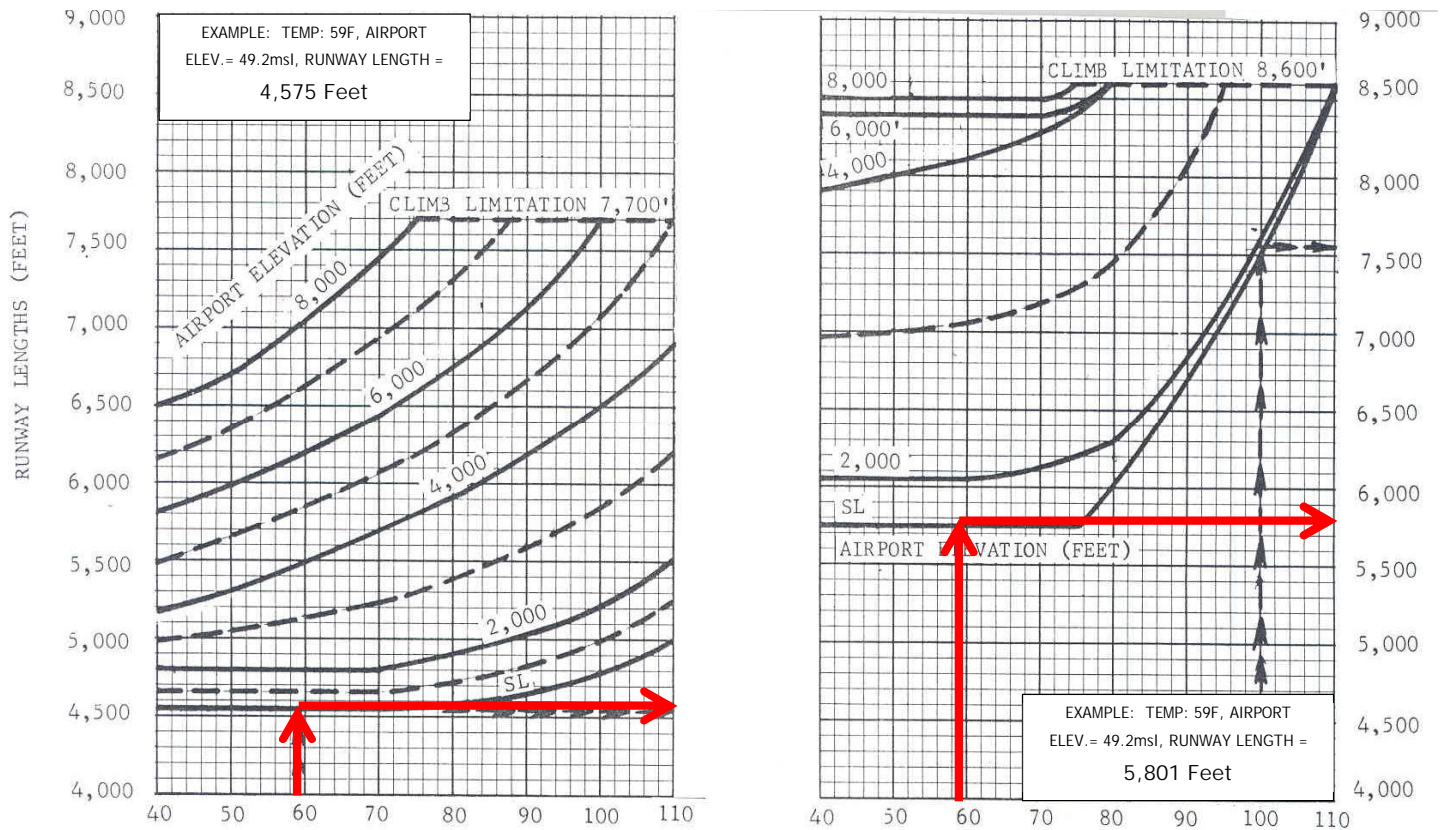
The Cessna Citation Composite include the Citation I, II, III, IV and V and the following table outlines the maximum Certificated Takeoff Weight (MTOW) for each aircraft.

The Cessna Citation Composite			
Aircraft	Maximum Certificated Takeoff Weight (pounds)	Passengers	Percent Fleet
Citation I	11,850	5	75%
Citation II - (S550)	15,100	8	75%
Citation III - (650)	22,002	9	100%
Citation IV - (CJ4)	17,100	9	100%
Citation V - (Ultra/Encore)	16,630	8	75%

The Cessna Citation Composite outlined above shows that the majority of the Cessna Citation Composite are within the 75 percent of fleet as described in FAA Advisory Circular (AC) 150/5325-4B, Chapter 3, paragraphs 301-306. The percent of fleet was referenced in Tables 3-1 and 3-2 of the AC. Table 3-2 of the AC shows that both the Citation III (650) and the Citation IV (CJ4) fall under the 100 percent of fleet however, to be conservative, we utilized the 75 percent of fleet outlined in Figure 3-1 of the AC.

Norwood Standard Atmosphere Day: 75 percent of fleet at 60 percent useful load at 59° Fahrenheit nets a runway operational length need for Norwood of 4,575 feet. 75 percent of fleet at 90 percent useful load at 59° Fahrenheit nets a runway operational length need for Norwood of 5,801 feet.

AC 150/5325-4B Figure 3-1. 75 Percent of Fleet at 60 or 90 Percent Useful Load - Norwood



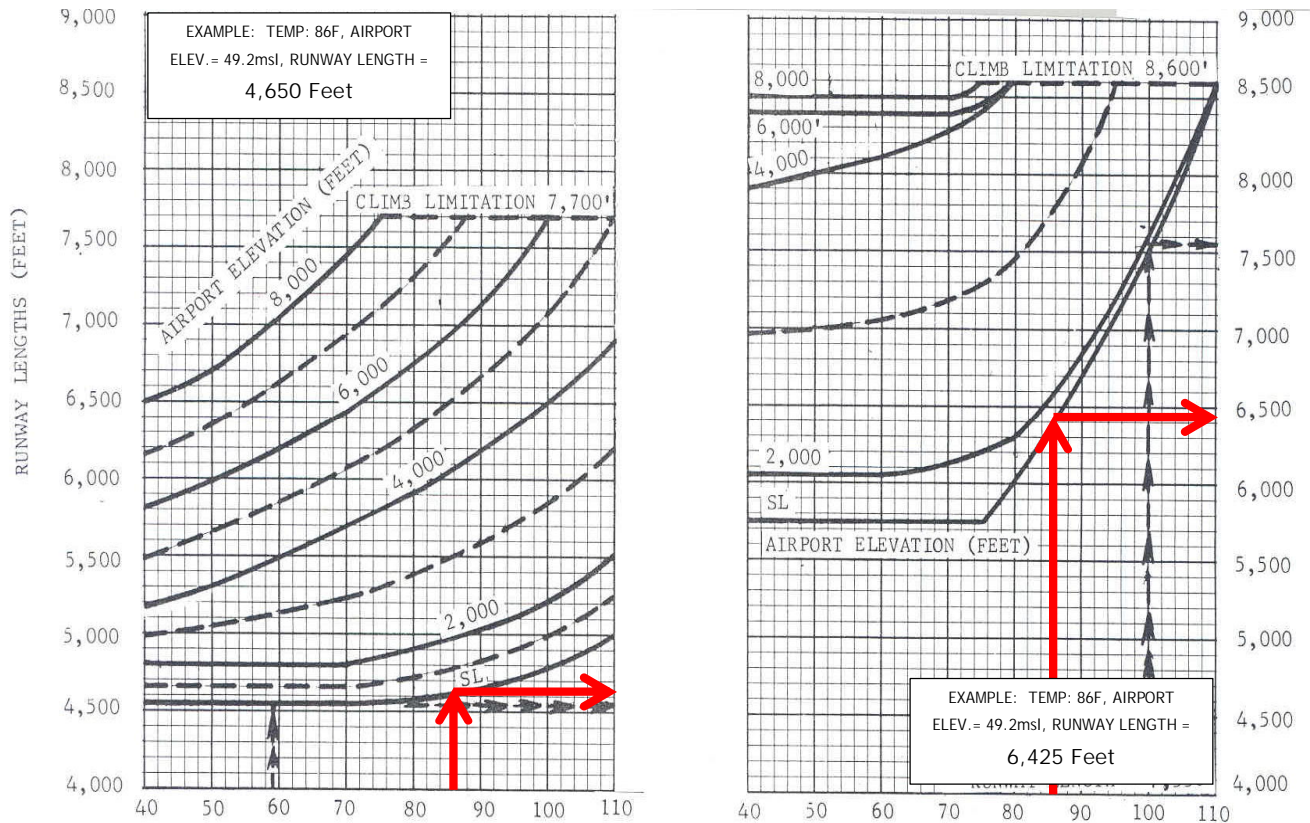
Standard Atmospheric Temperature in Degrees Fahrenheit

75 percent of Fleet at 60 percent of useful load

75 percent of fleet at 90 percent of useful load

Norwood Hot Day: 75 percent of fleet at 60 percent useful load at 86° Fahrenheit nets a runway operational length need for Norwood of 4,650 feet. 75 percent of fleet at 90 percent useful load at 86° Fahrenheit nets a runway operational length need for Norwood of 6,425 feet.

AC 150/5325-4B Figure 3-1. 75 Percent of Fleet at 60 or 90 Percent Useful Load - Norwood



Mean Daily Maximum Temperature (86F) of Hottest Month on the Year in Degrees Fahrenheit

75 percent of Fleet at 60 percent of useful load

75 percent of fleet at 90 percent of useful load

Cessna Citation Composite - Runway Operational Length Needs			
Temperature (F)	Runway Length (feet)		Runway Length Average (feet)
	60% useful load	90% useful load	
59	4,575	5,801	5,188
86	4,650	6,425	5,538
	4,613	6,113	<u>5,363</u>

As a result of evaluating the runway operational length needs for the Cessna Citation Composite aircraft fleet mix operating at Norwood, the recommended runway length should remain as 5,001 feet. A 5,001-foot runway would accommodate a majority of the small and mid-sized aircraft operating at the Airport, under most conditions. Retaining the existing corporate operations would meet the Airport's Mission Statement, enabling the Airport to continue in its role of serving regional needs, while benefiting the long-term requirements of the Town and enhancing operational safety for users of the Airport.

Precision Instrument Approach System

Runway 35 is served by a Localizer and an RNAV GPS, non-precision instrument approaches. The localizer antenna provides an electronic signal to guide the aircraft laterally to the runway centerline.

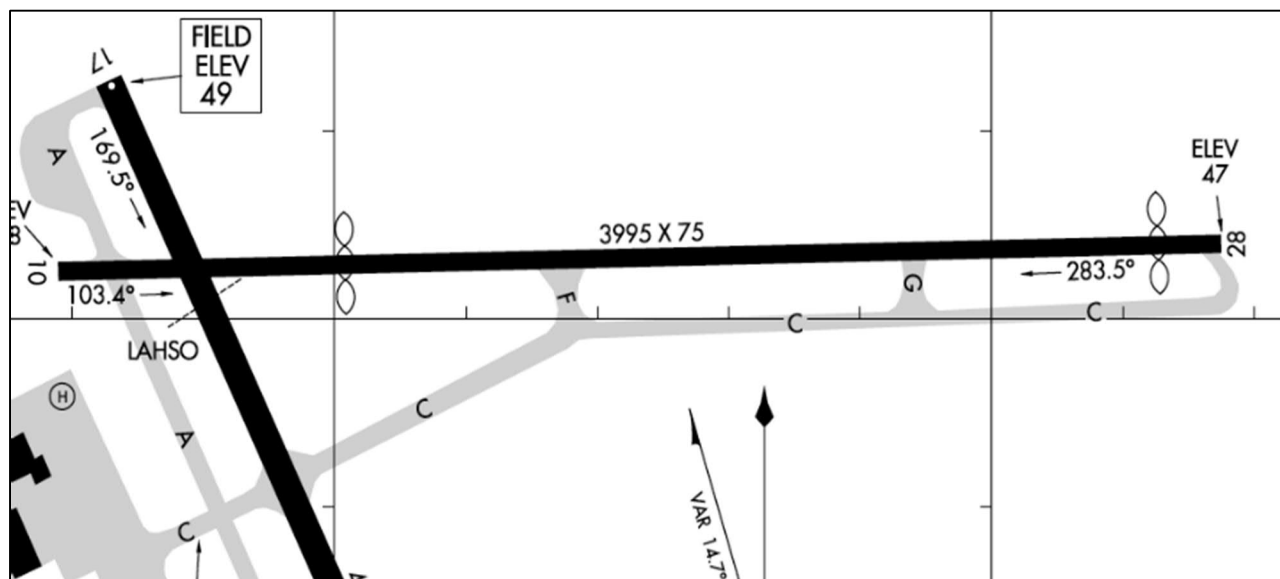
Runway 10/28 is not lighted and is restricted to flight operations under daytime Visual Flight Rules (VFR) only. Due to its short length, only small aircraft can utilize the runway. Larger aircraft typically do not have enough performance available to operate to/from Runway 10/28, especially when the runway is contaminated with water, snow or ice. A precision approach system was not recommended for Runway 10/28 because the length of the runway and the type of aircraft that use the runway do not justify the capital investment. Runway 10/28 should remain a visual runway, for use by smaller Category B-II aircraft.

Taxiway C

The existing taxiway system will support current and future operations at the Airport. If aircraft plan to park in the transient parking area, then Air Traffic Control (ATC) procedures typically clear an arriving aircraft to taxi to the GA ramp via Taxiway A and D. Based aircraft typically use Taxiway D or C. North/South Taxilane is primarily used by local based aircraft to access tie-downs.

Consideration may be given to the realignment of Taxiway C. Currently Taxiway C begins at terminal area apron and runs easterly until Taxiway F at which point it turns and parallels the remainder of Runway 10/28. The geometry of taxiway C is non-standard and creates an unsafe situation where aircraft leaving the apron have direct access to the intersection of Runway 17/35. Once the Taxiway C pavement has reached its useful life, realigning approximately 1,500' of Taxiway C would remove the non-standard geometry.

Figure 3-3: Taxiway C



Taxilane System

Norwood has three (3) internal taxilanes that provide access to hangars as depicted in Figure 3-4 below. In addition, Norwood recently had a single user, single owner construct a hangar north of Taxilane 2 as depicted in Figure 3-5 on the following page. Access to this hangar is under a long term lease with the BMA until 2047, which exceeds the time frame of the current master plan. This area may be evaluated as a potential additional Taxilane in a future master plan.

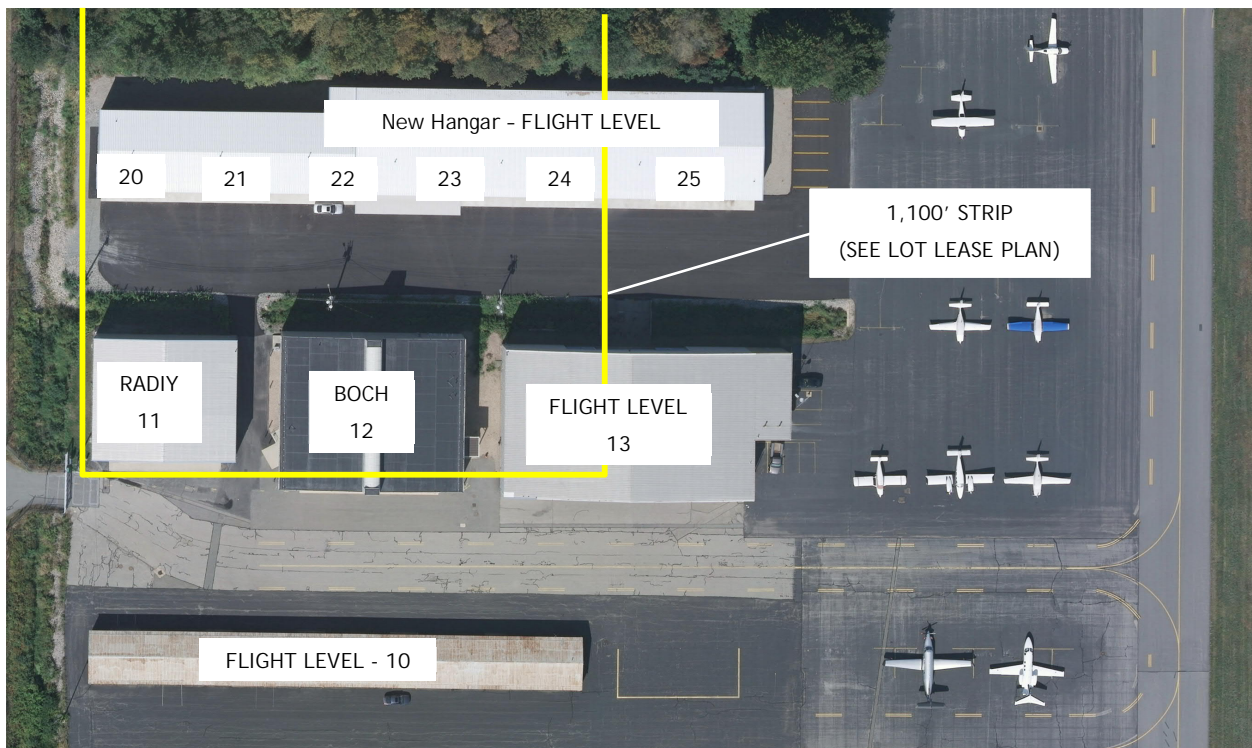
Figure 3-4: Existing Taxilane System, Norwood Memorial Airport



The three taxilanes currently serve multiple users and provide access to taxiways and runways. In review with airport management it was determined that the re-designation of the taxilanes to apron/ramp would not be a viable option as it would create an unsafe situation for taxiing aircraft as well as create a potential hardship for hangar owners and commercial operations along each taxilane as these areas could become blocked with parked aircraft or vehicles. It is the airport's desire to provide safe and equal access for all of its users in accordance with the FAA grant assurances as well as meet the airport taxilane design group standards.

It should also be noted that as a part of the planning process conducted when the north helipads were installed, it was determined that all space north of Taxilane 3 would be converted to apron. This would support and allow for safe helicopter operations.

Figure 3-5: Hangar North of Taxilane 2, Norwood Memorial Airport



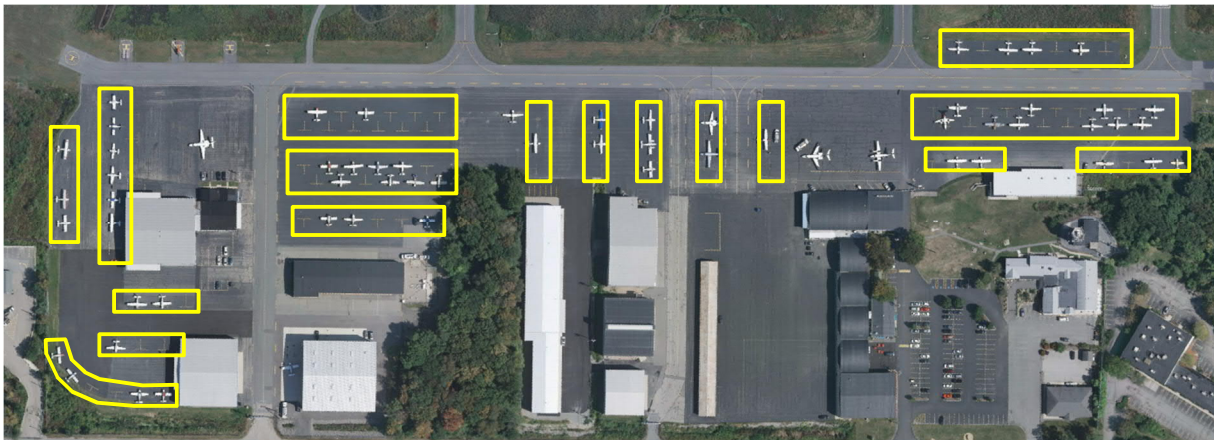
The following are descriptions of each taxilane, their restrictions and encumbrances.

Taxilane 1 (TL1) is located approximately midway between Taxiways C and D and adjacent to TL2. TL1 begins approximately 215' west of the North/South Taxilane on Lot 6 of the GA Ramp, runs easterly and merges with the North/South Taxilane. Due to the proximity of aircraft tie-downs and Building 10 T-Hangar from its centerline and object free area, TL1 will need to remain a Taxilane. Planning should be done in a manner that will eliminate current and future encroachments. TL1 alternatives are provided in Section 4 -Alternatives, some of which are phased.

Taxilane 2 (TL2) is located approximately midway between Taxiways C and D and of the GA Ramp. TL2 begins on the west end of the GA Ramp at access gate (2), and runs easterly approximately 625' and merges with the North/South Taxilane. TL2 runs east and west between Lot 6 & 7. Due to the proximity of tie-downs along the westerly end of TL2 and hangars from its centerline and object free area, TL2 will need to remain a Taxilane. Planning should be done in a manner that will eliminate current and future encroachments. TL2 alternatives are provided in Section 4 - Alternatives, some of which are phased.

Taxilane 3 (TL3) is located on the north end of the West Apron. TL3 begins at access gate (3) off Access Road, and runs easterly approximately 625' and terminates at the North/South Taxilane. TL3 splits the BMA "1,100' Strip", Lot W, X, Y and the West Apron. Due to the proximity of buildings from its centerline and object free area, TL3 will need to remain a Taxilane. Planning should be done in a manner that will eliminate current and future encroachments. Given the encumbrances related to the "1,100' Strip" identified in the lease agreement between the Town of Norwood and the Boston Metropolitan Airport, Inc., complete changes to TL3 may not become a reality until 2047. TL3 alternatives are provided in Section 4 - Alternatives, some of which are phased.

Figure 3-6: Existing Aircraft Tie-downs

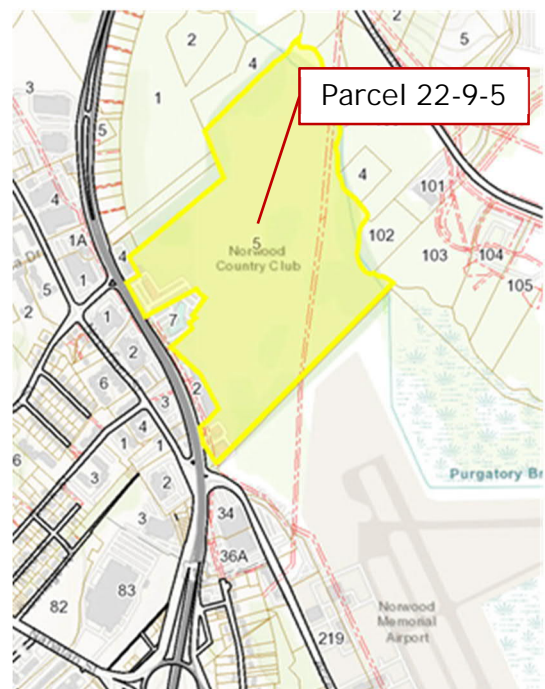


Aircraft Tie-Downs

The Airport has 6 aircraft parking aprons for based aircraft, 2 aprons for itinerant aircraft and 9 dedicated helicopter pads. As discussed in Section 2, currently, the Airport has a little over 516,000 SF of apron area available to accommodate based aircraft and itinerant parking. In 2017 there are 138-based aircraft and the airport has 134 total tie-downs. Approximately 51% of the based aircraft are on tie-downs while the remaining aircraft are stored in corporate or individually owned hangars. Based on the original forecast analysis, by 2025, the aircraft apron needs will be in excess of 565,000 SF. This is an approximate 9.5% increase in current apron space and equate to 12 additional tie downs will need to be added to the existing aircraft parking apron area. While current trends do not indicate a significant pressure for aircraft parking, it continues to be a valuable income generator for the airport.

Because the upland area available to the Airport is inadequate to meet future demand, there is a critical need to acquire added upland for aeronautical use. The Town should consider acquiring parcel Lot 22-9-5, presently owned by the Norwood Country Club. The location is shown in Figure 3-7.

Figure 3-7: Parcel 22-9-5 Location
(Image Source: Axis GIS)



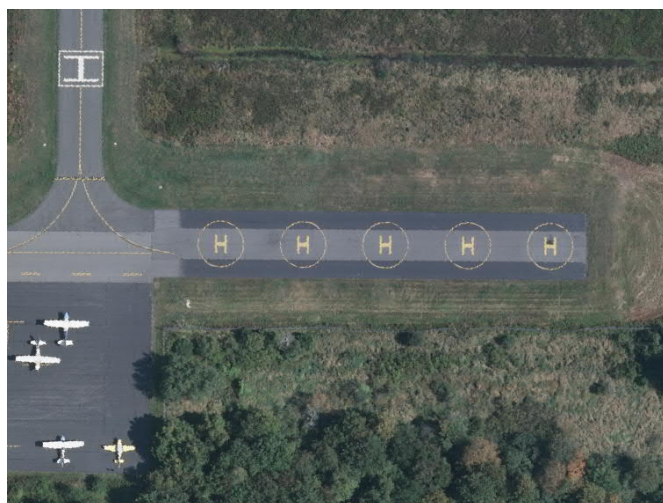
Hangars

Airport Management and airport businesses have expressed interest in constructing additional hangars to store aircraft, constructing aircraft maintenance facilities and to generate more revenue. Currently there is a waiting list for hangars. The space to construct additional hangars in upland areas is limited and therefore any development of hangars should be carefully thought out and vetted. This is an opportunity to deconstruct aging hangars and reconstruct in a way to increase apron, taxiway efficiencies, and aircraft storage capacity. Alternatives for additional hangars are outlined in the Section 4 - Alternatives.

Helicopter Pads - South

Figure 3-8 shows the five helicopter parking spots that are located on the south side of the Airport. Transient helicopters use the parking spots for temporary parking or drop-off/pickup, but the location of these spots is not near the FBO hangars. Vehicles are used to shuttle passengers back and forth, crossing aprons to these helicopter parking spots. Issues arise when helicopters are staged on the furthest

Figure 3-8: Southern Helicopter Pads



north helipad. This makes it difficult to stage other helicopters on the further southern pads.

In addition, there are several based helicopters that operate from hangars on the field. Typically, these helicopters are stored on rollaway platforms that are tugged from the hangars to the North/South taxiway where the helicopters depart or arrive. Some helicopters operate from their hangars and overfly aircraft that are on tie-downs. This has created a number of concerns and complaints over the years.

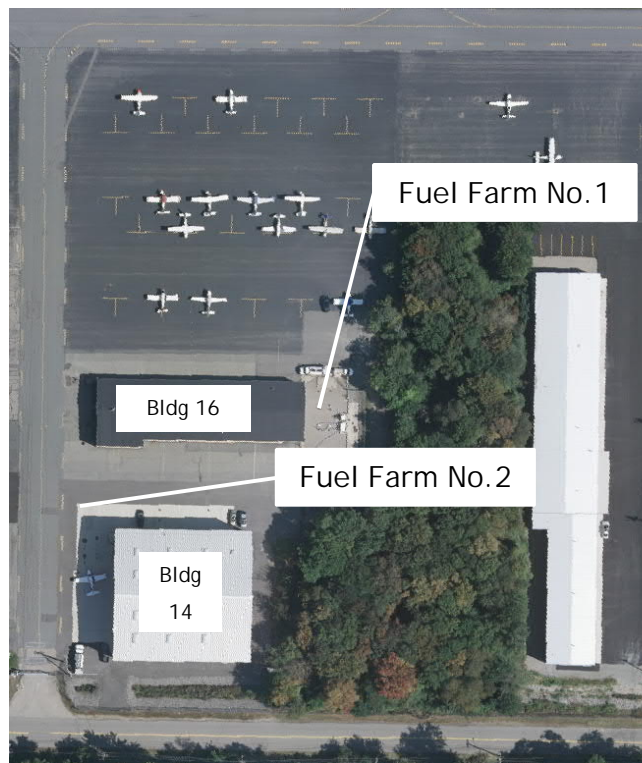
Currently, the flight school can trailer their helicopters to the parking spaces, but this requires tractors and dollies on the ramp area for a substantial period of time while this occurs. It would therefore be beneficial for helicopter operations to be located at a distance from parked aircraft so rotor downwash does not affect the parked aircraft.

It was forecasted in the 2007 Master Plan that helicopter operations are expected to increase to 2,791 operations by 2025. This equates to approximately 8 operations per day however it is not unusual to have almost 30 helicopter operations in a peak day, especially with the helicopter training school operations. Alternatives that would provide added rotorcraft aircraft parking apron space are discussed in Section 4 - Alternatives.

Airport Fuel Farm

The airport currently has two fuel farms. Fuel farm No. 1 is owned by Flight Level and is installed adjacent to Building 16. Fuel farm No. 1 consists of four (4) 12,000 gallon below ground tanks; two (2) 12,000 gallon JetA tanks and two (2) 12,000 gallon 100LL tanks. This system was installed in 1982 and this FBO is considering the replacement of the fuel farm in the next 5-10 years. When replaced the fuel farm design should consider two items. One, replacement tanks should be above ground. Two, the fuel farm should provide access for refueling trucks. Fuel Farm No. 2 is owned by Boston Executive Helicopter and is installed adjacent to Building 14. Fuel farm No. 2 consists of a 30,000-gallon fuel facility.

Figure 3-9: Existing Fuel Farm Locations



Airport management and the Airport Commission announced their desire to have self-serve 100LL made available to the flying public. With the replacement of the aging, below ground storage tanks, the airport commission has discussed the benefits of having a self-serve fueling system.

Major Mark C. Welch Administration Building (Snow Removal Equipment Building)

The 2007 Master Plan Update conducted a detailed inventory of the Airport's snow removal and airfield maintenance equipment as well as Snow Removal Equipment Building (SRE) needs. It was determined that in accordance with Advisory Circular 150/5200-30D there was a need for new Snow Removal Equipment Building (SRE).

The airport was in need of additional administration and security facilities, a public meeting space and a terminal for General Aviation passengers and pilots. Most general aviation airports in Massachusetts have an administration building and terminal, which houses the airport manager's office, a public terminal area, and a public meeting room that is available for airport groups and community meetings. This building has since been built and resides adjacent to the ATC Tower and south of the FBO along the south west edge of the southern GA Ramp. This facility is multi-use, multi-level building and this building is depicted in Figure 3-10.

Figure 3-10: Major Mark C. Welch Administration Building, 2018



Level one is on the same elevation as the GA Ramp. This level includes a 4,000 SF, 4-bay heated airport equipment facility with 2,000 SF of additional support facilities. Support facilities include a paint booth, part supply room, welding shop, flammable material storage area, airport mechanics office, unisex locker rooms and restrooms as well as a mechanical room. Airport snow and vegetation control equipment will be stored in this facility.

Level two includes 2,000 SF of Administrative facilities. Included on level two are facilities that include airport manager office, airport commission office, security office, airport records room and library, public space with conference and training room and public lobby/display area. The 2007 Master Plan Update identified the need for approximately 1,000 SF to house Airport administration, security facilities, a public meeting space, and a terminal for GA passengers and pilots. This facility has been constructed and the interior will be completed in 2019 allowing airport management and the Norwood Airport Commission to reside in this new building.

Aircraft Wash Area

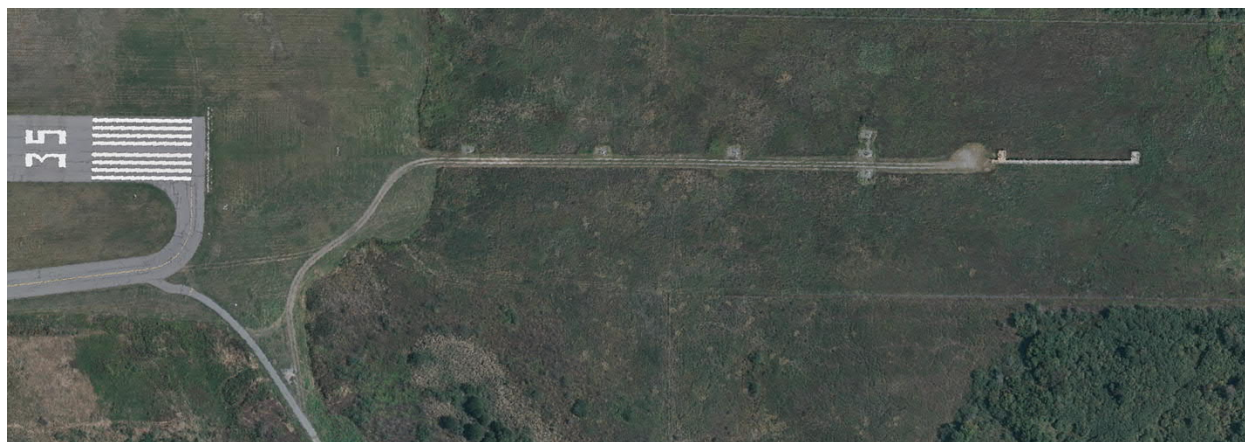
The FAA considers the washing, waxing and polishing as preventative maintenance listed with 14 CFR Part 43. Preventative maintenance for Part 135 operators, is held to a much higher standard. Annual aircraft exterior cleaning is a requirement of Part 135 operators and is a potential revenue source for FBO's and their maintenance facility. An FBO can network with Part 135 Operators such as NetJets, FlexJet, CitationAir, Flight Options, etc., and becoming listed as an FAA approved aircraft exterior cleaning station.

Norwood does not currently have a location identified on the airport to conduct aircraft wet wash exterior cleaning. It is recommended that the airport consider the installation of an aircraft wash area and alternatives that would provide apron space are discussed in Section 4 - Alternatives.

MALSF Access Road

Norwood's Medium Intensity Approach Lighting System (MALSF) provides pilots with a basic means to transition from instrument flight to visual flight for landing. The airport's operational requirements dictate the sophistication and configuration of the approach light system for Runway 35. The MALSF is installed in airport runway approach zone along the extended centerline of the runway and consists of a combination of threshold lamps, steady burning light bars and flashers. This provides visual information to pilots for Runway 35 alignment, height perception, roll guidance, and horizontal references for its Category I approach.

Figure 3-11: MALSF System Location



Norwood's MALSF installation includes seven (7) light bars, each light bar with five (5) lights spaced 10' apart. Each light bar is separated 200' apart over a distance of 1,700' from the

runway threshold. At the 1,000' point there are three light bars (15 lamps) for added visual reference for the pilot on final approach. Sequenced flashing lights provide added visual guidance down the runway centerline path.

The MALSF is owned and maintained by the FAA and accessed via an 1,150' dirt access road. The majority of the MALSF access road was constructed within wetlands. During the Spring thaw or following heavy rain events, this access road is submerged in water leaving the MALSF inaccessible. As water subsides, the integrity of the road is found to be compromised, requiring costly repairs. These repairs are an FAA expense and creates a financial burden.

The airport should consider a mid-term solution to the MALSF access road.

Airport Security & Wildlife Fencing

Security at general aviation airports consists primarily of perimeter fencing with card access gates. The Airport currently meets both the Transportation Security Administration (TSA) and Mass DOT Aeronautics security recommendations for general aviation airports. The perimeter of the Airport is fenced but some sections along the east side are old and require replacement. There are three vehicular and one pedestrian card access gates that provide vehicular access to the hangars and T-hangars from the west side along Access Road. A majority of the fence along the east side of the Airport is 10-foot high wildlife fence, installed in 2001 and has failed numerous times due to the high water table and wetlands. The airport is surrounded by and abuts a protected wildlife habitat (Ponkapoag ACEC). 95% of the perimeter of the airport is in wetlands. Wildlife is able to access the airfield and are often trapped within the fence line. Airport operations and maintenance staff are currently minimizing wildlife risk through wildlife harassment and depredation practices however the risk of a wildlife incident can be further reduced. These issues have been clearly documented in a recent wildlife hazard assessment and the recommendation from the study is that all airport perimeter fencing should be replaced as soon as possible.

Land Acquisition

The Airport has limited upland for development. Much of the undeveloped Airport property is wetland. These wetlands are located to the north, east and south of the airfield, and include rare species habitat.

The Airport has a need for additional developable upland based on the following key demands:

- There is an existing unmet demand for hangars.
- There is a need for auto parking.
- There is a need to protect the RPZ for RW 17 and RW 10.

As discussed in the 2007 MPU, several options were identified and include the buy-out of the Boston Metropolitan Airport (BMA) lease, purchase of the golf course in the RW 17 RPZ, and purchase of parcels in the RW 10 RPZ. These opportunities still exist and are discussed in Section 4 - Alternatives.

Automobile Parking

The Airport has a paved parking lot for automobiles on the landside of the Airport that is shared with several other adjacent businesses. Figure 3-12: Existing Landside Parking, illustrates the parking lot. The Airport owns a majority of the auto parking lot, except for the portion on the south side near the air traffic control tower. The lot can accommodate approximately 100 automobile spaces. There are weekends with high demand and during these times, the parking lot is not adequate to meet demands and current policy regarding auto parking. The pavement is in good condition as it was recently reconstructed.

Figure 3-12: Existing Landside Parking

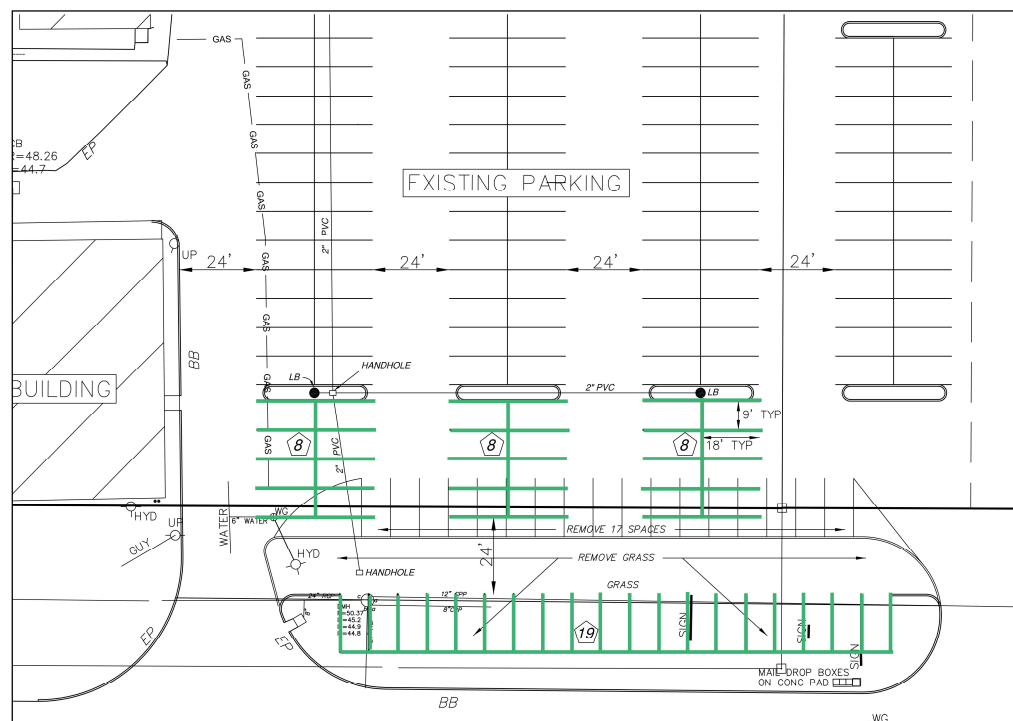


It is not clear how State security directives are expected to impact parking by tenants and FBO. These directives may require additional landside auto parking. Aircraft owners are currently allowed to park their automobiles on the airside of the Airport, within specific locations on the ramp. However, the new state security directives will limit access to, and automobile parking on the secure side of the airport fence. If new State directives require all automobiles (including FBOs) to be located outside the fence, the FBOs on the north side of the airfield would be impacted as well as the based aircraft owners. This will put additional demands on the existing parking lot. Based on discussions with airport management, about 30% of the based aircraft operate during the week, while at least 50% of the aircraft operate on the weekends. Automobile demand would be 100 vehicles based on weekend use. Since visitors and others are also expected to use the lot, a larger lot or a second lot on the north side of the airfield may be required. For consideration, the Town of Norwood's Engineering

Department recently drafted, for planning purposes, a proposed parking expansion document for the Norwood Memorial Airport.

As previously mentioned, the existing parking lot was recently repaved, however, additional areas for up to 26 vehicle parking spaces should be explored for the long term with alternatives discussed in Section 4 - Landside Alternatives (see Figure below).

Figure 3-13: Proposed Airport Parking Expansion Plan



C. Summary of Facility Needs

The Facility Needs Analysis presented in this section outlines the existing and future needs of the Airport. They include individual improvements needed to address the Airport's primary runway length, the primary surface area, Taxiway C alignment, the Taxiways 1, 2, and 3, aircraft tie-downs, hangar development, helipads - south, aircraft wash area, land acquisition, and automobile parking.

Runway Operational Length Needs - A 5,001-foot runway would be an optimum length for the Airport's fleet however, given the time it may take to acquire property and the associated environmental impacts, the airport should consider short term, incremental alternatives which will be evaluated.

Primary Surface Area - In 2019, RNAV GPS with Vertical guidance approaches are preferred over the installation of ground based instrumentation such as a glide slope needed for an ILS. The primary surface area for the ILS, a precision approach, is 1,000' in width, while the primary surface area for the RNAV GPS, a non-precision approach, is 500' in width. It is recommended that the airport right size the protected primary surface area for Runway 17-35 to 500 feet for both the current and future conditions.

Taxiways and Taxilanes - Norwood's design critical aircraft is the Cessna Citation Composite. The Cessna Citation III/IV is a Design Group II aircraft, therefore the goal of the airport is to have its taxiways and taxilanes meet a Design Group II standard. Taxilanes 1, 2 and 3 currently can only be safely utilized by DG I aircraft. Taxiway C has non-standard geometry issues and alternatives will be evaluated.

Hangars - With the existing airport having limited upland development space, accommodating the 2020 demand will be difficult. The Airport is severely land constrained by wetlands that are located to the north, east, and south of the Airport. Accommodation of future hangar, tie-down, and airport support facilities will be a challenge, especially as many of the Airport's current facilities are built to older FAA airport design standards. This has affected the Airport in a number of ways including the loss of tie-downs as old aprons and taxilanes are reconstructed to newer standards, which will require more hangar space and alternatives will be evaluated.

Helicopter operations at the airport are strong and with nine (9) helipads the need to be efficient is important. The helipads on the south end were installed in this location to enable a safe and orderly flow of landing and departing helicopters, however, the difficulty the airport is finding is the ability to stage and recover helicopters from these pads. Alternatives, to include improved lighting for these helipads, should be evaluated.

Norwood's ability to generate revenue is not only important for the airports goal of sustainability but also for the current and future businesses operating on the airport. The creation of a designated aircraft wash area will enable the airport and businesses to generate revenue that was not available in the past.

The auto parking lot pavement is in good condition and was recently repaved however the airport has experienced times when the number of parking spaces is inadequate.

Table 3-1 - Summary of Recommended Facility Needs summarizes the facility needs identified at the Airport and the recommended planning period for Design and Permitting tasks.

Table 3-1 - Summary of Recommended Facility Needs

Facility	Short Term	Mid Term	Long Term
Runway extension via paved safety areas	◆		
Primary Surface Area right sizing	◆		
Runway extension to 5,001'			◆
Taxiway C Realignment		◆	
Taxilane System Reconfiguration	◆		
Deice Capability	◆		
Hangar Development		◆	
Helicopter Pads (South)	◆		
Fuel Farm Replacement		◆	
Aircraft Wash Area	◆		
MALSF Access Road		◆	
Airport Security & Wildlife Fence	◆		
Land Acquisition		◆	
Automobile Parking	◆		

Section 4.0 Alternatives

A. Introduction

This section uses conclusions and findings of previous sections of the Master Planning process for Norwood to identify and evaluate various alternatives for both the airside and landside components of the airport. The underlying objective is to meet the identified needs for both capacity and safety requirements for the entire airfield operation and infrastructure. The key elements of this process are the identification of ways to address previously identified facility requirements; an evaluation of the alternatives such that stakeholders gain a thorough understanding of the strengths, weaknesses, and other implications of each; and selection of the preferred alternative.

B. Assumptions

It is important to address several key assumptions and project needs that were developed in earlier parts of this study before any alternatives can be analyzed. These assumptions are part of the foundation upon which the alternatives are built. Without a broad understanding and acceptance of these “building blocks,” subsequent discussion of airport alternatives is unlikely.

- The airport will remain a general aviation airport during the entire 20 year planning period.
- The existing types of aircraft using the airport and the existing mix of operations are not expected to change significantly throughout the planning period.
- Available runway length does not meet the needs of the current fleet and existing critical aircraft.
- The current B-II ARC will remain the same during the planning period.
- There is limited room for airside hangar and apron development to meet existing and future demand during the 20 year planning period.

C. Facility Requirements

Only those facilities identified as requiring capacity and/or safety improvements are evaluated in this section. The evaluation includes development of alternatives as well as review of facility requirements, environmental impacts, FAA standards, development costs, development flexibility, and best planning tenets based on FAA airport planning and design

guidelines. The proposed requirements are summarized below and addressed in detail in subsequent paragraphs.

Airside

- Extend Runway 17/35
- Paved 300' safety areas.
- Realign Taxiway C.
- Reconfigure Taxi-lanes for Design Group II aircraft.
- Add Deice capability.
- Expand aircraft hangar availability on West Apron.
- Evaluate the option for more hangars adjacent to the southernmost helipads.
- Construct Wet wash area on DC-3 Apron.

Landside

- Land Acquisition
- Increase automobile parking.

D. Airside Alternatives

Runway 17/35 Alternatives

As was noted in Chapter 3 - Facility Requirements, the current length of Runway 17/35 is acceptable for single-engine aircraft operations and a limited number of turboprop and corporate jet aircraft.

The runway operational length needs at Norwood were evaluated previously in the 2007 master plan and is validated in this 2019 technical master plan update. The validation process is outlined in Section 3.0; Facility Needs and Advisory Circular 150/5325-4B was utilized in this process. The aircraft that currently operate at the Airport are appreciably the same and the critical design aircraft at Norwood remains as the Cessna Citation Composite. The following alternatives have been considered:

Runway 17/35 Alternative A - (No build)

(See Figure 4-1)

The No-Build Alternative makes no changes to the existing runway 17/35 at Norwood Memorial Airport. As such, Runway 17/35 remains at 4,008 feet in length, 100 feet in width and maintains an ARC of B-II. This alternative has been deemed as undesirable from an operational safety standpoint because of limitations on current design critical aircraft and the airport's increasing role as an economic engine in the southwest metropolitan area.

Runway 17/35 Alternative A was evaluated against the five evaluation criteria; the results are summarized below:

Facility Requirements - Previous chapters of this report have identified the limitations on airport operations due to insufficient runway length. This alternative does not allow corporate aircraft to operate at full takeoff weights and, therefore, does not meet the existing and future regional demand for corporate aviation access to the southwest Boston metropolitan area. This evaluation criterion was given a value of No as it does not meet facility requirements.

Environmental Impact - This alternative does not require additional construction to extend the runway, therefore there would be no environmental impacts. Selection of this alternative could result in negative social impacts, however, as businesses could choose to utilize other airports as a result of the deficient runway length. This evaluation factor was given a value of None as the alternative has no environmental impacts.

FAA Standards - Norwood Memorial Airport has an FAA Airport Reference Code (ARC) of B-II. This includes small aircraft and light jets with approach speeds of less than 121 knots and wingspans less than 79 feet. Based upon previous forecasts and current trends, under Alternative A, the current ARC would be retained. This will accommodate the current corporate aircraft fleet that is expected to use the facility. This evaluation criterion was given a value of No as the current runway length does not support the design aircraft (Cessna Citation Composite) as noted earlier.

Development Costs - There are no design or construction costs associated with Runway 17/35 Alternative A.

Development Flexibility -Under Section 3.0; Facility Needs, Advisory Circular 150/5325-4B was utilized in to validate the airport runway operational length needs. When operating from a runway where the required takeoff distance exceeds the runway length, the pilot is forced to reduce either the amount of fuel, the number of passengers, or the amount of cargo, in order to reduce the takeoff distance required given the takeoff weight. This evaluation criterion was given a value of Fair for development potential and Poor for operational efficiency.

Figure 4-1: No Build Alternative



Runway 17/35 Alternative B - (Extend Runway 17 North 993 feet) (previous Master Plan Preferred)

(See Figure 4-2)

To achieve the targeted length of 5,001 feet, Runway 17 would be extended by 993 feet. Alternative B impacts 10 acres of wetland. The wetlands off the north end of the runway may be considered to have slightly lower function and value compared to the wetlands off the south end (35), because this area is farther away from the Neponset River, and is surrounded by development and a golf course. However, the wetlands adjacent to the north end of the runway have been identified as spotted turtle nesting habitat. Although the spotted turtle was removed from the State's List of Endangered, Threatened and Special Concern Species, it would be of concern to the environmental agencies. Future consultations with Natural Heritage and Endangered Species Program (NHESP) should be carried out to determine a habitat review process under the Massachusetts Endangered Species Act (MESA). To compensate for any wetlands fill, the Department of Environmental Protection (DEP) would require 2:1 replication under the variance process for the Wetlands Protection Act. Opportunities for wetlands enhancement elsewhere in the watershed may be an option under these procedures.

The golf course to the north of the runway lies within the RPZ and would need to be acquired in order to facilitate this alternative. Use of part of the golf course would be required for the RSA under this alternative. Use of the uplands in the golf course for the RSA would help avoid wetlands impacts at the southerly end in other alternatives and offer a potential location for wetland creation opportunities. Shifting the runway north, closer to the commercial uses along Route 1 and further from the residential development southwest of the Runway 35 end, would move air traffic away from noise-sensitive neighborhoods to the south. The potential costs of acquisition, however, make this alternative less desirable from a financial standpoint.

Lastly, Section 1; Land Use & Natural Constraints provided a discussion about the 125' flagpole at a local business northwest of the airport. With a runway extension to the north, this flagpole will require mitigation.

Runway 17/35 Alternative B was evaluated against the five evaluation criteria; the results are summarized below:

Facility Requirements -This alternative allows corporate aircraft to operate at full takeoff weights, which meets the existing and future regional demand for corporate aviation access to the southwest Boston metropolitan area. This evaluation criterion was given a value of Yes as it meets facility requirements.

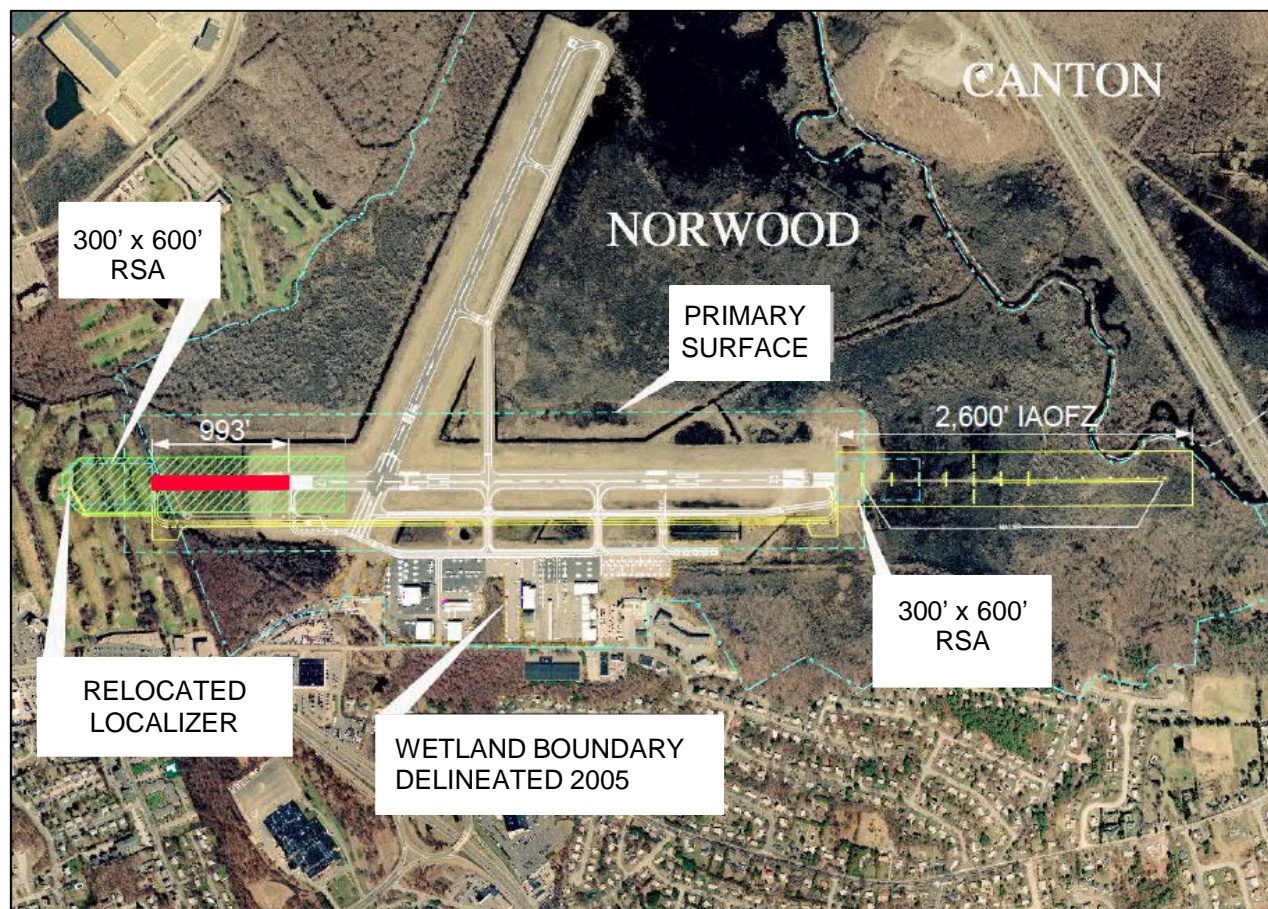
Environmental Impact - This alternative would impact 10 acres of wetlands. The presence of a rare or endangered species would require habitat review and consultation with State environmental agencies. Wetland fill would require compensation at 2:1 replication under the variance process for the Wetlands Protection Act. This evaluation factor was given a value of Major as the impacted area is a large area.

FAA Standards - Norwood Memorial Airport has an FAA Airport Reference Code (ARC) of B-II. This includes small aircraft and light jets with approach speeds of less than 121 knots and wingspans less than 79 feet. Based upon previous forecasts and current trends, under Alternative A, the current ARC would be retained. This will accommodate the current corporate aircraft fleet that is expected to use the facility. This evaluation criterion was given a value of Yes as it meets FAA standards.

Development Costs - While engineering and design costs may not be unusual for a runway extension, the potential for extended permitting and environmental analysis is likely to extend the time to implement. Further, the appraised land value of the Golf Course, as estimated in 2007, to be greater than \$5,000,000, making acquisition of the property challenging from a financial perspective. This evaluation criterion has been given a value of Most Costly.

Development Flexibility - Many of the corporate aircraft that operate at the Airport do so at reduced takeoff weights. Under Section 3.0; Facility Needs, Advisory Circular 150/5325-4B was utilized in to validate the airport runway operational length needs. When operating from a runway where the required takeoff distance exceeds the runway length, the pilot is forced to reduce either the amount of fuel, the number of passengers, or the amount of cargo, in order to reduce the takeoff distance required given the takeoff weight. This evaluation criterion was given a value of Excellent for development potential and Excellent for operational efficiency.

Figure 4-2: 17/35 Alternative B - (Extend Runway 17 North 993 feet)



Runway 17/35 Alternative C - Extend Runway 17/35 600 Feet by Paving Safety Areas (preferred short-term solution)

(See Figure 4-3)

The Runway Safety Areas on Runway 17/35 are currently unpaved. By paving these areas, the total length of the paved Runway area would be extended by 600 feet. While this solution would not bring Runway 17/35 to 5001 feet, it would increase the useable runway through declared distances of TODA; 4600 feet and LDA 4300 feet. This is an improvement over the no-build alternative, with minimal costs and minor environmental impacts. Alternative C would eliminate some of the issues associated with the shorter runway length, enable the Airport to sell more fuel, and would allow a higher percentage of B-II design aircraft to utilize the airport during hot days. Alternative C has been identified as the preferred short-term alternative due to its minor environmental impacts, less costly development cost and immediate operational benefits.

Figure 4-3: 17/35 Alternative C - Paved Safety Areas



Runway 17/35 Alternative C was evaluated against the five evaluation criteria; the results are summarized below:

Facility Requirements - This alternative allows corporate aircraft to operate at heavier takeoff weights, which improves goals to meet existing and future regional demand for corporate aviation access to the southwest Boston metropolitan area. This evaluation criterion was given a value of Partial as it does not entirely meet, but improves facility requirements.

Environmental Impact - This alternative requires minimal construction to pave the RSA, therefore there would be minor environmental impacts. The MALSF tower access road may require realignment. This evaluation factor was given a value of Minor as the alternative has minor environmental impacts. Impacts to vegetated wetlands are not anticipated. Based on recently completed projects, it is expected that any required floodplain mitigation or wetland mitigation can be accommodated on site.

FAA Standards - Norwood Memorial Airport has an FAA Airport Reference Code (ARC) of B-II. This includes small aircraft and light jets with approach speeds of less than 121 knots and wingspans less than 79 feet. Based upon previous forecasts and current trends the current ARC would be retained. Alternative C will accommodate a higher percentage of current corporate aircraft fleet over the no build alternative. This evaluation criterion was given a value of Yes as this short term preferred alternative progresses the airport toward the goal for reaching a runway length of 5001 feet to support the design aircraft (Cessna Citation Composite).

Development Costs - The cost of paving the RSA is minimal when compared to other alternatives. This evaluation criterion has been given a value of Less Costly.

Development Flexibility - While this alternative does not completely address runway length, it does increase TODA and LDA, which will have a clear operational benefit. This alternative does not limit Norwood to future runway extensions, instead it provides an improvement in current operations at a low cost. This evaluation criterion was given a value of Excellent for development potential and Good for operational efficiency.

Table 4-1: Runway Extension Alternatives Considered - Summary

Alternative	Meets Facility Requirements	Environmental Impact	Meets FAA Standards	Development Cost	Flexibility
RWY 17/35 Alt A (No Build)	No	None	No	None	Development = Fair Operational = Poor
RWY 17/35 Alt B (Extend by 993' Northerly)	Yes	Major	Yes	Most Costly	Development = Excellent Operational = Excellent
RWY 17/36 Alt C (pave 300' of Northerly and Southerly safety areas) - Preferred	Partial	Minor	Yes	Less Costly	Development = Excellent Operational = Good

Alternatives for Taxiway C

As described in Chapter 3 - Facility Requirements, the geometry of Taxiway C is non-standard and creates an unsafe situation in which aircraft leaving the apron have direct access to the intersection of Runway 17/35.

Taxiway C Alternative A (No Action)

The non-standard geometry issue with Taxiway C would not be corrected.

Facility Requirements - While Norwood has operated without significant issues due to the configuration of Taxiway C, the current alignment of Taxiway C puts the airport at risk for

potential incursions on Runway 17/35. Because it is always a goal to improve operational safety, this evaluation criterion was given a value of Partial.

Environmental Impact - There are no environmental impacts from this alternative.

FAA Standards - FAA standards and recommendations indicate that taxiways should not lead directly from an apron to a runway without requiring a turn. This evaluation criterion was given a value of No.

Development Costs - There are no costs associated with this alternative.

Development Flexibility - While there are no penalties to maintaining a taxiway configuration that is inconsistent with FAA standards, any future investments in the taxiway that utilized Federal funding would require it to be made compliant. The current configuration increases the risk of incursions between taxiing aircraft and Runway 17/35. This evaluation criterion was given a value of Fair for development potential and Poor for operational efficiency.

Taxiway C Alternative B - Realign Taxiway C

(See Figure 4-4)

Reconfiguring Taxiway C to eliminate direct access to Runway 17/35 will lessen the potential risk for runway incursions and make the Norwood taxiway system consistent with FAA standards. This is the preferred alternative.

Facility Requirements - Improving operational safety is a priority for Norwood Memorial Airport. Additionally, by making the Taxiway system consistent with FAA guidelines, potential funding restrictions due to noncompliance would be eliminated. This evaluation criterion was given a value of Yes.

Environmental Impact - The impact to wetlands is expected to exceed 5,000 SF and therefore will require an EIR to be completed. The evaluation criterion was given a value of Major.

FAA Standards - Taxiway C Alternative B will meet FAA guidelines. This evaluation criterion was given a value of Yes.

Development Costs - Realignment of Taxiway C requires some site work and engineering, as such this evaluation criterion was given a value of Costly.

Development Flexibility - The proposed Alternative B provides an opportunity to utilize airside land for a small solar installation that will reduce the airport's overall energy costs. Additionally, decreasing the potential for runway incursions increases overall operational safety. The installation of a solar array will require a glare analysis and evaluation of the Runway Visual Zone (RVZ). This evaluation criterion was given a value of Excellent for development potential and Excellent for operational efficiency.

Taxiway C Alternative C -Taxiway C Stub Relocation

(See Figure 4-4)

Relocating Taxiway C stub to eliminate direct access to Runway 17/35 will lessen the potential risk for runway incursions and make the Norwood taxiway system consistent with FAA standards.

Facility Requirements - Making the Taxiway system consistent with FAA guidelines, potential funding restrictions due to noncompliance would be eliminated. This evaluation criterion was given a value of Yes.

Environmental Impact - The impact to wetlands is expected to exceed 5,000 SF and therefore will require an EIR to be completed. The evaluation criterion was given a value of Major.

FAA Standards - Taxiway C Alternative C will meet FAA guidelines. This evaluation criterion was given a value of Yes.

Development Costs - Realignment of Taxiway C requires some site work and engineering, as such this evaluation criterion was given a value of Costly.

Development Flexibility - The proposed Alternative C decreases the potential for runway incursions and therefore increases overall operational safety. However, this option does not provide development potential as noted in Alternative B above. This evaluation criterion was given a value of Fair for development potential and Good for operational efficiency.

Figure 4-4: Taxiway C Realignment Alternatives B and C

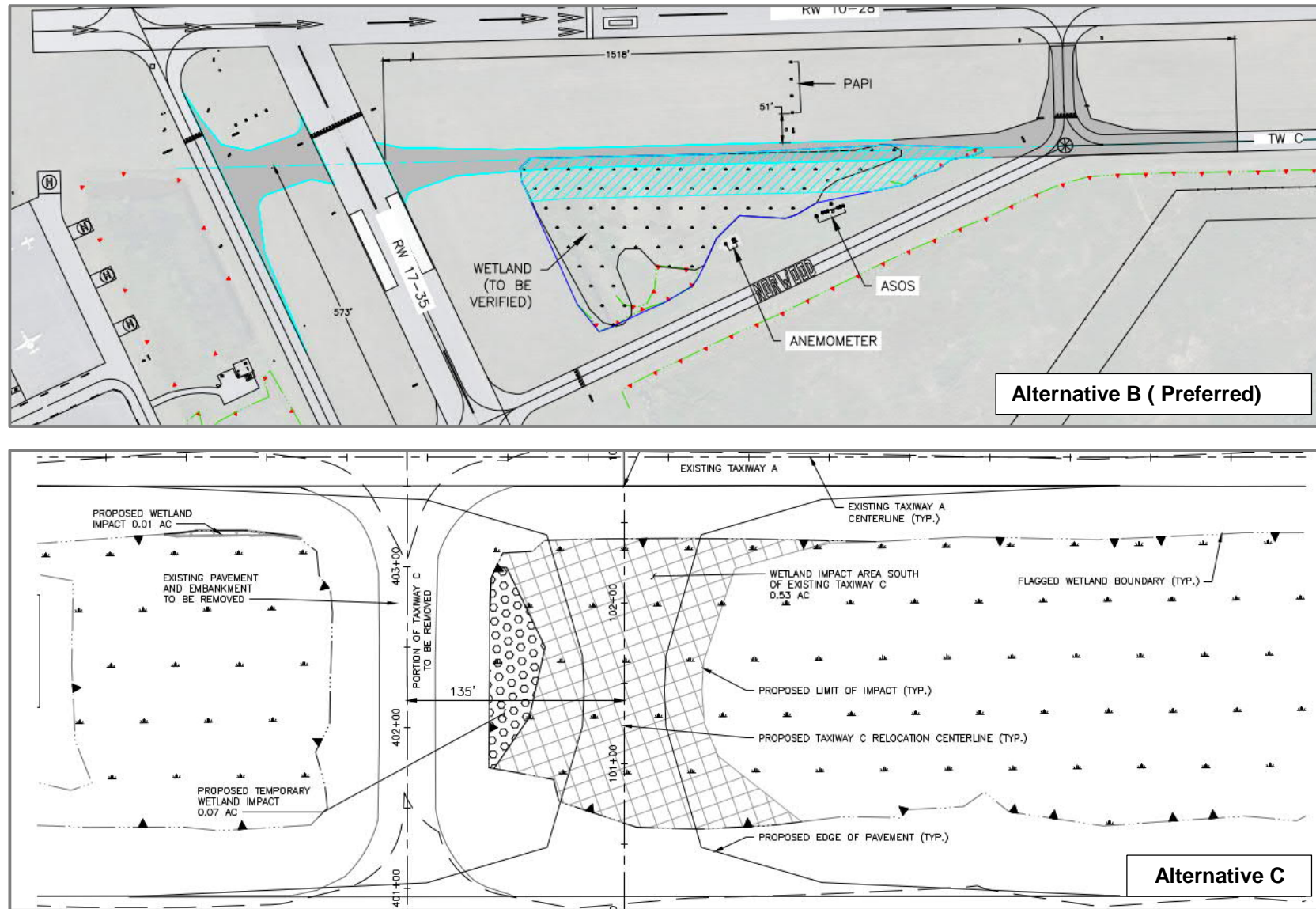


Table 4-2: Taxiway C Alternatives Considered - Summary

Alternative	Meets Facility Requirements	Environmental Impact	Meets FAA Standards	Development Cost	Flexibility
Taxiway C Alt A (No Action)	Partial	None	No	None	Development = Fair Operational = Poor
Taxiway C Alt B (Realignment) - Preferred	Yes	Major (More than 5,000 SF of wetland impact)	Yes	Costly	Development = Excellent Operational = Excellent
Taxiway C Alt C (Stub Relocation)	Yes	Major (More than 5,000 SF of wetland impact)	Yes	Costly	Development = Fair Operational = Good

Alternatives for Taxilane Reconfiguration

The critical design aircraft was previously determined to be the Cessna Citation Composite aircraft. The Cessna Citation fits into the Taxilane Design Group II category. AC 150/5300-13A provides the standards for Taxiway and Taxilane Design Group II dimensions. Chapter 3 - Facility Requirements outlines the need to meet ADG and TDG II and describes Norwood non-standard taxiways and taxilanes. As previously stated in Chapter 3 - Facility Requirements, in review with airport management, it was determined that the re-designation of the taxilanes to apron/ramp would not be a viable option as it would create an unsafe situation for taxiing aircraft as well as create a potential hardship for hangar owners and commercial operations along each taxilane as these areas could become blocked with parked aircraft or vehicles. It is the airport's desire to provide safe and equal access for all of its users in accordance with the FAA grant assurances as well as meet the airport taxilane design group standards.

Given the location of infrastructure in place today the airport, for the foreseeable future, will need to utilize taxilanes and the following alternatives were evaluated:

Taxilane Alternative 1 - No Build/Re-mark Centerlines

(See Figure 4-5)

Taxilanes 1, 2 and 3 meets design standard for Taxilane Design Group (TDG) 1B. Remark taxilane 1 & 2 centerlines. Remove 6 tie-downs. This alternative is insufficient to meet the airport design standard for ADG II.

Facility Requirements - While TDG 1B for Taxilanes 1, 2 and 3 is functional for some airport operations, it does not meet current FAA standards for TDG II for all taxilanes. This alternative will require the removal of 6 tie-downs. There is currently a surplus of tie-downs, hence the loss of these tie-downs will not have a significant impact. This evaluation criterion was given a value of No.

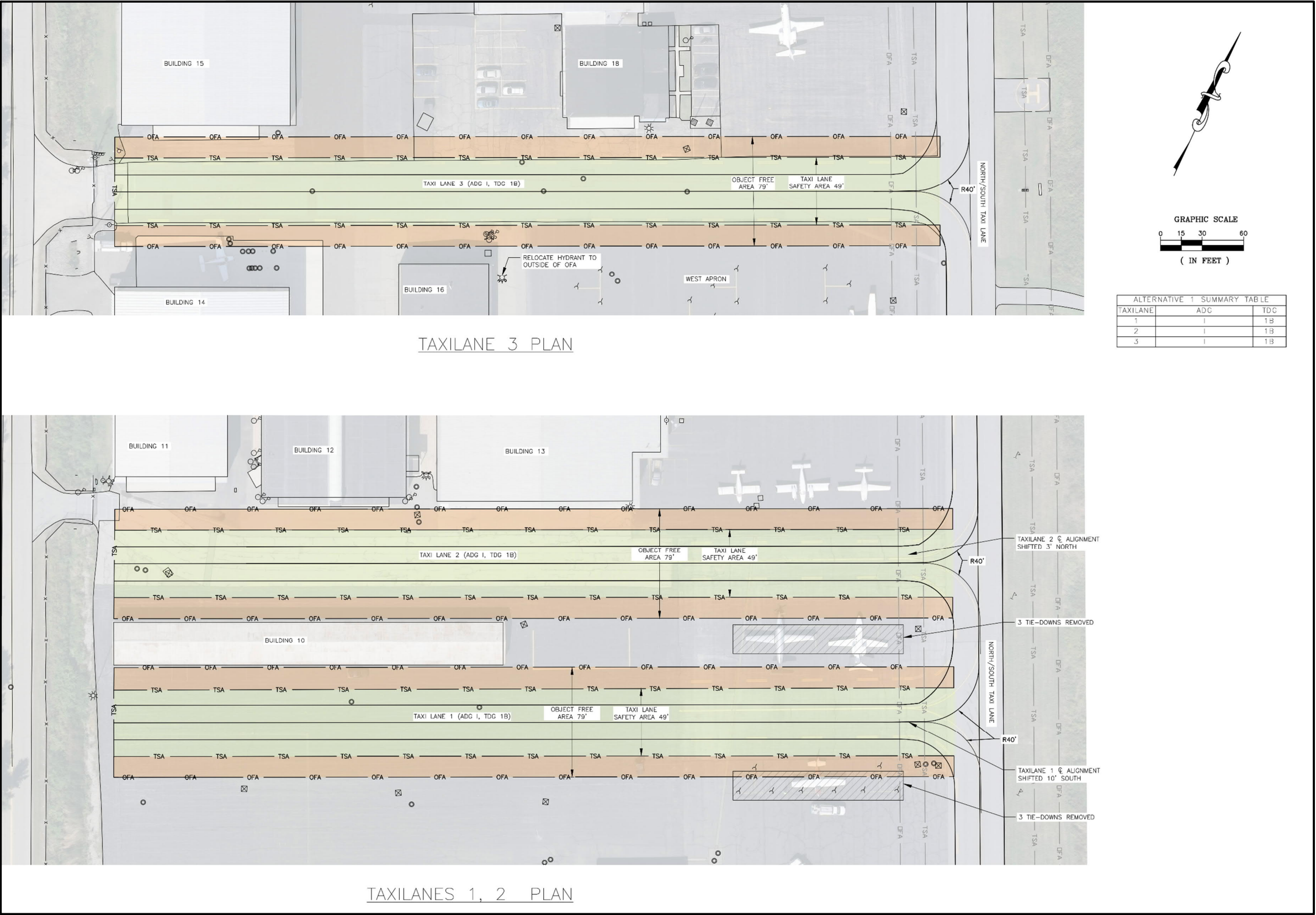
Environmental Impact - There are no environmental impacts from this alternative.

FAA Standards - FAA design standards indicate that the appropriate design group is TDG II. This evaluation criterion was given a value of No.

Development Costs - There are minimal construction costs associated with Taxilane Alternative 1. To meet TDG I standards, centerline markings for Taxilanes 1 & 2 will need to be shifted slightly and is depicted in Taxilane Alternative 1. As such this evaluation criterion was given a value of Less Costly.

Development Flexibility - This alternative creates challenges with meeting the objective of the airport to allow the object free movement of ADG II aircraft. This evaluation criterion was given a value of Poor for development potential and Poor for operational efficiency.

Figure 4-5: Taxilane Alternative 1



Taxilane Alternative 2 - Taxilane 1 - TDG II and Taxilanes 2 & 3 - TDG I

(See Figure 4-6)

Taxilane 1 meets design standard for Taxilane Design Group (TDG) II. Taxilanes 2 & 3 will remain as TDG 1B. Remark taxilane 1 & 2 centerlines. Remove 6 tie-downs. This alternative is insufficient to meet the airport design standard for ADG II.

Facility Requirements - Taxilane 1 will meet the design standard for Taxilane Design Group II. Taxilanes 2 & 3 will remain as TDG 1B. While TDG 1B is functional for some airport operations, it does not meet current FAA standards for TDG II for all taxilanes. This alternative will require the removal of 6 tie-downs. There is currently a surplus of tie-downs, hence the loss of these tie-downs will not pose a significant impact on the airport. This evaluation criterion was given a value of No.

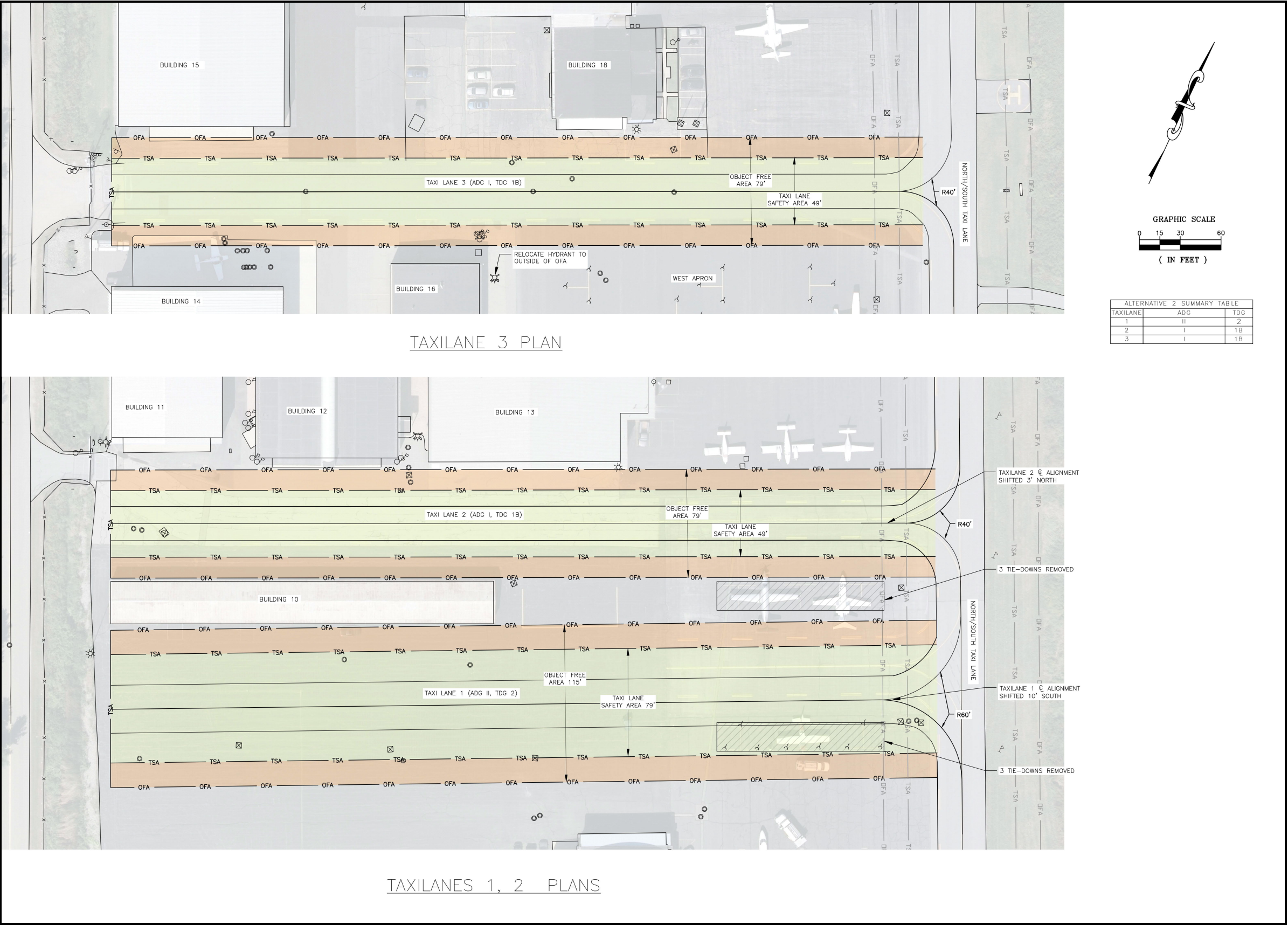
Environmental Impact - There are no environmental impacts from this alternative.

FAA Standards - FAA design standards indicate that the appropriate design group is TDG II. This evaluation criterion was given a value of No.

Development Costs - There are minimal construction costs associated with Taxilane Alternative 2. To meet TDG 1 standards, centerline markings for Taxilanes 1 & 2 will need to be shifted slightly and is depicted in Taxilane Alternative 2. This evaluation criterion was given a value of Less Costly.

Development Flexibility - This alternative creates challenges with meeting the objective of the airport to allow the object free movement of ADG II aircraft. Although Taxilane 1 will meet the design standard for TDG II, Taxilanes 2 & 3 will remain TDG I. This evaluation criterion was given a value of Fair for development potential and Fair for operational efficiency.

Figure 4-6: Taxilane Alternative 2



Taxilane Alternative 3 - Taxilane 1 - Eliminated, Taxilane 2 - TDG II, Taxilane 3 - Remain TDG I

(See Figure 4-7)

Taxilane 1 is eliminated and replaced with revenue generating centralized de-icing area. Building 10 T-Hanger on Lot 6 is removed. Taxilane 2 meets design standard for Taxilane Design Group (TDG) II. Remark Taxilane 2. 3 tie-downs are removed. Taxilane 3 will remain as TDG 1B. This alternative is insufficient to meet the airport design standard for ADG II.

Facility Requirements - The removal of the Building 10 T-hanger will improve access to hangars for ADG II aircraft on the north side of Lot 6. Currently ADG II aircraft cannot safely access hangars. Taxilane 2 will meet the design standard for Taxilane Design Group II. Taxilane 3 will remain as TDG 1B. While TDG 1B is functional for some airport operations, it does not meet current FAA standards for TDG II for all taxilanes. This alternative will require the removal of 3 tie-downs. There is currently a surplus of tie-downs, hence the loss of these tie-downs will not pose a significant impact on the airport. In addition, the elimination of Taxilane 1 will provide adequate space for a centralized, revenue generating de-icing area. This evaluation criterion was given a value of No.

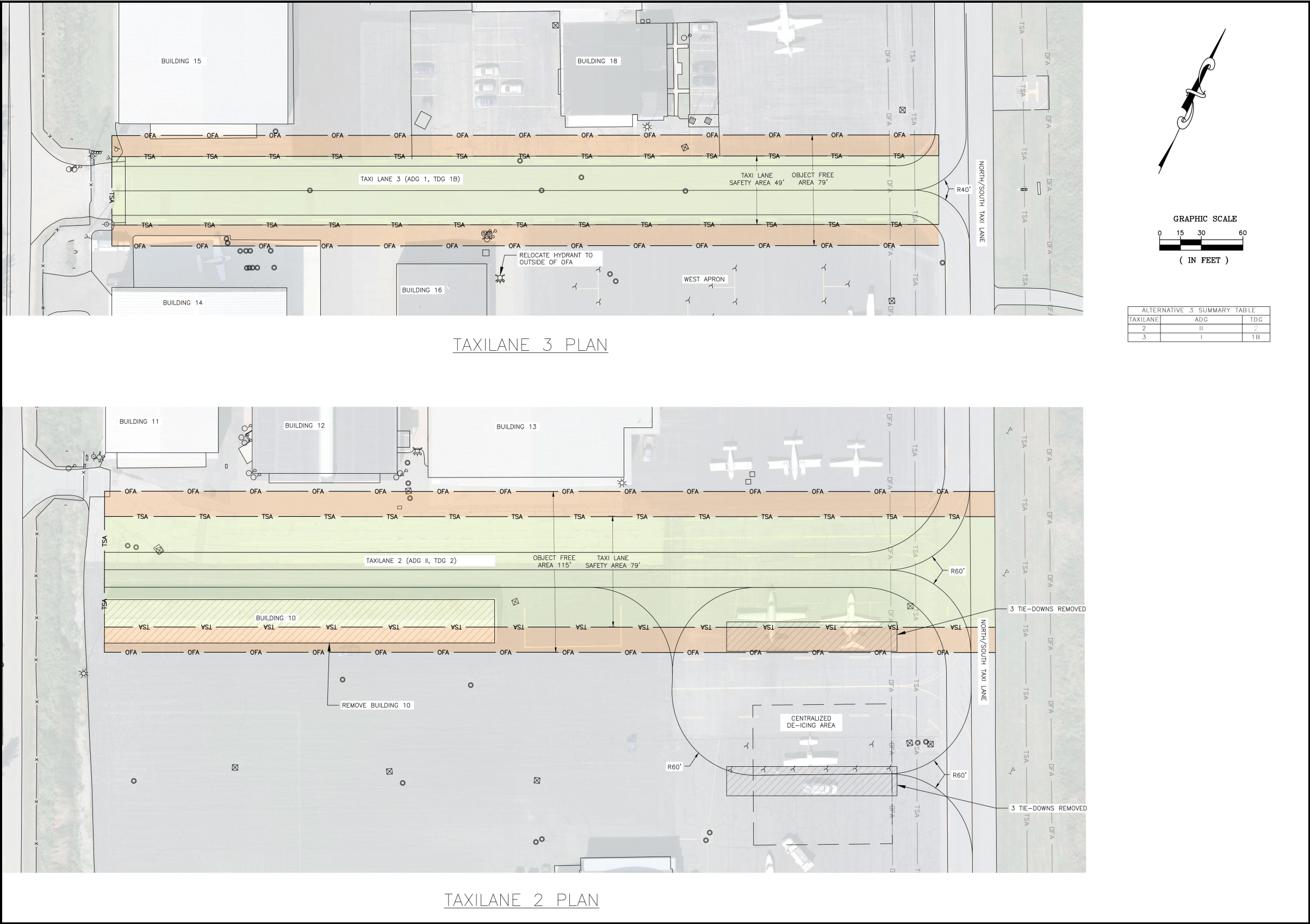
Environmental Impact - There are no environmental impacts from this alternative.

FAA Standards - FAA design standards indicate that the appropriate design group is TDG II. Although Taxilane 2 will meet design standard for TDG II, Taxilane 3 will not. This evaluation criterion was given a value of No.

Development Costs - There are limited costs associated with Alternative 3, as such this evaluation criterion was given a value of More Costly.

Development Flexibility - This alternative creates challenges with meeting the objective of the airport to allow the object free movement of ADG II aircraft. Although Taxilane 2 will meet the design standard for TDG II, Taxilane 3 will remain TDG I. The addition of a centralize de-icing area provides a service that is not currently available and adds to airport revenue. This evaluation criterion was given a value of Good for development potential and Good for operational efficiency.

Figure 4-7: Taxilane Alternative 3



Taxilane Alternative 4: Taxilane 1 - Eliminated, Taxilanes 2 & 3 - TDG II (Preferred Alternative)

(See Figure 4-8)

Taxilane 1 is eliminated and replaced with revenue generating centralized de-icing area. Building 10 T-Hangar on Lot 6 is removed. Taxilanes 2 & 3 meet design standard for Taxilane Design Group II. Remark Taxilanes 2 & 3. Nine (9) tie-downs removed. This alternative is sufficient to meet the airport design standard for ADG II.

Facility Requirements - The removal of the Building 10 T-hanger will improve access to hangars for ADG II aircraft on the north side of Lot 6. Currently ADG II aircraft cannot safely access hangars. Taxilanes 2 & 3 will meet the design standard for Taxilane Design Group II. This alternative will require the removal of nine (9) tie-downs. There is currently a surplus of tie-downs, hence the loss of these tie-downs will not pose a significant impact on the airport. In addition, the elimination of Taxilane 1 will provide adequate space for a centralized, revenue generating de-icing area. The centralized de-icing area is expected to assist aircraft operations during cold weather. This evaluation criterion was given a value of Yes.

Environmental Impact - There are no environmental impacts from this alternative.

FAA Standards - All taxilanes will meet FAA TDG II standards. This evaluation criterion was given a value of Yes.

Development Costs - Taxilane Alternative 4 requires the removal of a portion of building 16, which is due for renovation, as well as the relocation of a hydrant outside of the OFA in Taxilane 3. The T-hangar on lot 6 will be removed. This evaluation criterion was given a value of Most Costly.

Development Flexibility - By meeting the standards for TDG II, Norwood will be able to offer hangar space to ADG II aircraft in all landside locations. The centralized de-icing area provides a service that is not currently available and adds to airport revenue. This evaluation criterion was given a value of Excellent for development potential and Excellent for operational efficiency.

Figure 4-8: Taxilane Alternative 4 (Preferred)

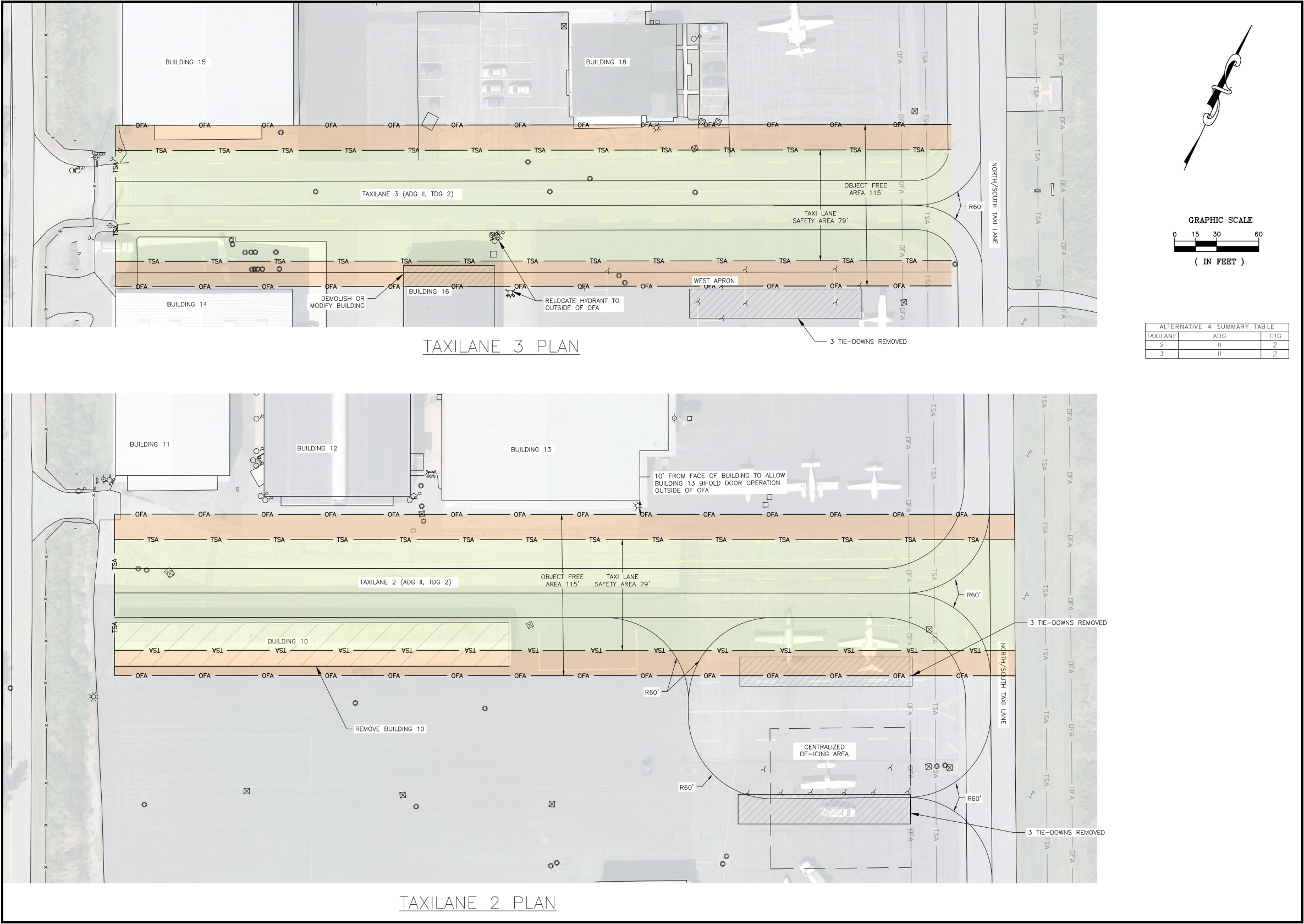


Table 4-3: Taxi Lane Reconfiguration Alternatives Considered - Summary

Alternative	Meets Facility Requirements	Environmental Impact	Meets FAA Standards	Development Cost	Flexibility
Taxi Lane Alt 1 (TL 1-3 TDG 1)	No	None	No	Less Costly	Development = Poor Operational = Poor
Taxi Lane Alt 2 (TL 1 - TDG II) (TL 2&3 - TDG I)	No	None	No	Less Costly	Development = Fair Operational = Fair
Taxi Lane Alt 3 (TL 1 - Eliminate) (TL 2 - TDG II) (TL 3 - TDG I)	No	None	No	More Costly	Development = Good Operational = Good
Taxi Lane Alt 4 Preferred (TL 1 - Eliminate) (TL 2 - TDG II) (TL 3 - TDG II)	Yes	None	Yes	Most Costly	Development = Excellent Operational = Excellent

West Apron Alternatives

It was previously discussed that Norwood's Primary Surface Area (PSA) is currently 1000 feet, in place to accommodate an ILS - Precision approach system. The 1000 feet PSA reduces usable portions of the apron system, specifically eliminating a number of former tie-down locations and restricting airport development, such as potential hangars on the West Apron. In this section a preferred alternative was deduced and it includes the reduction of the PSA from 1,000' wide to 500'. Section 3 Facility Requirements provides the need for additional hangar space for both ADG I & II aircraft. Following is the analysis of alternatives for the development of hangars on the West Apron:

West Apron Alternative A: Hangar Development - 1000' Primary Surface Area (See Figure 4-9)

Construct ADG I & II Hangars. Allow 25' mobile fueling setback. This alternative is not sufficient to meet the Airport's hangar needs.

Facility Requirements - There has been an identified need for additional hangar space at Norwood Memorial. Hangars generate more revenue for the airport than tie downs, which offsets the loss of tie downs on the West Apron. The 1,000ft PSA will limit the ability to construct the adequate number of hangars needed for the airport. The building height restrictions determined by the 7:1 required transitional slope make building development less practical. For example, buildings on the eastern side of the West Apron would be limited to 11 feet. This would limit development of only 3 - 60' x 70' ADG II hangars. This evaluation criterion was given a value of No.

Environmental Impact - There are no environmental impacts from this alternative.

FAA Standards - Any new buildings located on the West Apron will be limited in height. This evaluation criterion was given a value of Yes.

Development Costs - Development costs associated will be offset with the determination of a return on investment. This criterion was therefore not evaluated.

Development Flexibility -By leaving the PSA at 1000', there is limited flexibility for future expansion of hangar space. The added revenue from additional hangars would benefit Norwood's long range operation. This evaluation criterion was given a value of Poor for development potential and Poor for operational efficiency.

West Apron Alternative B: Hangar Development - 500' Primary Surface

(See Figure 4-10)

Construct ADG I & II Hangars. Allow 25' mobile fueling setback. This alternative is sufficient to meet the Airport's hangar needs. This is the preferred alternative.

Facility Requirements - The addition of a Group I & II box hangars would expand aircraft storage and operation significantly, which would add to revenue. This evaluation criterion was given a value of Yes.

Environmental Impact - There are no environmental impacts from this alternative.

FAA Standards - With a PSA of 500', the proposed buildings would meet height and setback FAA standards as they relate to the 7:1 transitional slope. This evaluation criterion was given a value of Yes.

Figure 4-9: West Apron Hangar Development Potential Alternative A

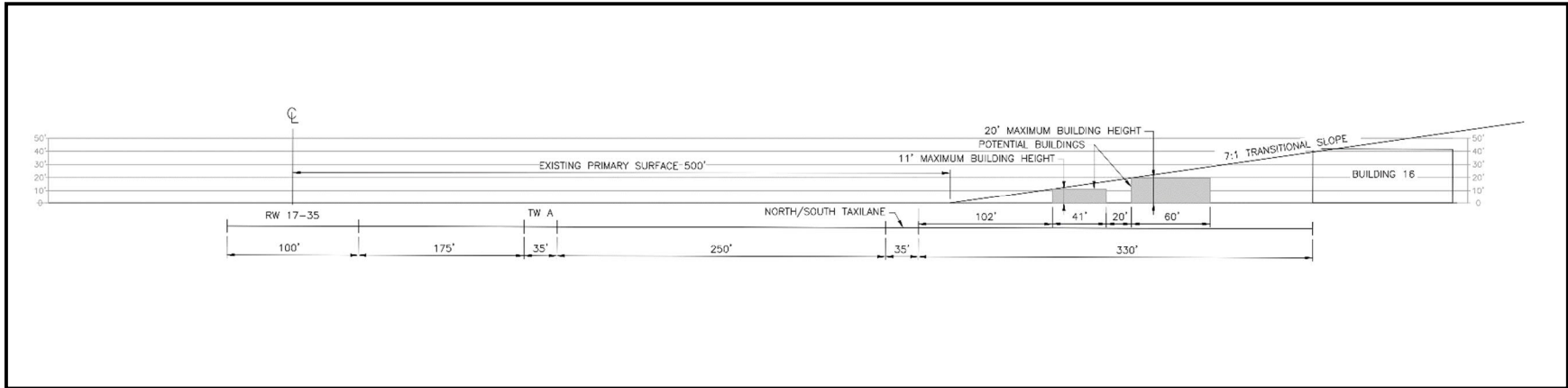
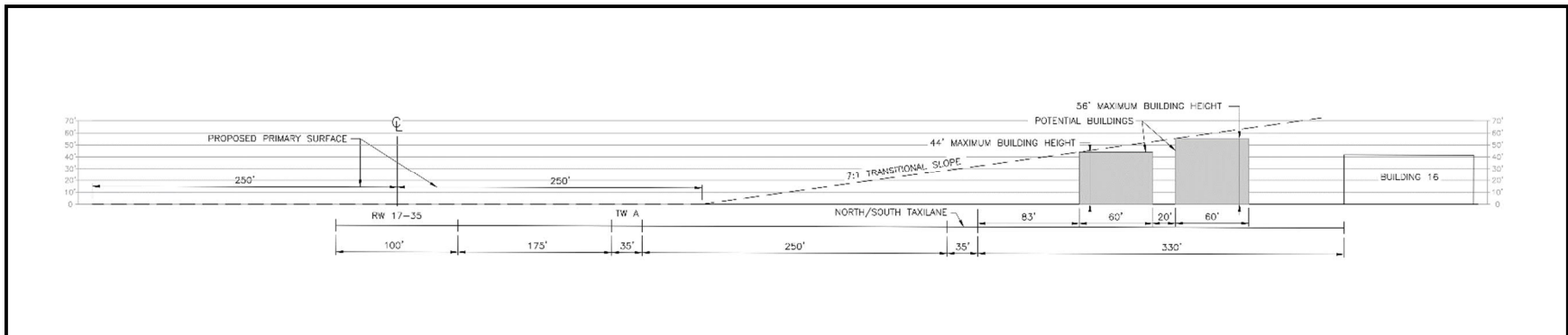


Figure 4-10: West Apron Hangar Development Potential Alternative B (Preferred)



Development Costs - Development costs would be limited to private investments and therefore have no cost associated. This criterion was therefore not evaluated.

Development Flexibility - The airport is afforded flexibility to develop much needed hangars and other facilities. The added revenue from additional hangars will benefit Norwood's long range operation. This evaluation criterion was given a value of Excellent for development potential and Excellent for operational efficiency.

Table 4-4: West Apron Alternatives Considered - Summary

Alternative	Meets Facility Requirements	Environmental Impact	Meets FAA Standards	Development Cost	Flexibility
W. Apron Alt A (Development with 1000' PSA)	No	None	Yes	-	Development = Poor Operational = Poor
W. Apron Alt B (Development with 500' PSA) - Preferred	Yes	None	Yes	-	Development = Excellent Operational = Excellent

DC-3 Apron Alternatives

The "DC-3" apron has been leased to a company called Papa Whisky1, LLC since 2013. The lease expired in March of 2018 and Airport Management has entered into a tenant at will lease until a decision is made on the best utilization for this approximately 20,000 SF apron space. Following is the analysis of alternatives for the DC-3 Apron:

DC-3 Apron Alternative A: No Action

The DC-3 apron is an underutilized section of Norwood's airside facility. Its location places it too close to the PSA to allow for construction of new buildings.

Facility Requirements - Leaving the DC-3 ramp as is does not serve existing or future needs of the Airport. This evaluation criterion was given a value of No.

Environmental Impact - There are no environmental impacts from this alternative.

FAA Standards - This area meets FAA design standards. This evaluation criterion was given a value of Yes.

Development Costs - There are no development costs associated with the no action alternative.

Development Flexibility - This area serves minimal benefit to the Airport as it is currently configured. This evaluation criterion was given a value of Fair for development potential and Fair for operational efficiency.

DC-3 Apron Alternative B: Aircraft Wet-Wash Area

(see Figure 4-11)

The preferred alternative proposes the development of an Aircraft Wet Wash area on the DC-3 Ramp. This amenity would provide a valuable service to aircraft and an additional revenue stream for the Airport.

Facility Requirements - This alternative provides a new service and additional revenue to the Airport. This evaluation criterion was given a value of Yes.

Environmental Impact - There will be minor environmental impacts associated with the installation of catch basins associated with the wet-wash for this alternative.

FAA Standards - This area meets FAA design standards. This evaluation criterion was given a value of Yes.

Development Costs - There are development costs associated with the wet-wash installation and therefore this alternative is evaluated as Costly.

Development Flexibility - By taking advantage of an underutilized space, Norwood is providing an amenity that will benefit existing users and may be attractive to additional airport users. Added revenue benefits the long-range operational stability of the airport. This evaluation criterion was given a value of Excellent for development potential and Excellent for operational efficiency.

Figure 4-11: DC-3 Alternative B - Wet Wash Area (Preferred)

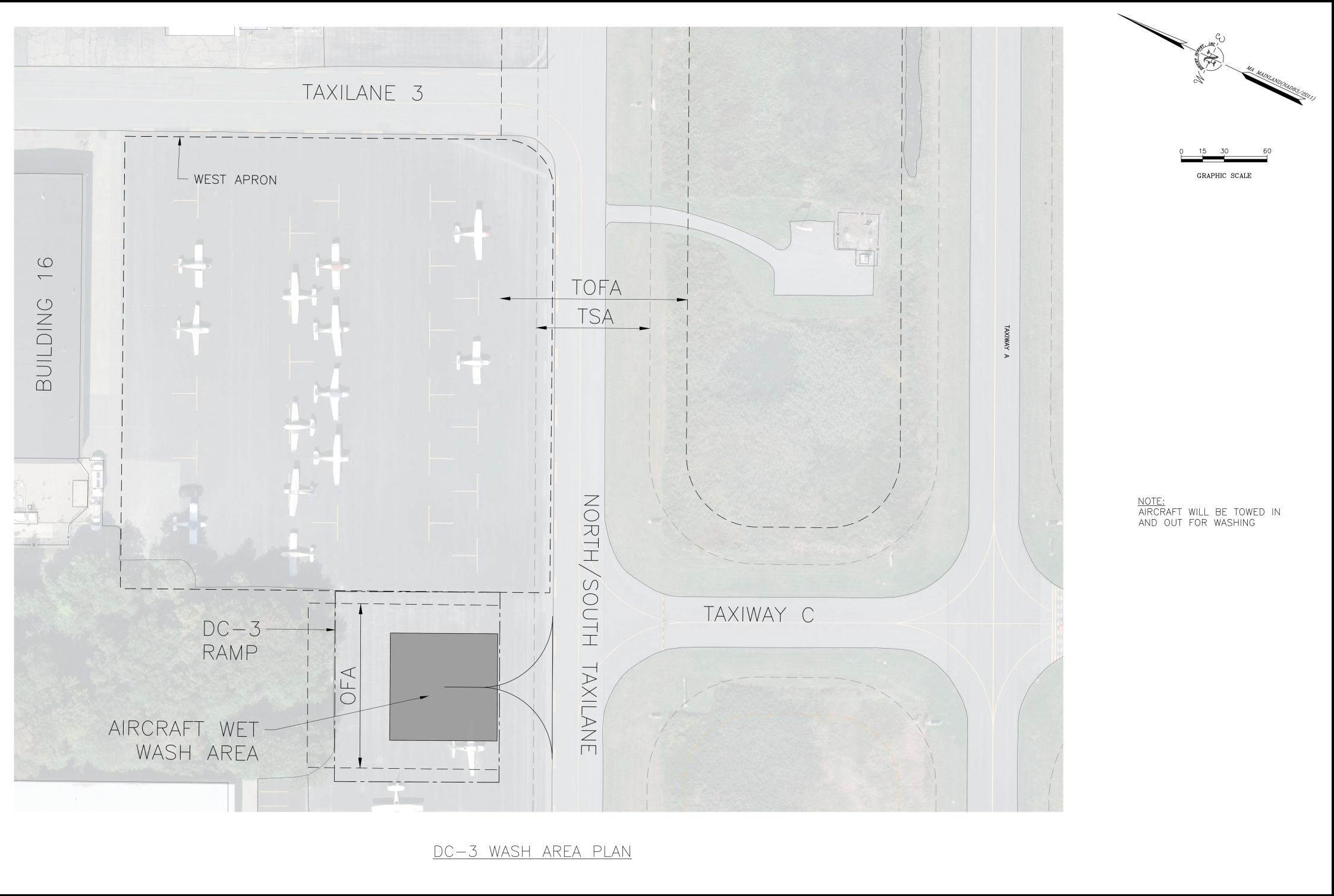


Table 4-5: DC-3 Apron Alternatives Considered - Summary

Alternative	Meets Facility Requirements	Environmental Impact	Meets FAA Standards	Development Cost	Flexibility
DC-3 Apron Alt A (No Action)	No	None	Yes	None	Development = Fair Operational = Fair
DC-3 Apron Alt B (Aircraft Wet Wash) - Preferred	Yes	Minor	Yes	Costly	Development = Excellent Operational = Excellent

Helicopter Pads (South) Alternatives

As discussed in Section 3; Facility Needs, helicopter operations at the airport are strong. With nine helipads, the need to be efficient is important. The helipads on the south end were installed to enable a safe and orderly flow of landing and departing helicopters, however, the difficulty the airport is finding is the ability to stage and recover helicopters from these pads. The following is an analysis of the two alternatives for the Helicopter Pads (South):

Helicopter Pads (South) Alternative A: No Action

Facility Requirements - Leaving the southern helicopter pads in their current geometric configuration does not serve existing or future needs of the Airport due to the staging and recovery difficulties previously mentioned. This evaluation criterion was given a value of No.

Environmental Impact - There are no environmental impacts from this alternative.

FAA Standards - This area meets FAA design standards. This evaluation criterion was given a value of Yes.

Development Costs - There are no development costs associated with the no action alternative.

Development Flexibility - This area does not provide optimal benefit to the Airport as it is currently configured. This evaluation criterion was given a value of Fair for development potential and Fair for operational efficiency.

Helicopter Pads (South) Alternative B: Extend Pads Easterly

(see Figure 4-12)

The preferred alternative proposes the extension of the helicopter pads easterly, similar to the northern helicopter pads, and add lighting. This improvement would enable aircraft to be staged and recovered safely, increase safety, and increase helicopter operation efficiency.

Facility Requirements - This alternative provides improved safety, staging and operations. This evaluation criterion was given a value of Yes.

Environmental Impact - There will be minor environmental impacts associated with the installation of new impervious areas for this alternative.

FAA Standards - This area meets FAA design standards. This evaluation criterion was given a value of Yes.

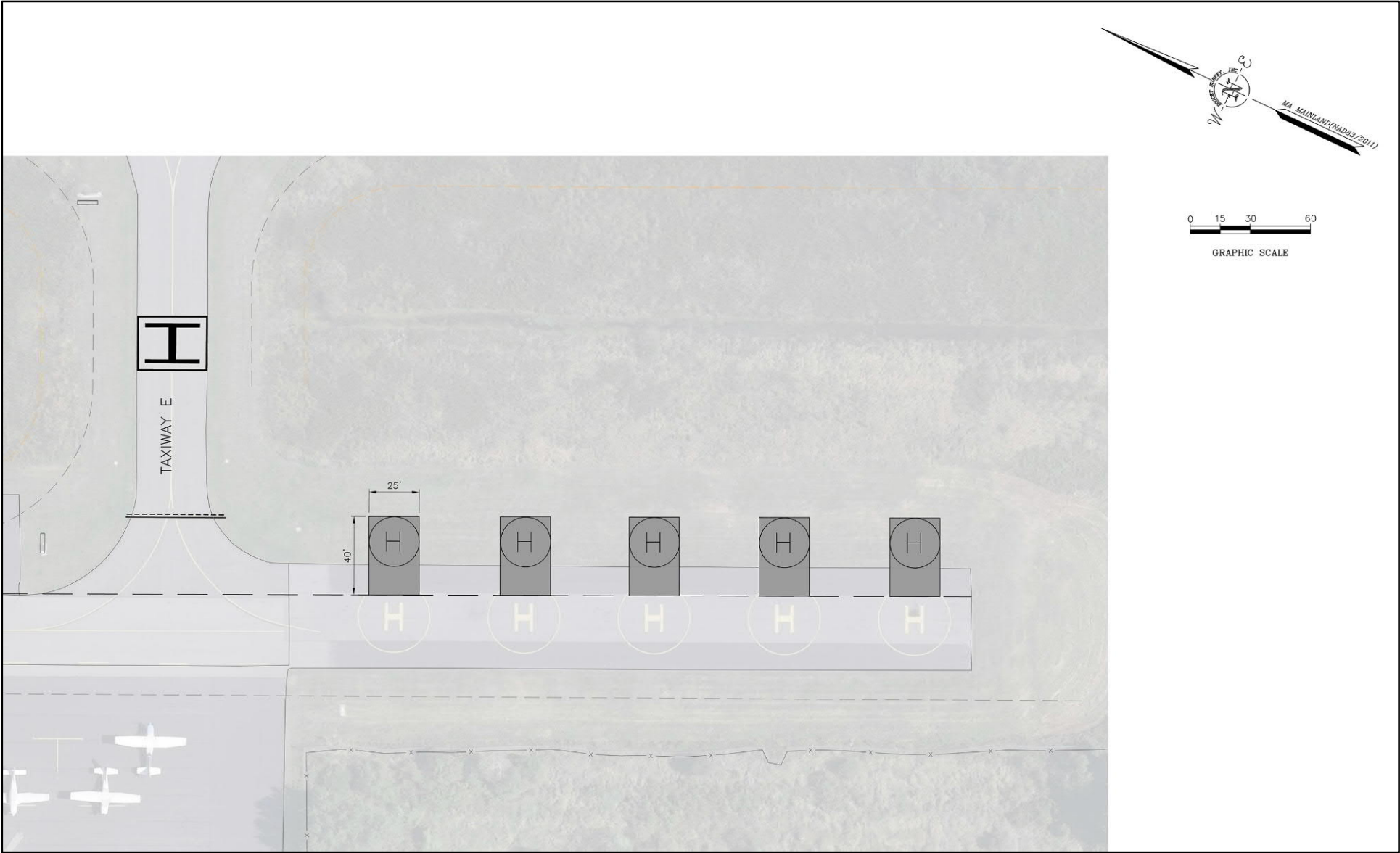
Development Costs - There are development costs associated with the helicopter pad extension, and therefore this alternative is evaluated as Costly.

Development Flexibility - This improvement will benefit existing users by providing improved staging and recovery of helicopters. This evaluation criterion was given a value of Excellent for development potential and Excellent for operational efficiency.

Table 4-6: Helicopter Pads (South) Alternatives Considered - Summary

Alternative	Meets Facility Requirements	Environmental Impact	Meets FAA Standards	Development Cost	Flexibility
Helicopter Pads (South) Alt A (No Action)	No	None	Yes	None	Development = Fair Operational = Fair
Helicopter Pads (South) Alt B (Extension) Preferred	Yes	Minor	Yes	Costly	Development = Excellent Operational = Excellent

Figure 4-12: Helicopter Pads South Alternative



Preferred Airside Alternatives Summary

The following airside alternatives were selected from the sub-sections of Runway 17/35, Primary Surface Area, Taxiway C, Taxilane Reconfiguration, West Apron, DC-3 Apron and were combined into Table 4-7 below.

Table 4-7: Airside Preferred Alternatives - Summary

Alternative	Meets Facility Requirements	Environmental Impact	Meets FAA Standards	Development Cost	Flexibility
RWY 17/35 Alt C (pave 300' of Northerly and Southerly safety areas)	Partial	Minor	Yes	Less Costly	Development = Excellent Operational = Good
PSA Alt A (Right Size PSA to 500' in width)	Yes	None	Yes	No Cost	Development = Excellent Operational = Excellent
Taxiway C Alt B (realignment)	Yes	Major	Yes	Costly	Development = Excellent Operational = Excellent
Taxilane Alt 4 (TL 1 - Eliminate) (TL 2 - TDG II) (TL 3 - TDG II)	Yes	None	Yes	Most Costly	Development = Excellent Operational = Excellent
W. Apron Alt B (Development with 500' PSA)	Yes	None	Yes	Costly	Development = Excellent Operational = Excellent
DC-3 Ramp Alt B (Aircraft Wet Wash)	Yes	Minor	Yes	Costly	Development = Excellent Operational = Excellent
Helicopter South Apron Alt B (Extension)	Yes	Minor	Yes	Costly	Development = Excellent Operational = Excellent

E. Landside Alternatives/Discussions

This Section examines the future placement of, and relationships between, existing and future landside facilities at the Airport. Norwood Memorial Airport has limited opportunities for landside development. This section will focus on alternatives that were identified during this master plan update. The previous 2005 master plan identified other opportunities.

In planning for landside facilities, an important consideration is the relationship between the activity centers of an Airport. An activity center is an area in which a certain type of activity occurs, such as aircraft fueling and maintenance, flight training, or equipment maintenance. As an airport grows and activity increases, the smooth functioning of these activity centers and the relationships between them become increasingly important. Following is a discussion regarding land acquisition and the airport's auto parking lot.

Land Acquisition

The Airport, with its existing land holdings and pattern of leases, has little or no opportunity to greatly increase the revenue flow from Airport parcels or to expand Town control of the surrounding parcels. This has been deemed unacceptable by the Airport Commission.

Section 3; Facility Needs outlines the need for additional developable upland property. With the existing unmet demand for hangars and the ongoing need to protect the runway protection zones for runway 17 and runway 10, there is a critical need to acquire additional upland area to meet current and future aviation demands.

The Boston Metropolitan Airport, Inc. (BMA) lease parcel is at the heart of the Airport's upland area and should be acquired as part of a long-range effort to redevelop the terminal area into a more efficient space for tie-downs and hangars. The present pattern of leases and subleases is inefficient and does not maximize the aviation use in order to best meet current and future needs. The current pattern of leases and sublease offer no incentives for needed safety improvements, or maximize potential revenues to the Airport. The lease associated with the BMA parcel expires in 2047 leaving the airport with two options. Option one includes the facilitation of a buy-out with BMA. The legal and financial costs associated with such a buyout may be funded by the FAA, however until such time, would need to be funded by the Airport. Option two includes allowing the parcel to continue, status quo, and to not renew

the lease. This would enable a clean-slate approach to plan for a more efficient and self-sustaining Airport.

Runway 10 Runway Protection Zone (RPZ) key parcel acquisitions should be made. These parcels contain several acres of upland that are currently used for automobile storage. The RPZ area between Access Road and the airport property line west of RW 10 should be acquired to preserve compatible land use within the RPZ. This may also afford the potential for creating numerous new small aircraft tie-down spaces. The new tie-downs could generate a respectable amount of annual revenue for the airport.

Airport Auto Parking Lot

As discussed in Section 3; Facility Needs, there is an increasing demand for additional airport auto parking to service the airport during periods of high demand. Following is a discussion regarding various options to meet this demand.

Option A - Short Term

The existing parking lot, shown in Figure 4-13: Existing Landside Parking Area, services the current terminal area and was recently repaved. The repaving of the existing lot enhanced the public image of the Airport to its neighbors as well as to airport users.

Consideration should be given to re-orienting the strip of parking along the edge of the grassy knoll ledge area. This strip could be made into up to eight additional diagonal parking spaces, to add capacity for Airport Management staff, limo drivers, and taxicabs that are picking up corporate and transient GA users.

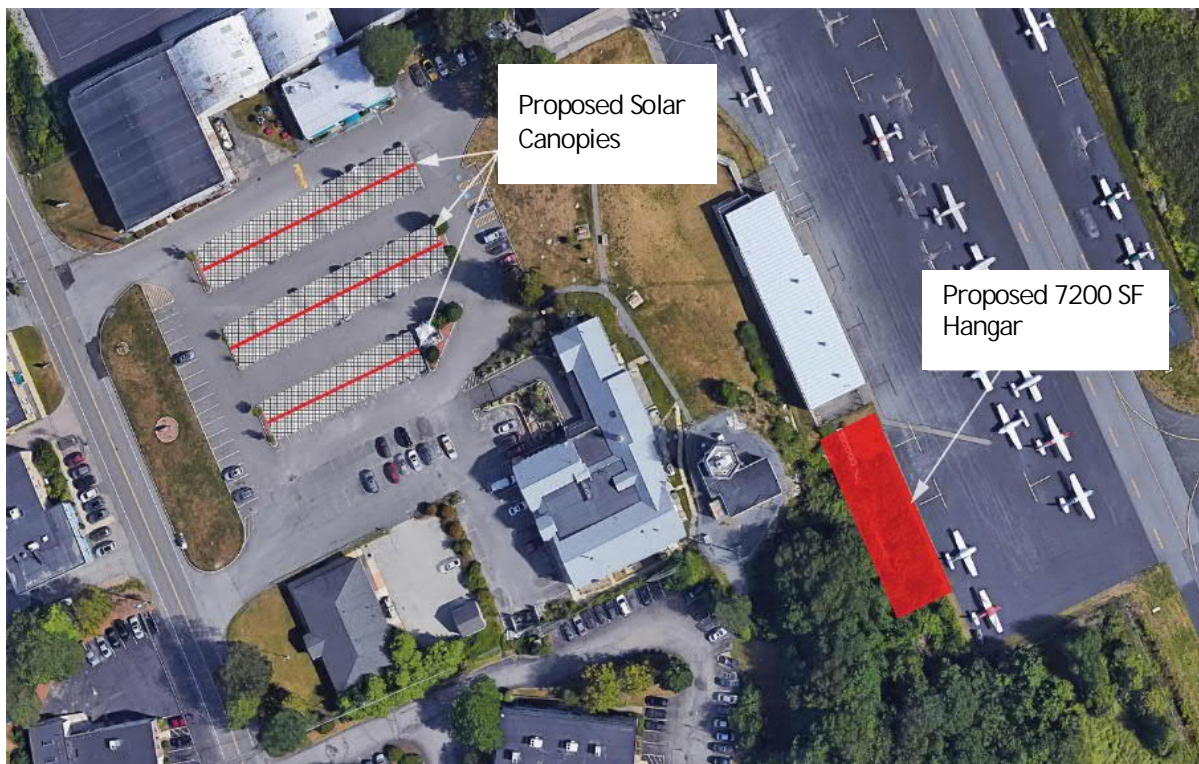
Figure 4-13: Existing Landside Parking Area



Additionally, as previously noted in Section 3 and shown in Figure 3-13, the Town of Norwood DPW has prepared a conceptual design which would allow for up to 26 additional spaces adjacent to the Access Road.

The Airport may also consider the use of grid-tied solar, installed onto canopies over current parking as depicted below in Figure 4-14: Proposed Solar Canopies. Grid-tied solar on canopies is a good use of the space, provides cover for the airport's customers and can be used to reduce the airports operating expenses through the generation of photo-voltaic energy.

Figure 4-14: Proposed Solar Canopies

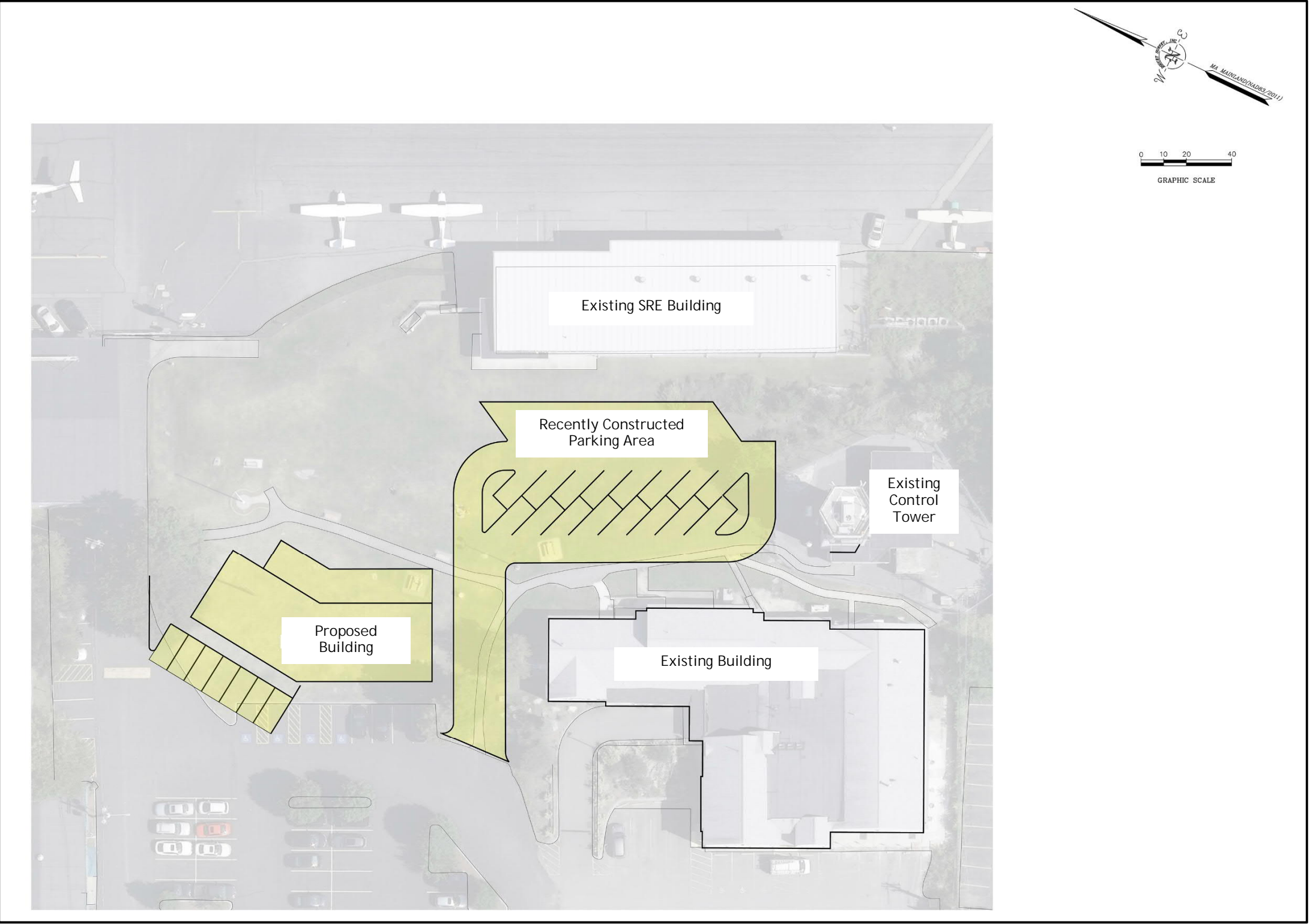


Option B - Mid-Term

(Recently Constructed)

With the demand for more vehicular parking, the airport should consider constructing additional parking. Depicted in Figure 4-15: Proposed Office and Restaurant Building, is a proposed alternative that would increase vehicular parking by adding an addition 22 parking spaces. This will minimize the impacts during periods of high demands.

Figure 4-15: Proposed Office and Restaurant Building



Section 5.0 FINANCIAL AND IMPLEMENTATION PLAN

A. Introduction

The analyses completed in the preceding chapters evaluated development needs at Norwood Memorial Airport over the next 20 years based on forecast activity and operational efficiency. The next step is to apply fundamental economic, financial, and management rationale to each development item so that the feasibility of each item in the plan can be assessed. The presentation of the capital improvement program (CIP) has been organized into three sections. First, the Airport's capital program needs are recognized by various categories ranging from enhancing safety to satisfying demand. Second, the Airport development schedule and project cost estimates are presented in narrative form. Third, capital improvement funding sources on the federal, state, and local levels are identified and discussed. The CIP is developed following Federal Aviation Administration (FAA) guidelines for Master Plans and primarily identifies those projects that are likely eligible for FAA and/or MassDOT grant funding. Other aviation projects that are not programmed to receive federal and/or state funding participation are also presented.

B. Phasing

Norwood is a well-maintained airport. The one serious safety matter is the taxiway object free area issues for taxiways 1, 2 and 3. Reconfiguring the taxiway system for design group II aircraft should eliminate this issue. In terms of capacity, the airport should consider the short-term runway extension of Runway 17-35 by way of paving the safety areas. This will enable the use of declared distances, increasing the use of the airport.

C. Project Priorities

As discussed in Chapter 4, Alternatives, the airport has several projects, both airside and landside, to develop over the course of the planning period. The order in which these projects appear in the CIP is a matter of importance in terms of not only safety and capacity, but also the financial ability of the town to fund their share, as well as FAA and MassDOT

priorities. With the two agencies, safety always comes first, with capacity issues considered a secondary concern.

It is important to note that this list is dynamic in nature, meaning the order in which projects appear can, and often does, change from a number of reasons. Change in airport demand, funding availability, and political disposition are few examples of catalysts for priority modifications. The town should be prepared to make adjustments as necessary, provided they are justified, eligible and feasible, . Given this information, the list below represents the priority of the projects at this time, broken out in the short-, intermediate-, and long-terms.

Construction, engineering, and other costs listed in this chapter are based on 2019 dollars. These costs will rise in the future, possibly by as much as 2-5% per year. To compute current cost estimates or revisions in the future, refer to the Construction Cost Index (CCI) of Engineering News Record (ENR). As an example (see formula below), a \$100,000 project in 2019, with a CCI of 206.2, would cost \$114,355 in the year 2025 with a (presumed) CCI of 235.8.

Calculating Future Costs

Construction, engineering, and other costs listed in this chapter are based on 2019 dollars. These costs will rise in the future, possibly by as much as 2-5% per year. To compute current cost estimates or revisions in the future, refer to the Construction Cost Index (CCI) of Engineering News Record (ENR). As an example (see formula below), a \$100,000 project in 2019, with a CCI of 206.2, would cost \$114,355 in the year 2025 with a (presumed) CCI of 235.8.

Formula:

$$\begin{aligned} & 2019 \text{ project cost} * 2025 \text{ CCI} / \\ & 2019 \text{ CCI} = \text{future project cost} \\ & \$100,000 * 235.8 = 23,580,000 / \\ & 206.2 = \$114,355 \end{aligned}$$

Thus, a \$100,000 project in 2019 could cost 14% more in 2025.

D. Airport Development

With the recommended Master Plan concept developed and specific needs and improvements for the Airport having been established, the next step is to determine a realistic implementation timeline and associated costs for the plan. Planning periods are grouped into short term (current - 5 years), intermediate term (6 - 10 years), and long-term (11 - 20 years). Table 5-1 summarizes key activity milestones for the three planning horizons. A key aspect of this Master Plan is the use of demand-based planning milestones. Many projects

should be considered based on actual performance levels. As short-term horizon activity levels are reached, it will then be time to program for the intermediate term based on the next event milestones. Similarly, when the intermediate term milestones are reached, it will be a chance to schedule for the long term activity signs. Some of the development items included in the recommended concept will need to follow these demand indicators. For example, the plan includes the construction of a Deicing system, which is tied to the reconfiguration of the system of Taxiways. Based on the need to remove T-Hangar (Building 10) to accommodate the reconfiguration of Taxiway 2 from a TDG 1 to a TDG II, the actual deconstruction of Building 10 will be the primary indicator for this project. Another example is the plan includes the construction of additional hangars to meet the current demand, which is tied to the reduction of the Primary Surface Area from 1,000' in width to 500' in width. Based on the need to reduce the Primary Surface Area to accommodate the heights of new hangars, the reduction of the Primary Surface Area will be the primary indicator for this project. Some projects may be delayed, thus, capital expenditures are planned to be made on an as-needed basis, which leads to a more responsible use of capital assets.

At Norwood Memorial Airport, hangars are privately owned by tenants, which then have land lease contracts with the Town of Norwood. Because of economic realities, few airports are constructing new hangars on their own, instead relying on private developers. In some cases, private developers can keep construction costs lower, which in turn lowers the monthly fee necessary to amortize the cost of development. To the greatest extent possible, private development of all hangar types should be supported and promoted by the Town. The CIP for the Airport assumes that the potential for future hangars would most likely be constructed through public/private partnerships. This assumption does not preclude the possibility of the Airport building new hangars. Ultimately, the Town of Norwood will determine, based on demand and the needs of a potential developer, whether to self- fund hangar construction or to rely on private developers.

Not all projects identified are necessary to meet projected demand. Other projects are needed to enhance the safety and efficiency of the Airport, maintain existing pavement infrastructure, generate revenue, or to address FAA design standards.

Since a Master Plan is a conceptual document, implementation of the capital projects should only be undertaken after further refinement of their design and costs through architectural and engineering analyses. Moreover, some projects may require additional infrastructure

improvements (i.e., drainage improvements, an extension of utilities, etc.) that may increase the estimated cost of the project or increase the timeline for completion.

Once a list of significant projects was identified and refined, project-specific cost estimates were developed. The cost estimates include design, engineering, construction administration, and contingencies that may arise on the project. Capital costs presented here should be viewed as estimates subject to further refinement during the design process. Nevertheless, they are considered sufficient for planning purposes. Cost estimates for several projects included in the CIP were provided by the Airport's Engineer, DuBois and King, Inc. Cost estimates for each of the development projects in the CIP are based on present-day construction, design, and administration costs. Adjustments will need to be applied over time as construction costs or capital equipment costs change. The sidebar on Page 5-92 provides one possible method of determining future costs.

The following pages show a proposed 20-Year CIP for the Norwood Memorial Airport. An estimate of FAA and MassDOT funding eligibility has been included, although actual funding is not guaranteed. For those projects that would be eligible for federal funding, FAA's Airport Improvement Program (AIP) provides 90 percent of the total project cost. The federal eligibility breakdown is based on the Airport's FAA designation (general aviation). The remaining amount would be equally shared between the MassDOT and the City of Norwood at 5 percent each. Other projects in the CIP are funded solely through local funding. As detailed in the CIP, most projects listed are eligible for both federal and state funding. Naturally, demand and justification for these projects must be provided by a grant being issued by the FAA and/or MassDOT.

The FAA and MassDOT each utilize a priority ranking system to help objectively evaluate potential airport projects. Projects are weighted toward safety, infrastructure preservation, meeting design standards, and capacity enhancement. The FAA will participate in the highest priority projects before considering lower priority projects, even if a lower priority project is seen as a more urgent need for the local sponsor, although there are exceptions.

Nonetheless, the project should remain a priority for the Airport, and funding support should continue to be requested in subsequent years or funded locally if the project is critical to the airport.

Some projects identified in the CIP will require environmental documentation. The level of documentation necessary for each project must be determined in consultation with the FAA

and MassDOT. There are three major levels of environmental review to be considered under the National Environmental Policy Act (NEPA) that include categorical exclusions (CatEx), Environmental Assessments (EA), and Environmental Impact Statements (EIS). Each level requires more time to complete and more detailed information. Guidance on what level of documentation is needed for a project is provided in FAA Order 1050.1F, Environmental Impacts: Policies and Procedures. The following sections will describe in greater detail the projects identified for the airport over the next 20 years.

The short term projects are subdivided into yearly increments and refer to the federal fiscal year (FY) (October - September). Local priorities group the intermediate and long terms projects per both need and the financial means of paying the city's share. While the CIP shows the priority ranking of the projects, the list should be evaluated and revised on a regular basis.

Short-Term Program (2019-2023)

The short term planning period is the only planning horizon separated into single years. This is to allow the ACIP to be coordinated with the five-year planning cycle and anticipated funding sources with the FAA and MassDOT. If any of these projects cannot be funded in the time frame indicated, the city should consider the project for the following year. Plans called out during this timeframe are very specific regarding actual planning, design and construction. Some projects in the first five years may also be addressed in a CatEx or an EA. As such, some projects are initially put through an environmental and/or design phase and then followed up with actual construction. The short term program considers some projects over the five-year planning period as presented earlier in Table 3-1 - Summary of Recommended Facility Needs. The following provides a detailed breakdown of each project within FY 2019 through 2023. The Plan's CIP includes FY 2018 projects to be consistent with the current ACIP submitted to the FAA, resulting in a total of six years included within the short term program.

Pavement Marking and Maintenance

This project involves the marking and preventative maintenance for all runways and taxiways. Cost Estimate: \$500,000.

Runway Extension via paved Safety Areas

This project involves the extension of Runway 17/35 by way of paving the 300' safety areas on both ends for a total of 600' resulting in declared distances of TODA; 4,600' and LDA; 4,300'. Cost Estimate: \$1,200,000.

Taxilane System Reconfiguration

This project involves the reconfiguration of Taxilanes 1, 2 & 3 to meet taxilane design group II airport standards. Cost Estimate: \$110,000.

Airport Security & Wildlife Fencing.

This project involves the construction of approximately 20,000' of security and wildlife fencing to increase the overall safety of the flying public. Cost Estimate: \$1,600,000.

Deice Pad

This project involves the construction of a deice pad and glycol collection system aimed to increase airport revenue and operations. Cost Estimate: \$210,000.

Helicopter Pads (South)

This project involves the construction of extensions of the helipads easterly which will result in increased safety and efficiency with helicopter operations. Cost Estimate: \$350,000

Automobile Parking

This project involves the construction of addition parking and solar canopies (FAA ineligible) for current parking aimed to reduce operating expenses for the airport. This will increase the number of parking spaces to meet demand. Cost Estimate: \$1,200,000.

Aircraft Wash Area

This project involves the construction of a collection system for the aircraft wet wash area on the "DC-3" apron. In addition to the collection system, some pavement markings will be required. Cost Estimate: \$210,000.

Intermediate-Term Projects (2024-2028)

The intermediate term covers the period 6 through 10 years and includes five projects. These projects are listed in Table 3-1 - Summary of Recommended Facility Needs. Planning new projects beyond the short-term timeframe can be challenging. Due to the fluid nature of funding availability and the possibility of changing priorities, these projects have been grouped together into a single project list and not prioritized by year. Further evaluation of these projects should occur during this planning horizon to determine their order of

importance based on airport safety, demand, and efficiency. Note that estimated cost are based on 2019 dollars.

Taxiway C Realignment

This project involves the realignment of the Taxiway C, eliminating the non-standard access from the north apron to Runway 17/35, reducing potential incursions. This project will also involve the planning associated with potentially constructing a solar array on the abandoned Taxiway C, once realigned. Cost Estimate: \$3,000,000.

Hangar Development

This project involves the construction of aircraft storage hangars to meet the current demand. Six (6) Group II box hangars can be constructed on the West Apron enabling the airport to generate revenue. Cost Estimate: \$1,800,000.

Fuel Farm Replacement

This project involves the replacement of the aging and below ground storage fuel farm. When the fuel farm is replaced the tanks will be constructed above ground. Cost Estimate: \$600,000.

MALSF Access Road

This project involves the enhancement of the current Access Road that is subject to flooding. Cost Estimate: \$150,000.

Land Acquisition

This project involves the acquisition of necessary property to extend Runway 17/35 to the north. Acquisition will include property to allow for the physical construction of the runway extension and aviation easements associated with the protection of airspace. Cost Estimate: \$5,000,000.

Intermediate Term ACIP Summary

Projects included in the intermediate term continue to improve the overall safety, security and effectiveness of the airfield as well as expand the ability of the airport to generate more revenue while reducing operating expenses. The total investment necessary for the intermediate term ACIP is approximate \$10.6 million. About \$5.6 million is programmed for federal/state funding assistance. The remaining \$5,000,000 is to be provided through local sources of financing.

Long-Term Projects (2029-2038)

The long term covers the period 11 through 20 years. This planning horizon includes one (1) project for the timeframe as listed in Table 3-1 - Summary of Recommended Facility Needs. The following section includes a description of the project.

Runway 17/35 Extension to 5,001 feet.

The project involves the extension of Runway 17/35 to the north. As a continuation of the Short Term project in which the safety areas were paved, the project will extend the primary runway to an ultimate length of 5,001 feet. Property will need to be acquired to facilitate the physical construction of the runway extension as well as requisite safety area. In addition, aviation easements will be required to protect the approach surfaces on the Runway 17 end. Cost Estimate: \$12 million. [Long Term ACIP Summary](#)

The total costs associated with the long-term program are estimated at \$12 million. Of this amount, approximately \$10.8 million could be eligible for federal/state funding, and the local share is projected at \$1,200,000.

E. Capital Improvement Summary

The CIP presented in this chapter is intended as a road map of airport improvements to help guide the Town of Norwood, the Airport, the FAA, and MassDOT. The plan as presented will contribute to accommodate increases in forecast demand at Norwood Memorial Airport over the next 20 years and beyond. The first five years of the CIP are separated into yearly installments, and the intermediate and long-term projects are grouped together respectively. The sequence of projects may change due to the availability of funds or changing priorities. Nonetheless, this is a comprehensive list of capital projects the airport should consider in the next 20 years. Capital Improvement Funding Sources

There are generally four sources of funds used to finance airport development which include:

- Airport cash flow;
- Revenue and general obligation bonds;
- Federal/state/local grants; and

Access to these sources of financing varies widely among airports, with some large airports maintaining substantial cash reserves and the smaller commercial service and general aviation

airports often requiring subsidies from local governments to fund operating expenses and finance modest improvements. Financing capital improvements at the Airport will not rely solely on the financial resources of the Town. Capital improvement funding is available through various grant-in-aid programs on both the federal and state levels. Historically, Norwood Memorial Airport has received federal and state grants. While some years more funds could be available, the CIP was developed with project phasing to remain realistic and within the range of anticipated grant assistance. The following discussion outlines key sources of funding potentially available for capital improvements at the Airport.

Federal Grants

Through federal legislation over the years, various grant-in-aid programs have been established to develop and maintain a system of public use airports across the United States. The purpose of this system and its federally based funding is to support national defense and to promote interstate commerce. The most recent legislation affecting federal funding is titled the FAA Reauthorization Act of 2018 (Public Law 115-254).

Non-Primary Entitlement (NPE) Funds

The passage of the Wendell H. Ford Aviation Investment and Reform Act for 21st Century (AIR-21)³, introduced a new funding source for general aviation airports, Non-Primary entitlement. The subsequent AIP re-authorizations including the FAA Reauthorization Act of 2018 (Public Law 115-254) retained Non-Primary Entitlement funding with changes. Non-Primary entitlement funds are specifically for general aviation airports listed in the latest published National Plan of Integrated Airports (NPIAS) that show needed airfield development. General aviation airports with an identified need are eligible to receive the lesser value of 20% of the 5-year cost of their current NPIAS value or, \$150,000 annually. A funding condition of Non-Primary Entitlement is that Congress must appropriate \$3.2 billion or more for non-primary entitlement funds to existing in that fiscal year.

Discretionary Funds

The remaining AIP funds are distributed by the FAA based on the priority of the project for which they have requested federal assistance through discretionary apportionments. A national priority ranking system is used to evaluate and rank each airport project. Those projects with the highest priority from airports across the country are given preference in funding. High priority projects include those related to meeting design standards, capacity improvements, and other safety enhancements.

Under the AIP program, examples of eligible development projects include the airfield, public aprons, and access roads. Additional buildings and structures may qualify if the function of the structure is to serve airport operations in a non-revenue generating capacity, such as maintenance facilities. Some revenue-enhancing structures, such as t-hangars and fuel farms, may be eligible if all airfield improvements have been made; however, the priority ranking of these facilities is very low. At Norwood Memorial Airport, funding for these types of projects should be considered carefully in the near term due. This is one reason the fuel farm and hangar development is proposed for the intermediate-term after safety related and high priority maintenance projects have been completed.

Whereas entitlement monies are guaranteed (subject to annual appropriations) on an annual basis, discretionary funds are not. If the combination of entitlement, discretionary, and airport sponsor match does not provide enough capital for planned development, projects may be delayed although a project that is “shovel-ready” may be considered by the FAA for end of year money.

FAA Facilities and Equipment Program

The Airway Facilities Division of the FAA administers the Facilities and Equipment (F&E) Program. This program provides funding for the installation and maintenance of various navigational aids and equipment of the national airspace system. Under the F&E program, funding is provided for FAA airport traffic control towers (ATCTs), en route navigational aids, on-airport navigational aids, and approach lighting systems.

While F&E still installs and maintains some navigational aids, on-airport facilities at general aviation airports have not been a priority. Therefore, the airport should consider all sources of funding when looking to improve the MALSF access road.

Project Priority

Because the demand for AIP funds exceeds the availability, the FAA bases the distribution of limited AIP funds on current national priorities and objectives. Projects that rate a high priority will receive higher consideration for funding over those projects with lower priority ratings. Each fiscal year, the FAA apportions AIP funds into major entitlement categories such as enplanements, non-primary, and state apportionment funds. The FAA distributes the remaining funds to a discretionary fund. Set-aside projects are mandated congressionally.

AIP Grant Obligations

When Sponsors receive Federal assistance, they also accept certain obligations and conditions associated with that support. Sponsor may incur these obligations by contract or by restrictive covenants within property deeds. These generally involve one of the following:

- Agreements issued under Federal grant programs
- Instruments of approved property transfers
- Deeds of conveyance

Airport owners and operators who accept a Federal grant are obligated to maintain and operate their facility in a safe and efficient manner. Acceptance of the subsidy also invokes certain conditions and assurances for which the sponsor must comply. These terms and guarantees become binding contractual obligations between the sponsor and the United States.

Obligations may span different grant development programs. The FAA has administered three such development programs:

- Federal Airport Aid Program (FAAP)
- Airport Development Aid Program (ADAP)
- Airport Improvement Program (AIP)

Airport owners should be aware that obligations incurred under each program or conveyance document can vary. The following list identifies some of the general responsibilities of an airport owner. This list is not inclusive of all such incurred Federal obligations.

- Prohibition on Exclusive Rights
- Utilization of Airport Revenue
- Proper Maintenance and Operation of Airport Facilities
- Protection of Approaches
- Maintaining Good Title of airport property
- Compatible Land Use
- Availability of Fair and Reasonable Terms without unjust discrimination
- Adherence to the approved Airport Layout Plan
- Sale or Disposal of Federally acquired property
- Preserving Rights and Powers

- Maintaining acceptable accounting and record keeping systems
- Compliance with Civil Rights requirements
- Compliance with Disadvantaged Business Enterprise (DBE) requirements

The FAA encourages airport owners to thoroughly review and understand each executed agreement and conveyance document to verify the obligations they have accepted. The Administration also helps Airport owners to establish a central point for record keeping purposes that permit readily available reference to their obligations. Annual reviews of all such agreements will significantly aid Sponsor efforts in complying with their Federal obligations.

Local Funding

The balance of project costs, after consideration has been given to other sources of financing described above, must be funded through local resources. Norwood Memorial Airport is owned and operated by the Town of Norwood.

Airport revenues are generated by airport operations through the collection of various rates and charges. Funds collected by the airport are to be used specifically to help fund the operation and maintenance of the airport and for additions or improvements to airport facilities. All general aviation airports should establish standard base rates for various leases.

All rental rates should be set to adjust to a standard index such as the consumer price index (CPI) to assure that fair and equitable rates continue to be charged into the future. Many factors will impact what the standard lease rate should be for a facility or ground parcel. For example, land leases for aviation-related facilities should have a different lease rate than for non-aviation leases. When airports own hangars, a separate facility lease rate should be added to the ground rent. The lease rate for any individual parcel or hangar can vary due to the availability of utilities, condition, location, and other factors. Nonetheless, standard lease rates should fall within an acceptable range.

There are several alternatives for local financing options for future development at the airport, including airport revenues, direct funding (subsidizing) from the Town, issuing bonds, and leasehold financing. These strategies could be used to fund the local matching share or complete the project if grant funding cannot be arranged.

There are several bonding options available, including general obligation bonds, limited obligation bonds, and revenue bonds. General obligation bonds are a common form of bond

which is issued by voter approval and secured by the full faith and credit of the Town, and future tax revenues are pledged to retire the debt. As instruments of credit and because the community secures the bonds, general obligation bonds reduce the available debt level of the community. Due to the community pledge to secure and pay general obligation bonds, they are the most reliable type of bond and are generally issued at lower interest rates and carry lower costs of issuance. The primary disadvantage of general obligation bonds is that they require voter approval and are subject to statutory debt limits. This requires that they are used for projects that have broad support among the electorate, and that they are reserved for projects that have the highest public priorities.

In contrast to general obligation bonds, limited obligation bonds (sometimes referred to as self-liquidating bonds) are secured by revenues from a local source. While neither general fund revenues nor the taxing power of the local community is pledged to pay the debt service, these sources may be required to retire the debt if pledged revenues are insufficient to make interest and principal payments on the bonds. These bonds still carry the full faith and credit pledge of the local community and are considered, for financial analysis, as part of the debt burden of the local community. The overall debt burden of the local community is a factor in determining interest rates on bonds.

There are several types of revenue bonds, but in general, they are a form of bond which is payable solely from the revenue derived from the operation of a facility that was constructed or acquired with the proceeds of the bonds. For example, a lease revenue bond is secured with the income from a lease assigned to the repayment of the bonds. Revenue bonds have become a common form of financing airport improvements. Revenue bonds present the opportunity to provide those improvements without direct burden to the tax payer. Revenue bonds generally carry a higher interest rate because they lack the guarantees of general and limited obligation bonds.

Leasehold financing refers to a developer or tenant financing improvements under a long-term ground lease. The obvious advantage of such an arrangement is that it relieves the community of all responsibility for raising the capital funds for improvements. However, the private development of facilities on a ground lease, particularly on property owned by a government agency, produces a unique set of concerns.

It is harder to obtain private financing as only the improvements and the right to continue the lease can be claimed in the event of a default. Ground leases frequently provide for the

reversion of improvements to the lessor at the end of the lease term, which reduces their potential value to a lender taking possession. Also, companies that want to own their property as a matter of financial policy may not locate where land is only available for lease. It is also acceptable for the airport to enter some form of public/private partnership for various airport projects. Typically, this would be limited to hangar construction, but there are some examples where a private developer constructs, for instance, a taxiway, then deeds it to the airport for ongoing maintenance. When entering any such arrangement, the airport must be sure that the private developer does not gain an economic advantage over other airport tenants.

F. Master Plan Implementation

To implement the recommendations in this Plan, it is key to recognize that planning is a continuous process and does not end with acceptance and/or approval of this document. The airport should implement measures that allow them to track various demand indicators, such as based aircraft, hangar demand, and operations. The issues that this Master Plan identifies will remain valid for some years. The primary goal is for the Airport to serve the air transportation needs of the region best while continuing to be economically self-sufficient.

The actual need for facilities is best established by airport activity levels rather than a specified date. For example, projections have been made as to when additional hangars may be needed at the Airport. The timeframe in which the development is necessary may be substantially different. Actual demand may be slower to develop than expected. On the other hand, high levels of demand may establish the need to accelerate development. Although every effort has been made in this planning process to estimate when facility development may be necessary conservatively, aviation demand will dictate the timing of facility improvements.

The value of a master plan is keeping the issues and objectives at the forefront of leadership. In addition to adjustments in aviation demand, when to undertake the improvements recommended in this Plan will impact how long the plan remains valid. The format of this program reduces the need for regular and costly updates by just adjusting the timing of project implementation. Updating can be done by the manager, thereby improving the plan's effectiveness.

In summary, the planning process requires the Town to consistently monitor the progress of Norwood Memorial Airport regarding aircraft operations and based aircraft. Analysis of aviation demand is critical to the timing and need for new Airport facilities.

Section 6.0 Public Comment

Public Input was solicited through public hearings and a public comment period. The original purpose of the technical master plan update was to address ongoing issues with the taxilanes. As the update progressed, the airport explored opportunities to increase revenues and decrease operating expenses.

Where appropriate, many of the comments submitted inspired edits to the document and those edits were indeed made. Examples include, reference to a second FBO and fuel farm. Other examples of edits were the removal of the fuel truck access and the change from the Falcon 7x, an Aircraft Design Group-II aircraft, to a composite of Cessna Citation jets, also Aircraft Design Group-II.

Where comments were submitted related to legal matters, the TMPU was not modified and are best responded to by the Airport. The following pages represent public comments received.

May 10, 2019

Mark Ryan, Chairman
Norwood Airport Commission

Lisa Lesperance
Federal Aviation Administration
Lead Community Planner

Jeff Adler
Dubois and King engineering

Russ Maguire
Manager, Norwood Airport

Dear Mr. Ryan, Ms. Lesperance, Mr. Adler and Mr. Maguire,

In accordance with the public meeting held on April 30, 2019 regarding the Technical Master Plan update (TMPU) for the Norwood Municipal Airport, I am submitting the following questions and comments.

The following references were used in preparation of this document:

Norwood Memorial Airport master plan update phase 1. Dated November 22, 2014
Norwood Memorial Airport master plan update phase 2. Dated March 2007
Advisory Circular AC 150/5070-6B
FAA Part 16 determination FAA 16-07-03. Dated April 11, 2008
FAA Part 16 determination FAA 16-15-05. Dated November 2, 2018 (Revised)
MASSDOT letter, RE. Part 16 complaint FAA DD and order. Dated November 27, 2018
Review of Norwood Memorial Airport revenue and expenses Dated October 2017
Land use inspection conducted by the FAA and Mass DOT. Dated September 16, 2014.
FAA Part 16-07-03 Corrective action plan Dated May 16, 2008
Draft Norwood Memorial Airport technical master plan updated. Dated 2019
Norwood Memorial Airport technical master plan update handout Dated April 30, 2019
FBO trends (Professional Pilot magazine). FBO Survey 2019 (AIN), 2018 PRASE survey and awards (PRO Pilot).
RFP for Lots ABC, Norwood Airport undated (2019).

Flight Level Norwood LLC introduction (2008)

Boston Executive helicopters Business plan (2014).

FAA Q&As-FBO industry consolidation and pricing practices. ACO-100 December 7, 2017

Questions and comments regarding the draft Technical Master Plan update.

1. On December 7, 2017 the FAA issued guidance to address the nationwide problem regarding Fixed Base Operators (FBO's) and service at federally obligated airports like Norwood. This guidance which is relevant to the TMPU addressed significant concerns regarding:
 - A. The rising costs of FBO services, including fueling services. (And its possible impact, IE. Contributing to a decrease in use of the airport).
 - B. Significant, if not exclusive, FBO control over airport ramp parking and fees.

The FAA stated in part: "Pricing practices could, in some cases, preclude reasonable access to public use airports". The airport sponsor (The Town of Norwood acting through the Norwood Airport Commission (NAC) cannot rely on the FBO to meet its obligations under FAA law. The reliance on an FBO does not diminish the NAC's obligations to comply with its federal obligations.

On November 2, 2018 the FAA in its decision regarding Part 16—15-05 states in part: "The Town (Norwood) has delegated daily operation of the airport to the Norwood Airport Commission. The Commission is an agent of the Town, while the Town is the airport sponsor with respect to the applicable federal obligations. As such, the Town is ultimately responsible for insuring compliance with its federal obligations concerning any and all of the Commissions actions or inactions. Reference to the Commissions actions and statements in the pleadings and in this decision are understood to be the Towns as well".

The impact of past practices regarding access for aeronautical service providers can be a significant variable in the decrease of operations at the airport. These conditions are not included in the TMPU.

2. Page #1-5. The draft states the airport is expanding in its role as a major corporate facility. Based on the decreasing based aircraft, overall operations as well as fuel sales this claim is not reflected in the current conditions. Alternative reasons for this decrease in operations should be explored. The most significant metric in airport operations is fuel pricing (in comparison to other local airports with similar characteristics) followed by facilities. No analysis was done regarding fuel prices in comparison to local and regional airports or the condition of facilities available at the airport (IE. FBO facilities).

The continued negative publicity surrounding the airport based on both the 2008 and 2018 violations is not analyzed. These significant events are not in the TMPU or utilized in any analysis.

3. Norwood had several Master Plans completed in 2004 (Phase 1) as well as 2007 Phase 2. The draft fails to capture the significant detail of both the 2004 and 2007 Master plans for the airport regarding Capital Improvements under the 2004/2007 Capital Improvement Plan (CIP).

4. Yearly the airport has produced a CIP outline that is not consistent with the draft or reflected in the history/overview. The CIP plans from each year should be included to show what the NAC has planned in comparison to the analysis or needs of the airport.
5. Page #1-6. The background regarding the airport fails to detail significant events which have occurred at the airport, creating a negative impact on the airport and possibly contributing to the decline of fuel sales, operations and based aircraft.
 - A. The Airport has received violations from the FAA regarding Grant Assurances in both 2008 and 2018.
 - B. The Airport created a corrective action plan (CAP) in 2008/2009 to address violations regarding leasing/sub leasing, regaining control of AIP funder ramps and aprons, plans to allow aeronautical service providers access to the airport to conduct fueling/self-fueling operations and most importantly implementing a short term leasing policy regarding AIP funder ramps. These details are not mentioned anywhere in the draft.
 - C. The airport currently leases and allows subleases of airport property for non-aviation use. This practice has negatively affected the public mission of the airport.
 - D. The airport recently, against the warnings of the FAA, extended leases on several major portions of the airport, including AIP improved ramps. These lease extensions effectively violate the CAP from 2008 and grant one party control over most of the airport aprons/ramps until 2047-2050. These lease extensions include sub lease extensions on AIP ramps against the warnings of the FAA. This action contradicts FAA guidance on providing access to aviation service providers at the airport. The report fails to explain any steps taken to allow access for aviation service providers, the source of many past violations. The lease extensions have provided a further barrier to aviation service providers.
 - E. Part 16-15-05 has not been closed as no corrective action plan has been submitted or approved by the FAA. This plan should be included in the TMPU.
 - F. The airport recently put out a request for bids regarding the AIP ramp (ABC), which is the subject of both the 2008/2009 CAP and the ongoing 2018 Part 16 violations. This RFP violates the CAP and will grant a 30-year lease to AIP ramps (ABC) without any justification. A hangar may be allowed adjacent to the ABC ramps; however, the hangar has not been shown on the ALP or discussed in any public forum. The draft fails to mention this new hangar or 30-year lease of AIP ramp/apron space.
 - G. The airport is currently in litigation and settlement discussion in which proposals by the airport contradict the draft TMPU (This will be discussed in detail later in this document).
6. The TMPU fails to discuss the obstacles allowed in the runway 10/28 RPZ (Light Poles) which continue to create a hazard to aviation safety. Page #1-6.
7. On page #1-9 the TMPU discusses the possible effects of the 9-11 terrorist attacks as a contributing factor in the overall decrease of operations. This comparison is faulty based on the data cited.
 - A. The TMPU draft cites a decrease from 9-11-2001 of 41% in airport operations compared to the 11-30-2016 5010. Blaming this decrease in part on 9-11-2001. This comparison is misleading at best.

- B. The Master Plan from 2004 (Page # 3-3) shows airport operations had rebounded after the 9-11-2001 terrorist attacks to 84,311 annual operations (2002). There were 201 based aircraft listed in 2002.
 - C. From 2002 until 11-30-2016 flight operations decreased from 84,311 to 58,400. This decrease cannot be attributed to the 9-11 attacks on our country.
 - D. In early 2008 the airport approved the purchase of the FBO operations to a single FBO operator. Over the next several years promised improvements by the FBO failed to materialize. This inaction resulted in a steady deterioration of the FBO facilities and a ramp area. The business plan submitted by the single FBO failed to materialize. The FBO based its business plan on the emergence and explosion of VLJ use throughout the United States. This prediction has not materialized. Recently the FBO ownership has changed. Without a clear understanding of the plans from the FBO in coordination with the NAC it is impossible to understand the business direction of the airport.
 - E. The existence of a single FBO operator resulted in higher fuel prices at the airport relative to surrounding airports.
 - F. The higher fuel price which resulted from a single fuel provider contributed to the 2008 and 2015 part 16 complaints. These complaints highlighted disparity in fuel prices at the airport relative to other airports through the region. The airport delayed and ultimately blocked both fuel providers which has resulted in violations, litigation and years of turmoil at the airport. The ultimate cost for preventing another FBO has impacted the public as well as the revenue generated for the NAC. The primary variable source of increasing revenue is by increasing fuel sales.
8. On Page #1-10 the TMPU references the "Airports Fixed Base Operator (FBO), Flight level Norwood". According to the NAC BEH has been approved to become a second FBO at the Norwood Airport. The FAA ordered the NAC on November 2, 2018 to "provide BEH any remaining requirements for the FBO permit and promptly complete the permitting process"

The TMPU does not contain any reference to this order or BEH. No mention is made regarding the second FBO or the possible effects on airport operations. The FAA order also reiterates that the NAC "discontinue leasing practice that provide exclusive rights to a single FBO" The recent "RFP" concerning the ABC ramp contradicts this order. BEH was never involved in any discussion with Dubois and King, NAC, FAA or MASS DOT regarding the master plan update and opinions based on the BEH business plan.

- A. Boston Executive Helicopters (BEH) first expressed interest in acquiring leased space to become an FBO at Norwood Airport in 2010.
- B. In 2012 the Norwood Airport Commission (NAC) approved the fuel system design and proposed facility. On January 22, 2013 the Norwood Board of Selectmen (BOS) approved the application of BEH for its aviation fuel facility and license to sell fuel at the Norwood Airport. In July 2013 following a site review the FAA approved the fuel operations of BEH.
- C. Just prior to completion of its facility on June 11, 2014 the NAC tabled all discussion with BEH regarding its FBO approval based solely on BEH asking the FAA for assistance (Part 13 complaint).

9. The TMPU contains a map on page # 1-13 showing lease areas on the airport. This map contains significant errors. (Figure 1-4).
 - A. One building is labeled "Chris Donovan" which is inconsistent with the labeling of other buildings.
 - B. The map labels Taxi lane 1, Taxi lane 2 and Taxi lane incorrectly. These designations are not part of the 2007 master plan and inconsistent with past designations on the airport.
 - C. The map labels gate 1 but fails to label gate 2 and gate 3. All gates 1,2 and 3 are primary vehicle gates for emergency vehicle access to the airport.
 - D. The map shows TOFA/OFA area removed from the lease area for the DC-3 ramp and West apron but fails to show the same treatment or designation for Flight Level ramps W,X,Y. ABC, or Lots 6 and 7. This would show the practice by the NAC in selective use of TOFA/OFA claims to deny BEH space and operations while claiming the TOFA/OFA does not apply on Flight Level leased ramp areas. The NAC further claims and allows Flight Level to claim the "FAA" has approved the removal of TOFA/OFA restrictions on specific areas without any evidence to support this discriminatory action.
 - E. The map fails to show the new hangar proposed by the NAC South of the SRE building. The NAC has offered an RFP for this hangar coupled with the lease of lots ABC. ABC ramps have been improved under the AIP program. These ramps were part of the CAP from 2008 as well as violations cited by FAA in 2018. The NAC had given ABC back to Flight Level in secret in 2014 to deny BEH any ramp space to operate our FBO.
 - F. The NAC now proposes a 30-year lease of this AIP ramp (ABC) which directly contradicts the CAP as well as the 2008 and 2018 orders from FAA.
 - G. The MAP fails to include all the area of Norwood Memorial Airport. The area leased and then sub leased to Verizon Communications is not shown on this map. This vital airport area is not "Segregated" from the airport as claimed by the NAC. This area was used for years for airport operations.
 - H. The map fails to show current easements or licenses as well as proposed easements or licenses.
10. On page #1-0 there is discussion regarding the BMA lease (1,100-foot strip), its impact on the airport and FAA guidance against long term leases. The NAC is currently violating this order by offering lease of the ABC ramp for 30 years. This will create further problems for airport planning. The TMPU also fails to mention the recent 2017 lease extensions to Flight Level on Lots 6 and 7. These lease extensions were done against the warnings of the FAA which further give exclusive rights to Flight Level for AIP ramp areas.
11. The TMPU completely ignores the planning from 2004-2007 and the CIP plan currently presented yearly to the FAA, MASS DOT and the public. While discussing the possible long-term acquisition of the golf course North of runway 17/35 the plan neglects numerous other plans with parcels around the airport.
 - A. The plan ignores the prior guidance and orders from FAA regarding the BMA lease and acquisition of this lease utilizing FAA/State funding.
 - B. The CIP includes acquisition of land in the runway 10 RPZ which abuts the airport land currently leased to Verizon communications. This airport land was also subject to orders from the 2008 Part 16 directive. The area North and West of runway 10/28 and 17/35 is critical to the airport's success. The TMPU completely ignores this critical planning step.

12. On page #1-1 the TMPU lists the TOFA as a physical constraint on the airport. This is not supported by the history or current use at the airport. NAC has used the TOFA/OFA selectively only after BEH initiated construction of its hangar and fuel facility.
Both the 2004 and 2007 master plans do not list or discuss any issues with the TOFA/OFA as it is applied to the "Taxi lanes" of vehicle gates 2 and 3.

This is discussed in more detail in the analysis regarding alternatives on the taxi lanes

13. On Page #1-2 the lack of self-serve fueling is listed as a physical constraint on the airport. No mention is made regarding the self-serve fuel facility used by Flight Level with the support and approval of the NAC and airport manager. The airport currently has a fully functioning self-service fuel system.

From 2008 until 2013 the commercial self-service fuel cabinet/facility was approved and used by Flight Level without incident. This use was contrary to claims by the NAC designed to prevent BEH from providing competition on the airport for fuel sales. In 2013 when it became clear the FAA, Mass DOT and Norwood Fire Department had fully approved the BEH fuel operation and facility Flight Level quietly stopped using this self-serve fuel operation.

The Flight Level self-serve fuel cabinet contradicts the selective claims by the NAC and Flight Level regarding the National Fire Protection Standards and TOFA/OFA restrictions. Jet aircraft routinely taxied down gate lane 3 (Now called Taxi lane 3) in excess of claimed size restrictions to taxi between hangars on Lots F and G. This process was utilized after hours without incident and with full NAC approval. No NFPA restrictions were presented as an obstacle for this operation. When it was presented to contradict the newly imposed NFPA-TOFA/OFA restrictions on BEH only this practice was ignored.

BEH designed and constructed both its Jet and Avgas facility to allow self service fueling operations. Rather than support and explore this vital need the NAC denied BEH this operation and further restricted BEH with selective enforcement of TOFA/OFA and NFPA restrictions.

NFPA airport guidelines do not apply under Massachusetts Fire Code contrary to the claims by NAC and the manager used against BEH only. The TMPU should explore the use of the BEH self service fuel system consistent with real operations and regulations.

14. The TMPU fails to recognize the aircraft wash facility constructed by BEH as part of its hangar facility.
15. The TMPU fails to note significant opportunities under page #1-3 (Opportunities). Other than designing the TMPU to support the demolition of the T hangars in favor of Flight Level no mention is made regarding the investment by BEH in the airport and its facilities.

The draft notes high fuel prices without exploring the benefits of competition. No comparison is done regarding fuel prices at KOWD compared to local or regional fuel pricing.

16. On page #2-6 the report lists VLJ as continuing the trend toward increased corporate activity. The 2008 introduction from Flight Level based its business model on the VLJ concept. This has not materialized at Norwood or nationwide. Corporate users have increasingly utilized aircraft sharing models, purchasing shares or utilizing charter providers for travel.

The term VLJ refers to a specific class and type of jet aircraft that is not being used extensively for corporate travel. The VLJ was primarily designed with the individual owner in mind to realize the benefits of turbojet aircraft without the expense of a smaller or mid-size jet aircraft.

Corporate travel increasingly utilizes turbo prop aircraft for short distance economical travel and use sharing arrangements via time sharing arrangements for smaller and mid-size jet travel. With the increase in efficiency of smaller jet aircraft many of the limitations of the runway length at KOWD have become less significant in limiting KOWD as an alternative. Jet aircraft are more powerful, have a lighter empty weight and better short field performance compared to legacy jet aircraft. These more efficient jet aircraft consistently note fuel pricing as well as facilities as the leading variable when choosing what airport to use. With the location of Norwood from Boston and surrounding areas the trend should be toward more operations and use by corporate travelers.

The price of jet fuel and facilities compared to other airports has not been considered in the TMPU as a significant negative factor for the airport. Coupled with poor management and the continued turmoil created by years of conflict this has influenced operators to avoid Norwood Airport. Corporate travelers want competitive fuel prices, modern facilities, access to the airside without overly burdensome security policies and consistent working relationships between operators and the airport management. General aviation enjoys the spill over benefits when corporate aircraft utilize the airport and contribute to the investment of airport facilities. The airport has neglected to pursue corporate partnerships and development of facilities which contribute to the overall success of the airport.

The TMPU fails to include analysis of the limitations imposed on the airport when the environment is perceived as being negative between users and the airport management. The TMPU fails to include any analysis from the commercial business on the airport regarding the perception of management toward users and selective imposition of conditions which detract from the reputation of the airport in the commercial aviation community. Many jet aircraft owners have left the airport because of the failure by management coupled with the monopoly conditions created by a single FBO. Fuel prices, facilities and the relationship between users and the sponsor have created a negative image of Norwood Airport. This removes the airport from consideration when corporate aviation users evaluate possible locations to base or operate.

These critical concepts have driven the decline of the airport. Without an honest impartial analysis of the airport this trend will continue.

The significant decrease in based aircraft is ignored in analyzing the underlying reasons for the failure of the airport over the last 10 years. Utilizing questionable government reports which lack

realistic data in their analysis only increases the inability to realistically address failure based on measurable data.

The TMPU attributes declining based aircraft on runway length while ignoring fact-based analysis of jet or turbo prop operations. No attempt was made to obtain information from operators who have departed Norwood in significant numbers. No attempt is made to engage actual jet or turbo prop users to understand their needs. Numerous surveys are available providing realistic data to analysis current real-world use and future trends. Fractional users are exploding nation wide but continuing to avoid Norwood is larger numbers. Fuel pricing, facilities and access on the airport are the driving factors for corporate users. Without a clear understanding of these facts the sponsor can not understand the true reason for the decline of the airport. There are many jet or turbo prop aircraft that could choose to base or use Norwood airport but have chosen other regional airports. The runway length is not the significant factor in many of these decisions.

17. The based aircraft hangar table on page #2-13 is incorrect. The number of aircraft shown is incorrect. This data should include the specific type and size of based aircraft to provide a clear understanding of the actual users at the airport. By utilizing the design group classification in another attempt to restrict BEH and its operations a more detailed data set would assist in understanding the actual type and class of based aircraft.

Hangars on or adjacent to the vehicle gate lanes of gate lane 2 and 3 contain most of the larger jet and turbo prop aircraft. Rather than construct the TMPU to further restrict the operations of BEH the actual aircraft utilizing the hangars would present a true picture of operations. Without incident the users of Gate lanes 2 and 3 have operated for years in harmony safely. This table should include detailed types of aircraft currently stored in hangars which operate safely from the airport.

18. On page #2-16 fuel sales are discussed. This analysis is devoid of the most significant factor affecting fuel sales as measured yearly by numerous surveys. The price of fuel relative to airports regionally is cited as one of the most important factors influencing which airport commercial operators will use. Without competitive pricing corporate operations will select other airports or avoid buying fuel at Norwood airport even when they may land at Norwood. Cooperative working relationships between airport management, FBO's, users and sincere efforts to improve accessibility for potential corporate operators are necessary. Coupled with higher fuel prices relative to other airports the airport has seen a decline in based jet aircraft and fuel sales. Runway length may explain limitations in attracting larger corporate aircraft however fuel pricing, facilities and poor working relationships have had hurt the airport more than runway.

The airport also suffers from a poor plan addressing snow. Closing the airport after other similar airports have opened impacts the current operations and becomes a factor in planning for operators. Operators will plan to avoid getting stuck at Norwood airport. This can cause several days of lost operations before and after storms in the winter months. This factor is not discussed in the TMPU.

19. Page #2-17 under responsive FBO lists several factors which may affect fuel sales. Nationwide surveys show Fuel price, facilities and customer service as key factors when operators choose and rate FBO's. No data or analysis is provided to understand the impact of a single FBO on the overall operation of the airport. Detailed surveys are taken yearly regarding FBO metrics. Norwood has a single FBO. Management can work with the FBO's, operators and other stake holders to develop a way to assess the factors effecting the operators use of Norwood airport. Evaluating the factors seen by users as important will allow the airport management opportunity to assess services.

Airport management should retain an independent consultant outside the area to evaluate the airport using factors cited in nation wide surveys. With this data the airport can develop a master plan meeting the needs identified as lacking while planning realistic improvements based on the actual needs of users.

20. On page #3-19 the TMPU draft discusses design standards and facility needs. This critical section does not include any data on the actual users of the airport and does not identify the design aircraft type for the airport. Aircraft capabilities have dramatically improved since the last master plan of 2004 and 2007. Runway length has become much less of a limiting factor being overtaken by improvements in aircraft design, performance and use. Advances in turbo prop aircraft in the charter or fractional industry coupled with increases in jet aircraft utilization have made Norwood runways more useful for current commercial/commercial operators.

The design standard does not reflect the actual users of the airport or ground operations. Data from the types of aircraft using the airport is essential. Norwood has had a significant and long history in helicopter operations. No outreach has been made to assess the actual needs of helicopters operators. With its location and history Norwood is uniquely positioned to meet the needs of commercial helicopter operators.

The facility needs section has no information regarding the BEH FBO capabilities and new state of the art fueling system installed at the BEH facility. In March of 2018 I reached out to Jeff Adler of Dubois and King regarding the TMPU. Mr. Adler understands since 2013 BEH has invested millions in pursuit of a full service FBO. Mr. Adler has been involved in the approval of the BEH fuel. No mention is made of the BEH fuel system or positive impact from this investment in the airport

Prior to 2013 the "TOFA/OFA" concerns are not mentioned anywhere regarding gate lanes 2 and 3 at Norwood airport. Claimed NFPA restrictions are not applicable at the airport but have been used to further restrict operators. The TMPU, without any input or discussion with BEH, proposes to expand restrictions on BEH while ignoring current proposals by the NAC to remove restrictions based on actual use. The current operations of the airport regarding the Gate 2 and 3 lanes is not detailed in the TMPU. A review of the 2004 and 2007 master plans shows the gate lanes were not discussed or noted as any operational problem. The Taxi way system is clearly discussed which does not include the gate2 and 3 lanes.

21. Page #3-25 figure 3-4 shows the "Existing taxi lane system of Norwood Memorial airport. This figure does not designate non movement areas with the same designation as figure 1-4, page #1-13. Figure 3-4 does not depict the actual use or claimed restrictions on these areas. Numerous lease plans and fueling plans show varying rules and designations for the non-movement areas at the airport.

Lease plans for Lots ABC, Lot 6, Lot 7, DC-3 ramp, West ramp, WXY lease, gate lane 2 and gate lane 3 show various TOFA/OFA restrictions or lack of restrictions and varying NFPA setbacks. The selective and inconsistent application as well as enforcement of these restrictions has been an ongoing problem since BEH proposed to provide competitive fuel operations at the airport. The FAA has been aware of these issues since 2013.

Gates 1,2 and 3 are primary vehicle access points for the airport. Emergency vehicles as well as daily vehicle traffic utilize these gates 24 hours a day. Hangars, fire hydrants, light poles, electrical structures, power line poles, signs, security camera poles, and parked vehicles are in vehicle gate lane 2 and 3. These items have in some cases been present for many years.

The entire area is a non-movement area with no tower control. Additionally, the pavement markings exist throughout these areas but are subject to different restrictions depending on unknown standards. The suggested standards are not in any way reflective of the actual use in these areas. The airport should be working with the FAA and users to understand the actual use of these areas to develop or improve safety. The current draft simply supports selective enforcement of unsupported restrictions on BEH in favor of Flight Level.

Proposing conditions and restrictions that cannot realistically be implemented until 2047 or beyond is a waste of valuable opportunity squandered by this TMPU. Recent lease extensions against the warnings from FAA has only made this TMPU appear to be designed to inflict further retaliation on BEH in favor of a single FBO at Norwood.

22. Page #3-28 briefly discusses hangar needs and development as well as helicopter needs. Throughout this process BEH was never invited or involved in any analysis of this area. As a user of the airport for over 20 years and a premier helicopter charter operation it is confusing why BEH would not be involved in these critical areas. The TMPU also fails to include the detailed analysis of the 2004 and 2007 master plan regarding alternatives for future airport development.

There are significant portions of land available on the North quadrant of the airport which can be utilized for the needs presented. Airport land is leased long term to Verizon communications under a sub-lease. The airport claims an income stream from this airport land justifies the non-confirming use of this land. The primary mission of the airport is to protect and develop aviation with the resources available. The short-term gain from the income derived from this land fails to explore the long-term damage realized by the airport. The 2004 and 2007 master plans detail a realistic plan to develop this area and acquire further adjacent parcels which would improve airport safety while insuring to the success of the airport. The NAC carries these acquisitions on the CIP list however they have taken no action to support this plan. Providing a long-term lease of airport land without FAA approval has prevented implementation of the detailed plans from 2004 and 2007. This failure

to protect the airport while complying with MASS DOT and FAA grant assurances has had a long-term negative impact on the airport. The haphazard design and construction of helipads without any input from operators and users has also failed to address the needs of the helicopter users. Helicopters are now scattered throughout the airport without proper facilities or lighting.

23. Page #3-29 discusses the airport fuel farm. Dubois and King as well as the NAC have been involved in the BEH fuel farm since 2012. Since the completion of the BEH fuel farm in 2014 BEH has attempted to begin FBO and fueling operations. No one from airport management or Dubois and King involved BEH in this critical area or discussion. There is no mention of the BEH operation, facility or fuel farm. There is a pending Part 16 decision regarding numerous violations from the NAC which include the orders from FAA and MASS DOT regarding the NAC immediate approval of the BEH FBO permitting process. How or why the TMPU would fail to include the 30,000-gallon fuel facility is distressing.

The TMPU also suggests the use of self-service fueling facilities. BEH designed a fuel system to allow both Avgas and Jet self service fueling in 2014. The NAC denied this request utilizing new and unknown NFPA-TOFA/OFA restrictions.

The TMPU also fails to mention the self-service Jet fuel facility for the airport which was approved and support for use by the airport manager and NAC for Flight Level. This facility was used without incident for commercial jet fueling. Rather than restrict current capabilities the TMPU should explore the use of both the Flight Level and BEH self-service fuel capabilities.

24. Page #3-31 discusses the need for an aircraft wash area. BEH installed an oil water separator to allow aircraft washing in our hangar. This facility is not listed in the TMPU.
25. Page #3-33 discusses access points and land needs briefly mentioning the 2007 master plan. The TMPU fails to include the lack of access for the North end of the airport or the recent offer by the NAC to construct a new gate in the gate 3 area. This new gate would include a turn around area and pedestrian gate access.

The CIP for the airport since 2007 has included land acquisition as a primary objective in protecting the RPZ and development of needed hangars with ramp/apron area. The TMPU fails to mention this plan in detail and claims restrictions due to environmental considerations. This contradicts the actual physical layout of the land, the actual location of wet lands and the proximity of these parcels with the airport. After leasing and the allowing a sub-lease of airport land without FAA approval the NAC attempted to justify these violations with environmental concerns. Access from the airport to the Verizon airport lease area is available without significant wet lands disruption. The parcels which abut the Verizon lease area are currently being used commercially and provide a significant opportunity for the airport. Hangar development as well as proposed options for runway 10/28 were detailed in the 2004/2007 master plans.

The airport failed to execute this plan which would have protected the RPZ and insured the success of the airport through the long-term strategy. AIP funding has been available since

2004/2007 for the land acquisition to realize this opportunity. NAC presented this option on the yearly CIP listing however they failed to develop this opportunity. The leasing of airport property for 20 years to Verizon inserted a self-made obstacle to placing the needs of the airport behind Verizon communications and a private non-aviation entity. Once the lease was changed to allow sub lease of the airport land in favor of the private non-aviation developer the actual acquisition of the relevant parcels was impossible. Rather than realize this the airport continued to present land acquisition in the CIP which was misleading. The CIP acquisition of land was impactable as the critical middle land area had been leased by the NAC for 20 years.

The Verizon lease area could also have met then need for parking on the North end of the airport leading to the execution of the acquisition of adjoining space for the airport. This area should be returned to aviation use and explored in the TMPU.

26. The TMPU explores options to address claimed design standard violations which may harm the airport or fail to bring the airport up to the design group. No analysis is made regarding the historical use of these areas or the current practice.

In 2013 the airport placed new restrictions in the Airport Facility Directory (AFD) regarding gate lane 2 and 3. These restrictions limited aircraft on gate lane #2 to a 50-foot wingspan while Gate lane #3 was limited to aircraft with a 45-foot wingspan.

These new restrictions ignored the historical and current use of the gate lanes. Gate lane #2 has been used by aircraft safely for years with wing spans up to 63 feet.

Gate lane #3 has been routinely used by aircraft with wing spans up to 52 feet. Additionally, NFPA standards for airports do not apply under the Massachusetts Fire Code. The approval and use of the self-service fuel cabinet off Gate lane #3 by aircraft with a wing span of 52 feet further demonstrates the safe operation in these areas.

An analysis using current as well as historical data would show these gate lanes are and have been used over the past 11 plus years without any safety concerns or incidents.

Recent discussion between BEH and the NAC have resulted in the NAC supporting a realistic approach to the gate lanes at the airport. The NAC supports the elimination of taxi lane markings on Gate lane #3 which should include Gate lane #2.

These gate lanes (Gate #2 and #3) are primary vehicle service roads which includes use by emergency vehicles. AC 150/5300-13A Paragraph 404.b(1) states in part: The taxi way and taxi lane OFA clearing standards prohibit service vehicle roads, parked aircraft and other objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes. Vehicles may operate within the OFA provided they give right of way to oncoming aircraft by either maintaining a safe distance ahead or behind the aircraft or by exiting the OFA to let the aircraft pass.

Based on the history, current use and FAA guidelines a more practical and safer alternative to the options presented in the TMPU is the removal of the TOFA/OFA restrictions with markings consistent throughout the non movement area of the airport.

This change is completely consistent with FAA standards, and is identical to other actions that have been taken at the airport. Lots 6 and 7 have areas with taxi way markings where no TOFA/OFA restrictions exist. Lots ABC also have markings although TOFA/OFA restrictions do not exist according to airport management.

At present, taxi lane markings extend from the North South taxi lane all the way to the airport fence at Gate 3 and well short of the fence at Gate #2. Gates 2 and 3 are vehicle gates, not an aircraft gate, so Gate 2 and 3 is not a destination for aircraft using the taxi lanes.

The destination for aircraft using gate lane 3 is the ramp area between the BEH hangar and the Y2K hangar leased by Flight Level on Gate lane #3. Both the BEH and Y2K hangar properties abut the airport fence and access road, and there are no airport facilities accessible by aircraft beyond the ramp between these two hangars. The destination for aircraft using Gate #2 is the hangars or T hangar complex which abut Gate lane #2. Both hangars open onto this section of ramp and use it for aircraft parking or ground handling.

Accordingly, when aircraft on the gate lanes (Taxi lanes) reach the gate they are on a ramp area where it will be parked or moved into a hangar, and no longer using a through taxi lane to anywhere else. The taxi lanes should extend to this area, but not through it.

This condition is incorporated throughout the airport non movement areas, based on the actual use. First, the North South taxi lane (formerly Taxiway B) markings were removed from the helipad area on the North end, which is now marked as open ramp. The area between Flight Level's Y2K hangar and BEH's hangar would be treated the same as other areas on the airport. In the past, aircraft have been parked, fueled and moved in front of the hangar without any issues or concerns; elimination of the taxi lane markings will simply allow those actions to continue as they have in the past without any problems. This will make the non movement areas consistent throughout the airport.

The lease plans for ABC ramp show the removal of the TOFA/OFA conditions although these areas have the same markings as the gate lanes. FAA standards support this change, and do not require that the taxi lane be continued through the middle of this ramp. FAA Advisory Circular 150/5300-13A, paragraph 102, defines a taxi lane as:

www. Taxi lane (TL). A taxiway designed for low speed and precise taxiing. Taxi lanes are usually, but not always, located outside the movement area, providing access from taxiway (usually and apron taxiway) to aircraft parking positions and other terminal areas.

Chapter 5 of AC 5300-13A, *Aprons*, at paragraph 502, defines "Hangar apron" as "an area on which aircraft move into and out of a storage hangar."

Clearly, FAA design criteria assume that a taxi lane will extend "to" an apron, not through the middle of an apron unless there is another apron area beyond it, which is not the case here.

In addition, the decision to designate certain areas of the airport as a taxi lane results in an entirely unnecessary liability exposure for the NAC. There are several permanent immovable objects on both sides of the taxiways (Gate lanes) that impair the object free area. In the event that there is a mishap in this areas resulting in aircraft damage the NAC is going to be liable to the operator as the result of the misleading taxiway markings because an aircraft operator is entitled to rely on the representations regarding the wingtip clearance that taxiway markings make. Current markings are inconsistent with the AFD as well as practical application.

A review of FAA advisory circulars makes clear that a taxi lane is not required by FAA standards in that location. FAA AC 150/5300-13A, *Airport Design*, defines a taxi lane as a taxiway designed for taxiing aircraft "to aircraft parking positions and other terminal areas." This clearly does not apply to the Gate #2 or #3 lane, because there is no parking areas or other terminal areas at the end of the lane; there is just the airport fence and a vehicle gate. The fact that the taxi lane was marked on an AIP grant application means only that FAA allowed the taxi lane there, not that the agency required it as a condition of the grant

The current taxi lane designation has no safety benefit, (indeed it is a safety detriment as described above) and serves only to restrict operations. Gate #1 contains no taxiway markings even though that area sees far more vehicular and aircraft traffic than Gates #2 and #3. In addition, that area of the airport has no permanent objects that would impair the taxiway object free zone.

In summation, the taxiway designation leading to Gate #3 as well as Gate #2 is an inappropriate, irrational and unsafe designation that protects no one while badly impairing the utilization of these areas. Planning based on removing buildings is impractical based on existing leases.

27. Highlighted in the past Master Plan of Norwood Airport is access for users and customers (on the North end of the airport) consistent with the safety and security of Norwood Airport. Norwood Airport is lacking in the ability in the North end of the Airport to allow entry and access consistent with the security plan, to users.

Recently the NAC has supported the following actions regarding TOFA/OFA restrictions at the airport. The following suggested improvements, consistent with the Master Plan and security in place would improve access at the North end of the Airport. This alternative is realistic, safe, economical and contributes to the airport.

The NAC supports both removal of TOFA/OFA restrictions and construction of a new improved Gate #3 are, including a pedestrian gate.

Currently Norwood Airport only has one pedestrian gate to access the entire Airport. This gate allows the existing single FBO (Fixed Base Operator) ease of access to their facility and ingress/egress from the Airport and their facility. There are 3 vehicle gates (One which is located attached to Gate #1) which allow user's access to the Airport if they have a valid code and security

card. The lack of gates is noted as a deficiency in the past Master Plan and recommends additional gates. Users who are not based at Norwood without a security badge can not access the airport after the single FBO closes without paying to call someone in to allow access.

The BEH facility abuts Gate #3 and there is currently no pedestrian access at this area. Users inside the gate cannot exit the area without either a vehicle driving over the gate pressure pad or walking approximately ¼ mile throughout the Airport to the Gate #1 Pedestrian gate. This process is dangerous to pedestrians and users of the Airport and will not allow pedestrians to enter or exit the Gate #3 area. The gate #1 users can enter the Airport through the FBO lobby during Normal Business Hours or through the Pedestrian gate. Additionally, the FBO personnel can exit the Airport area via their gate or door. There is no such access at Gate 2 or #3. There is currently only one way to exit Norwood Airport while walking and that is through the Gate #1 Pedestrian gate. We can also not exit the Airport from Gate #3 on foot to allow a vehicle to enter the Airport under escort to our users as is possible at Gate #1.

Consistent with the security plan commercially permitted operators should be allowed to possess remote Vehicle gate opener (Garage door opener type device) so that after proper identification they can open the vehicle gate from inside the security fence and allow users to access their facility and property. This system allows users to pull up to the gate and contact the operator for attention. When the user is properly identified it allows the facility person to open the vehicle gate and gain access to the facility.

Consistent with the security plan install a pedestrian gate at Gate #3 exactly like the Pedestrian gate at gate #1 to allow users to enter and exit the facility on foot when needed. This is a common practice at Airports around New England and allows egress from the Airport with a self closing gate. Most Airports have a standalone gate with gate access lock whereby users can access the Airport with a generic security code. This is standard throughout New England and particularly allows after hour's access to users without the added cost of bringing in Staff for users.

Consistent with current practice and the security plan move a portion of fence along Access Road next to the property so a user can enter the BEH FBO facility from the building and exit the facility to the street. This would require a small movement of fence and allow consistent access from the exterior of the Airport to the BEH facility.

The Airport master plan notes in numerous cases the lack of support for parking in the North end of Norwood Municipal Airport and the need for additional facilities to include parking around the North end. The Master Plan begins to address the parking need to develop the North End. The Commission owns a parcel of land on the North End which is controlled by the Airport Commission and is part of the Norwood Airport and Master plan for the Airport. In the future planning and AIP program the Commission should support the additional purchase of land as outlined in the Master plan from 2004/2007 and take control of owned land to support the Airport and operations. With added parking and facilities consistent with the Master plan Norwood Airport stands to gain an increase in utilization and safety as well as expansion of property and aviation operations which directly abuts the Airport.

28. The alternatives section on Page # 4-38 contains inaccurate information.
- A. The assumptions state the available runway length does not meet the needs of the current fleet and existing critical aircraft. The current fleet using Norwood operates safely within available runway dimensions. It would clearly benefit the airport to expand the runway with over run areas and lengthen the overall runway. Norwood will never be able to accommodate the "Existing Fleet" of aircraft which includes the Boeing 747, etc.
 - B. There is limited room for airside hanger and apron development. The 2004 and 2007 master plans outlined a clear process to develop existing airport land, including the Verizon Airport lease parcel, as well as acquire the abutting land for airport use. AIP funding has been available since these plans for execution. By encumbering the airport land with a 20 year lease and then allowing sub lease, the needs of the aviation community were placed behind the needs of the private entity. This failure essentially destroyed the development of the airport since the 2004/2007 plans were ignored.
 - C. Rather than spending valuable resources and environmental permitting credit to realign taxi way C the airport should concentrate in acquiring available land as outlined in 2004/2007. Utilize the wetlands remediation available to develop land for hangers and apron.
 - D. Rather than encumber valuable apron space for a "wet wash area" utilize existing facilities such as the BEH wash area and available wash areas from airport tenants.
 - E. Rather than reconfigure taxi lanes when this process is impossible for at least the next 20 plus years, the current operation should be maintained. With equal and consistent enforcement rather than targeted enforcement to prevent aviation service providers from operating, the airport should remove the restrictions throughout the non movement area. This process is outlined in my prior comments. The alternative taxi lane configuration is simply designed to prevent BEH from operating a fuel system from our leased property.
 - F. Page 4-41 attributes the runway length to lost fuel revenue. This analysis ignores numerous other reasons outlined prior that have led to a decrease in fuel sales.
29. Page # 4-49 includes figure 4-3 which shows several incorrect presentations. The map shows a "Fuel service vehicle access way" which no one can describe. This is nothing more than another easement in favor of the single FBO Flight Level to encumber airport land intended for BEH and our FBO operations. The NAC has offered both the West apron and the DC-3 apron to BEH for FBO operations. However, unknown to BEH the NAC intends to place an easement for Flight Level running between the BEH FBO apron. This would allow Flight Level, at their leisure, to insist BEH remove all aircraft and stop operations on our FBO operating apron. This disruption could take place whenever the competitor desired to disrupt BEH under the claim of needing this area to operate their fuel system. This contradicts assurances by the NAC that there are no easements or encumbrances on the West apron.
- This map also shows an item labeled " 25' mobile fueling setback, (typ)". Dubois and King engineers acknowledged at the April 30, 2019 NFPA "set backs" are not in the Massachusetts fire code for airport operations. The imposition of phony NFPA standards has been used to prevent BEH from operating as an FBO for many years. Any map or diagram in the TMPU which shows this "setback" is incorrect.

30. Pages # 4 -57 to 4-63 are filled with incorrect data and assumptions. The issues cited along with alternatives presented are designed to assist the existing FBO in developing AIP ramp space while removing TOFA/OFA restrictions while utilizing TOFA/OFA restrictions to stop BEH from utilizing a fuel system first approved in 2012. By moving the Taxi Lane on gate lane #3 South the plan would place all BEH fuel system components and operations inside a TOFA/OFA, assisting the airport in blaming others for stopping competition. These plans also contradict the recent offers from the airport to BEH supporting the removal of TOFA/OFA restrictions.

Without a realistic assessment of the actual conditions, coupled with FAA oversight and involvement from everyone, the TMPU is designed to further restrict access from BEH as a service provider at the airport. The intent of the TMPU should be to involve everyone, tenants, users, aircraft owners/operators, service providers, FAA, MASSDOT, the community and businesses which contribute to the airport to protect aviation. Without involvement from everyone and an intent to produce a plan that prevents competition and destroys business, the TMPU shows simply highlights the toxic environment at the airport.

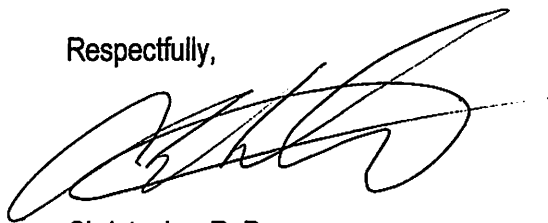
Questions and comments regarding the existing conditions in the TMPU.

- What capital plans has Flight Level Norwood proposed to the airport authority to address issues and concerns listed in the TMPU?
- Boston Executive Helicopters constructed a 15,000 SF hangar and state of the art fuel system at the airport. This significant improvement to the airport is not mentioned in the draft. No interviews were conducted by the consultant or FAA regarding this significant investment in the airport.
- The TMPU does not adequately address transient parking aprons and vehicle parking areas in accordance with the prior Master Plans from 2004 and 2007. A comparison of other airports would show a lack of modern tie downs (With electrical power at each tie down) as well as excessive and unnecessary security requirements which hamper efficient access to the airport contribute to declining use.
- The airport was cited for failing to maintain the Airport Layout Plan (ALP) in accordance with FAA requirements in the pending Part 16 violations. The ALP should be included in the draft and available online for review and input by the stakeholders as well as the users of the airport.

Questions and comments regarding AC 150-5070-6B as it applies to the TMPU.

1. The Master Plan is a comprehensive study of the airport. It should detail issues and problems facing the airport including land uses in the vicinity of the airport. The draft does not address any issues or problems surrounding the violations cited by the FAA in 2008 and November 2018 regarding the Norwood Airport. This critical information and corrective action plan(s) (CAP) should be included in the TMPU.
2. The Master plan study should include "Public involvement- establishing a public involvement program and identify and document the key issues of various stakeholders". I am not aware of any public involvement other than the April 30, 2019 meeting.
3. No public discussion was ever undertaken at the public NAC meetings regarding the scope, involvement or proposed issues of the Master Plan update.
4. Any "Technical report" in the Master Planning process should include coordination with Government agencies, tenants, users and the General public.
 - A. BEH has constructed a large fuel facility and associated "FBO" building on the Norwood Airport
 - B. No one from Dubois and King, The Town of Norwood, Norwood Airport Commission, FAA or the airport manager ever contacted BEH to discuss the Master Plan update or solicited any input from BEH.
 - C. No information was distributed to the public or placed on the airport web page until after the draft meeting held on April 30, 2019. This meeting was not widely noticed and only approximately 5-7 people attended this meeting. The single current FBO on the airport was not present.
 - D. No public information kit or material was ever distributed to the general public or users of the airport.
 - E. The FAA must approve the Airport Layout Plan under the Master Plan. With multiple ongoing Part 16 violations, which in part include violations associated with the ALP, Leasing, Ramp use and use of airport land for non-aviation uses, it is imperative the FAA accept and approve the Corrective Action Plan (CAP), prior to any approval of the Master Plan update. The FAA should encourage the airport to incorporate both violations and corrective plans in any future airport planning.
 - F. The first task of the Master Plan study is a "Public Involvement Program".
 - G. Public involvement should take place early in the planning process according to FAA guidelines. Throughout the Master Planning process BEH was never involved or included in any analysis.
 - H. There was no known public awareness campaign to involve the public. No public involvement is known regarding the Master Plan to include stakeholder meetings, user meetings or solicitation of any public input.

Respectfully,

A handwritten signature in black ink, appearing to read 'CR Donovan', with a large, sweeping flourish extending from the end.

Christopher R. Donovan

209 Access Road

Norwood, Mass. 02062