1 Purpose and Need

1.1 Introduction

Purpose and Need is an important part of the process established by the National Environmental Policy Act of 1969 (NEPA, as amended) (40 Code of Federal Regulations [C.F.R.] §§ 1500-1508). Federal Aviation Administration (FAA) Order 1050.1F, *Environmental Impacts: Policies and Procedures*, states that the purpose and need of an Environmental Assessment (EA) presents the problem being addressed and describes what the FAA is trying to achieve with the proposed action. In accordance with this guidance, the objectives of this section are to:

- Provide an introduction and background for context, including a brief description of the Proposed Action and summary of aviation activity at the Charlotte Douglas International Airport (the Airport or CLT);
- Define the "need" for the Proposed Action (where "need" is defined as the problem(s) the Sponsor is attempting to address);
- Define the "purpose" of the Proposed Action (where "purpose" is defined as the solution to the problem);
- Identify the federal actions requested of the FAA;
- Explain the environmental review process and timeframes; and
- Provide an overview of the EA document organization.

1.2 Background Information

The City of Charlotte (Sponsor) completed an Airport Capacity Enhancement Plan (ACEP) and Master Plan Update in February 2016. The ACEP utilized a comprehensive approach to understand the demand for and capacity of runways, taxiways, aircraft gates, ramp, and passenger processing facilities. The ACEP identified a number of deficiencies (needs) that exist at CLT. These included insufficient runway capacity and insufficient gate capacity and ramp space to accommodate the existing and future demand. This EA analyzes the proposed solutions (purpose) to meet the needs of the identified deficiencies.

The ACEP focused on two design years, 2023 and 2033, to stage the development of growth. For both design years, the ACEP developed facility requirements and expansion recommendations for airfield, aircraft gates and passenger terminal facilities, which serve as the basis for the Sponsor's Proposed Action that is the subject of this EA. Past planning efforts that describe the facility requirements considered in the development of the Sponsor's Proposed Action include the following:

- Charlotte-Douglas International Airport Master Plan Update (Phase 1) – Airport Capacity Enhancement Plan (ACEP), completed by Landrum & Brown in February 2016.
- Charlotte-Douglas International Airport Master Plan Update (Phase 1) – Airport Layout Plan (ALP) Narrative Report, completed by Landrum & Brown in February 2016.
- Charlotte-Douglas International Airport Master Plan Update (Phase 1) – Safety Risk Management Report, completed by Landrum & Brown and Applied Research Associates in February 2016.
- Charlotte-Douglas International Airport Master Plan Update (Phase 1) – Support Facilities Report, completed by Landrum & Brown in February 2016.

- Charlotte-Douglas International Airport Areas Strategic Development Plan, completed by MXD Development Strategists, Jacobs, Kimley-Horn & Associates, and Lyerly Agency in March 2017.

Following the completion of the ACEP, the Sponsor submitted an ALP to the FAA in February 2016, which was conditionally approved by the FAA on March 1, 2016. The FAA published a Notice of Intent (NOI) on March 22, 2018 in the Federal Register to prepare an Environmental Impact Statement (EIS) in support of the Federal actions related to the proposed capacity enhancements at CLT. The Proposed Action included the construction of a new 12,000-foot runway, Concourse B and Concourse C terminal and ramp expansion, and the construction of a new daily north parking deck.[1]

During the preparation of the EIS, the FAA updated the Terminal Area Forecasts (TAF) for all major airports in the U.S. due to the up-gauging[2] of aircraft that was occurring at a faster rate than previously projected. This up-gauging resulted in a decrease in operations at most major U.S. airports, including CLT. As a result, the aviation activity forecasts at CLT were also updated to reflect the change in fleet. In addition, the FAA prepared a runway length analysis during the EIS process to validate the need for a 12,000-foot runway. The runway length analysis was completed in October 2018 and concluded that only a 10,000-foot runway was required to meet the purpose and need for the project instead of a 12,000-foot runway. Given this change to a major element of the Sponsor's Proposed Action, the FAA began a process of reevaluating the appropriate level of environmental documentation for compliance with NEPA, the Council on Environmental Quality Regulations (CEQ) for Implementing the Procedural Provisions of NEPA (40 C.F.R. §§ 1500-1508),[3] FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, and FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*. This evaluation focused on likely changes to environmental impacts anticipated to occur as a result of the runway length change. The FAA determined that this was a sufficient change to one of the proposed capacity enhancements to warrant cancellation of the EIS and conversion to an EA. This was made public in the FAA's publication of a Notice of Cancellation in the Federal Register on February 27, 2019.[4] As such, the Sponsor is responsible for complying with the NEPA by preparing this EA in accordance with NEPA, all applicable Federal regulations, and FAA guidance. Similar to the EIS, this EA investigates, analyzes, and discloses the potential impacts of the Proposed Action and its reasonable alternatives. As the Federal Agency, the FAA is responsible for compliance with the requirements of NEPA, provides an independent evaluation of the environmental issues, takes responsibility for the scope and content of the EA, and makes a final decision of whether it can issue a satisfactory environmental finding based upon the EA. Additionally, the FAA determines whether it may take the Federal actions necessary to allow implementation of the project.

The project elements that make up the Proposed Action, shown in **Exhibit 1-1**, are a subset of project elements on the Future ALP. These project elements were selected to be analyzed in the same NEPA document because each would enhance capacity of the airport system and airfield efficiency at CLT during the same general period (with construction occurring between 2021 and 2028) and are reasonably foreseeable and likely to be implemented. The Proposed Action consists of the following

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1 The Sponsor has since removed the new daily parking structure from this EA and is evaluating it in a separate NEPA document as the project has utility independent from the Proposed Action in this EA. On March 2, 2020, the FAA formally approved CLT's request to remove the Daily North Parking Deck project element from the Major Capacity Projects EA.

2 Up-gauging is adding seats to aircraft and/or replacing smaller aircraft with larger ones.

3 The Council on Environmental Quality (CEQ) amended its regulations implementing NEPA effective September 14, 2020. Agencies have discretion to apply the amended regulations to NEPA processes that were begun before September 14, 2020 (40 C.F.R. § 1506.13 [2020]). FAA initiated its NEPA process for this project in March 2018 and has opted to apply the regulations in effect at that time.

4 84 Federal Register 6462 (February 27, 2019)

main project elements: construction of a new fourth parallel runway and associated exits and taxiways and expansion of the terminal (Concourse B and C building and ramp). The following describes the Proposed Action, the connected actions, and enabling actions of each element in more detail. [5]

Construction of a new (10,000-foot long by 150 feet wide) fourth parallel runway, capable of serving Aircraft Approach Category (AAC) D and Airplane Design Group (ADG) V aircraft (D-V), 1,200 feet to the west of Runway 18C/36C, including North and South End-Around Taxiways (EAT), Entrance and Exit Taxiways

1. Construct west parallel taxiway to provide access to the north EAT and south EAT to prevent runway crossings
2. Extend Taxiway V approximately 4,000 feet south from Taxiway S to the Runway 01 end to provide a full parallel taxiway between Runway 01/19 and Runway 18C/36C to facilitate more efficient flow of aircraft on the airfield
3. Construct 470,000-square foot Taxiway F hold pad to provide space for aircraft queuing for departure and provide arriving aircraft a staging area
4. Relocate approximately a one-mile portion of West Boulevard to an existing road in the footprint of the Runway Protection Zone (RPZ) of proposed Runway 01/19 and the south EAT
5. Construct a new Aircraft Rescue and Fire Fighting (ARFF) facility in the south airfield to meet emergency response times due to the additional runway crossings with new Runway 01/19
6. Acquire approximately 2.5 acres of land from Norfolk Southern, construct a 2,500 feet long retaining wall (material will be decided during design) and reconfigure the adjacent service road to accommodate the south EAT
7. Relocate FAA approach lighting buildings
8. Implement air traffic control and charted instrument flight procedures to support Runway 01/19

Expand existing terminal and ramp area to create additional gates to accommodate future demand

1. Expand Concourse B by approximately 180,000 square feet and reconfigure taxilanes to accommodate an additional 22 gates (depending on fleet mix)[6] and additional hold room area
2. Expand Concourse C by approximately 180,000 square feet, expand ramp by approximately 950,000 square feet, and reconfigure taxilanes to accommodate an additional 13 gates (depending on fleet mix) and additional hold room area
3. Reconfigure ramp to accommodate dual taxi, from Concourse E to Concourse C
4. Remove four gates off the end of Concourse D and replace the gates on the Concourse C expansion to allow for dual taxi along the east side of the terminal ramp
5. Remove 16,000 square feet and eight gates off the end of Concourse E and replace the gates on the Concourse B or C expansion to allow for dual taxi along the east side of the terminal ramp
6. Construct two crossfield taxi corridors, one south of the terminal complex and one through the north cargo area, to facilitate aircraft movement between the east and west airfield outside of the ramp
7. Reconstruct approximately 865,000 square feet of the ramp to replace pavement that has exceeded its useful life
8. Reconfigure Taxiway C and E connectors to comply with FAA design standards

[5] Section 163 of the FAA Reauthorization Act of 2018 limits the FAA's statutory authority over certain airport development projects. In this case, FAA reviewed the proposed project elements and determined that each is subject to FAA's decision and approval authority including, where appropriate, approval of the Airport Layout Plan under 49 U.S.C. § 47107(a)(16).

[6] Depending on final fleet mix, the number of gates could change.

9. Remove and relocate the Airport Surveillance Radar (ASR) to the northwest between Runway 18R/36L and Runway 01/19 to accommodate the expansion of Concourse B
10. Remove and relocate the triturator building into the existing terminal building to accommodate the east-west crossfield taxilanes and taxiways
11. Remove and relocate the Center Lighting Vault in the south airfield area to accommodate the east-west crossfield taxilanes and taxiways
12. Decommission Runway 05/23 and associated taxiways. Closure of Runway 05/23 necessitates updates to the nighttime noise abatement procedures. This will be completed in a Part 150 Update Study following the EA. In the interim, the nighttime noise abatement procedures would note the closure of Runway 05/23 and direct pilots to use Runway 18C/36C or 18L/36R. An interim plan for the use of the runway will also be completed.
13. Construct an approximately 665,000 square foot hold pad (Runway 18L end) to provide space for aircraft queuing for departure and arriving aircraft a staging area
14. Demolish and replace buildings 208 (American Airlines (AA) support), 209 (Delta Ground Support Equipment (GSE)), 210 (FedEx), 211 (Maintenance building), 212 (multi-tenant), 214 (airline support), 216 (GSE), 217 (LSG Sky Chefs building), 218 (AA), 247 (PSA Hangar), and 256 (AA maintenance storage) in the south midfield to accommodate the east-west crossfield taxilanes and taxiways
15. Demolish buildings #213 (Vacant), 215 (Vacant), 219 (Old Terminal), 220 (USPS), 221 (recycling center), and 246 (vacant maintenance building) to accommodate the east-west crossfield taxilanes and taxiways
16. Relocate approximately 2,500 feet of Yorkmont Road to accommodate crossfield taxilanes and taxiways and to provide landside access to relocated buildings
17. Construct an approximately 4,000-foot long midfield access tunnel to minimize future airfield pavement removal for access to a potential future satellite terminal
18. Construct a 20,000 square foot Federal Inspection Services (FIS) corridor between Concourse D and Concourse C to accommodate international operations that are forecasted in the future and cannot be accommodated at Concourse D where the existing FIS facility is located

Table 1-1 provides the estimated construction phasing of the major EA proposed project elements according to the Sponsor's Capital Improvement Program (CIP).

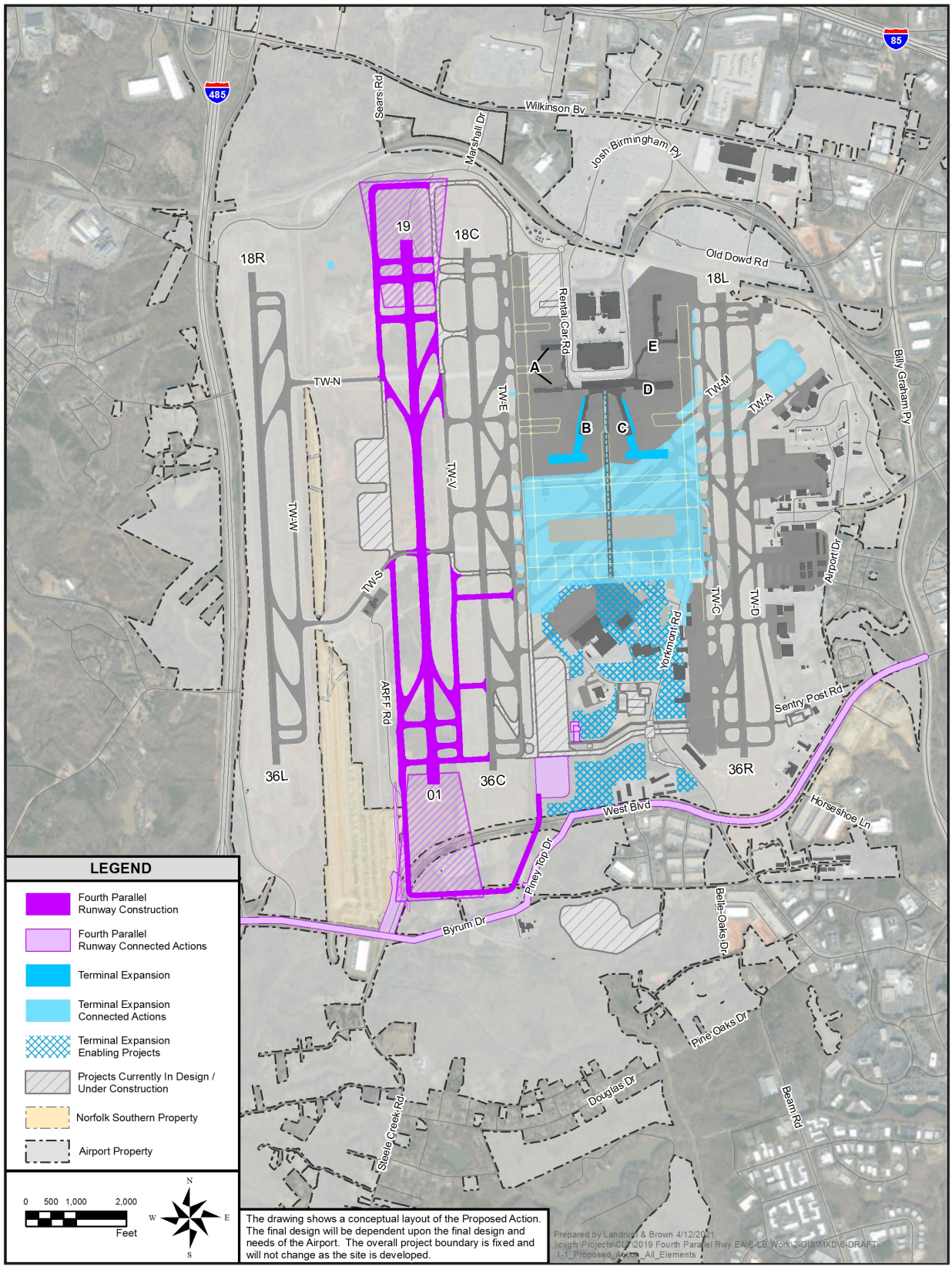
TABLE 1-1, SPONSOR'S PROPOSED ACTION PROJECT ELEMENTS AND CONSTRUCTION PHASING

Proposed Action Project Elements	2021	2022	2023	2024	2025	2026	2027	2028
Terminal and Ramp Elements								
East Ramp Dual Taxilanes	■	■	■					
Decommission of Runway 5/23	■	■						
Terminal Design		■	■					
Terminal Construction			■	■	■	■	■	■
South Ramp Design	■	■						
South Ramp Construction			■	■	■	■		
Runway Elements								
Runway Design	■	■	■					
Runway 01/19 Construction				■	■	■	■	

Note: Only the main actions included in the Sponsor's Proposed Action are listed in this table.
Source: Charlotte Douglas International Airport, January 2020

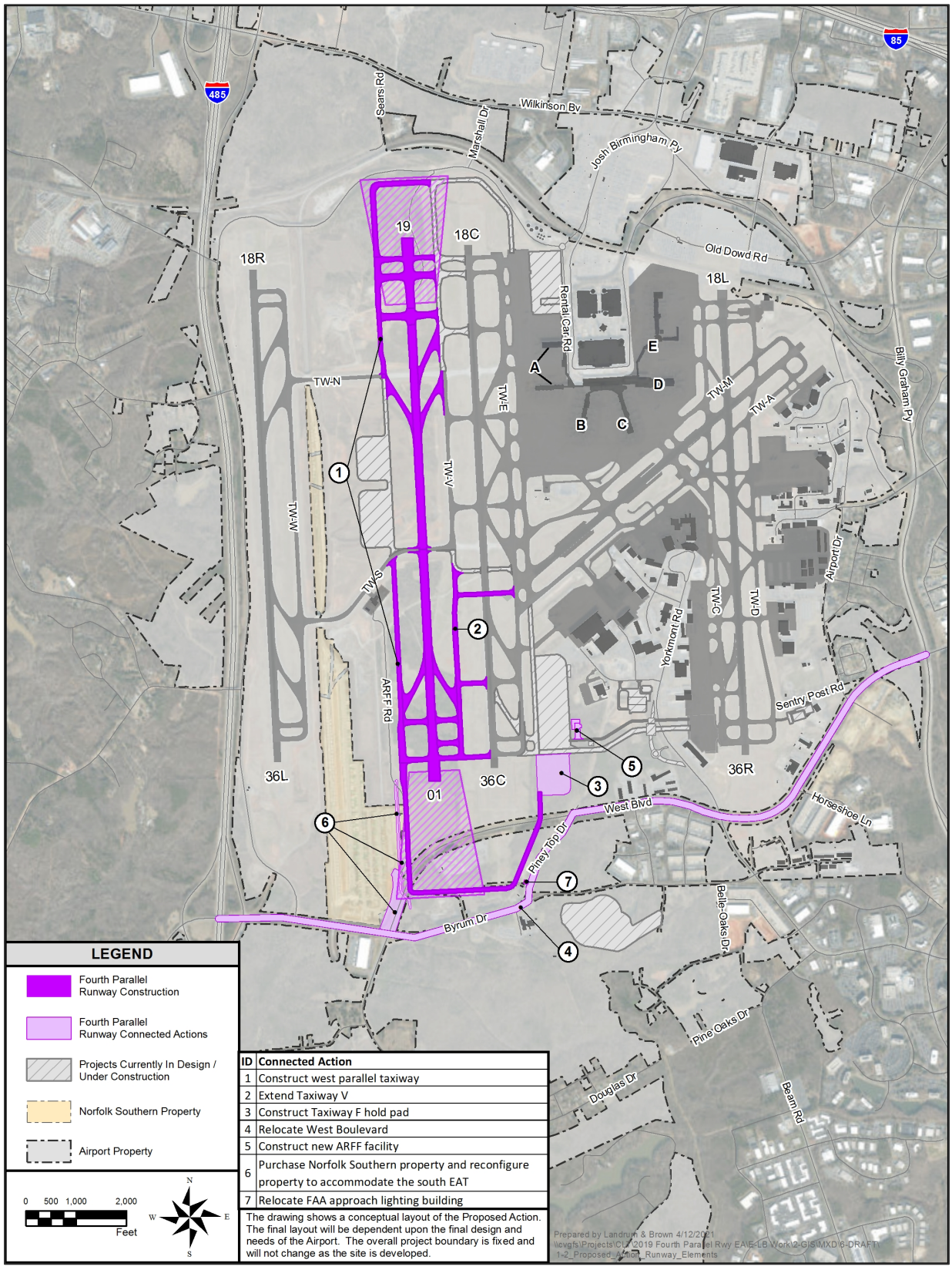
Each project element and connected actions, which are the subject of this EA, are highlighted in **Exhibit 1-1**, **Exhibit 1-2, Exhibit 1-3,** and **Exhibit 1-4**.

EXHIBIT 1-1, PROPOSED ACTION



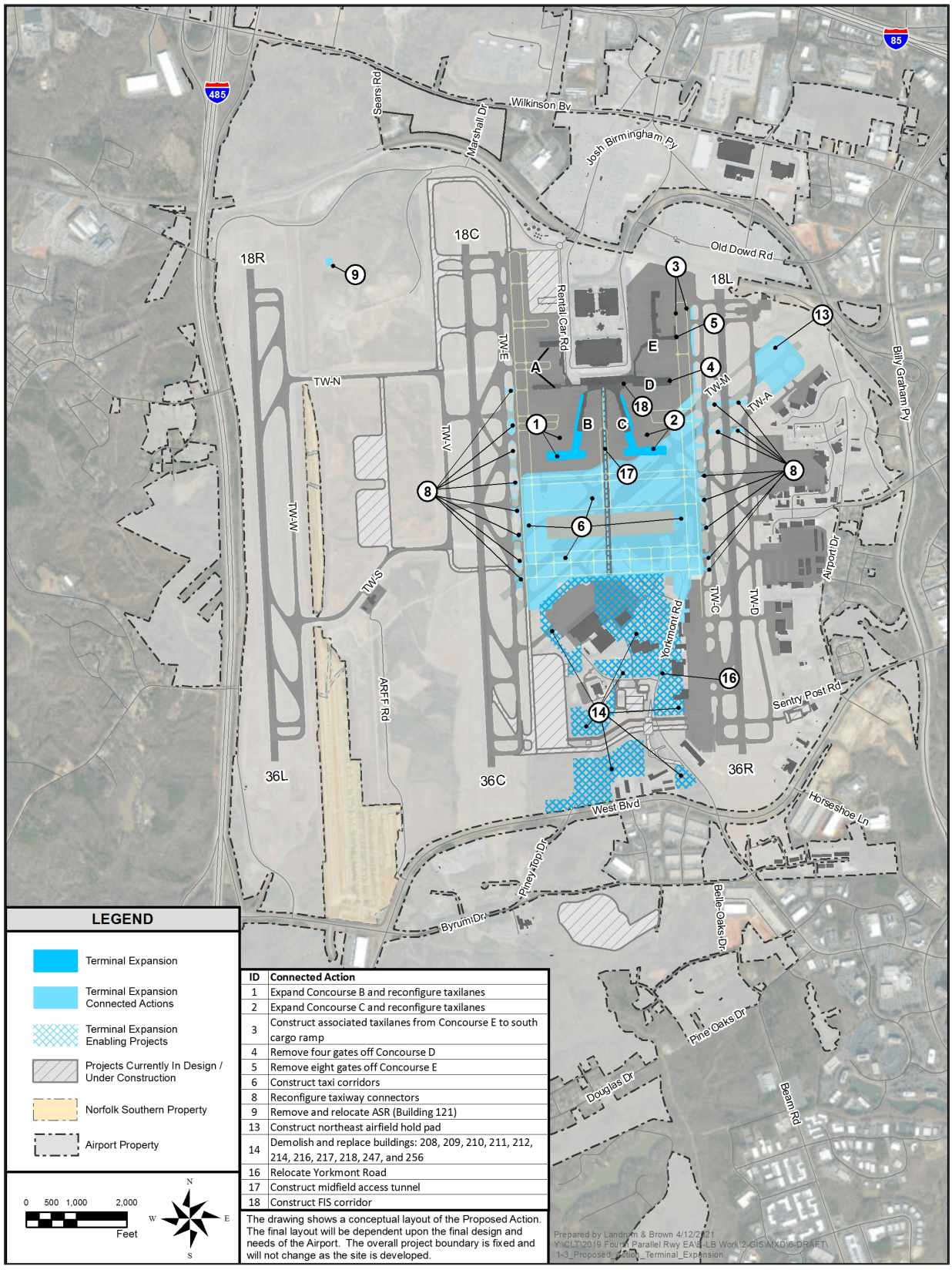
Source: Landrum & Brown, 2020

EXHIBIT 1-2, PROPOSED ACTION – RUNWAY ELEMENTS



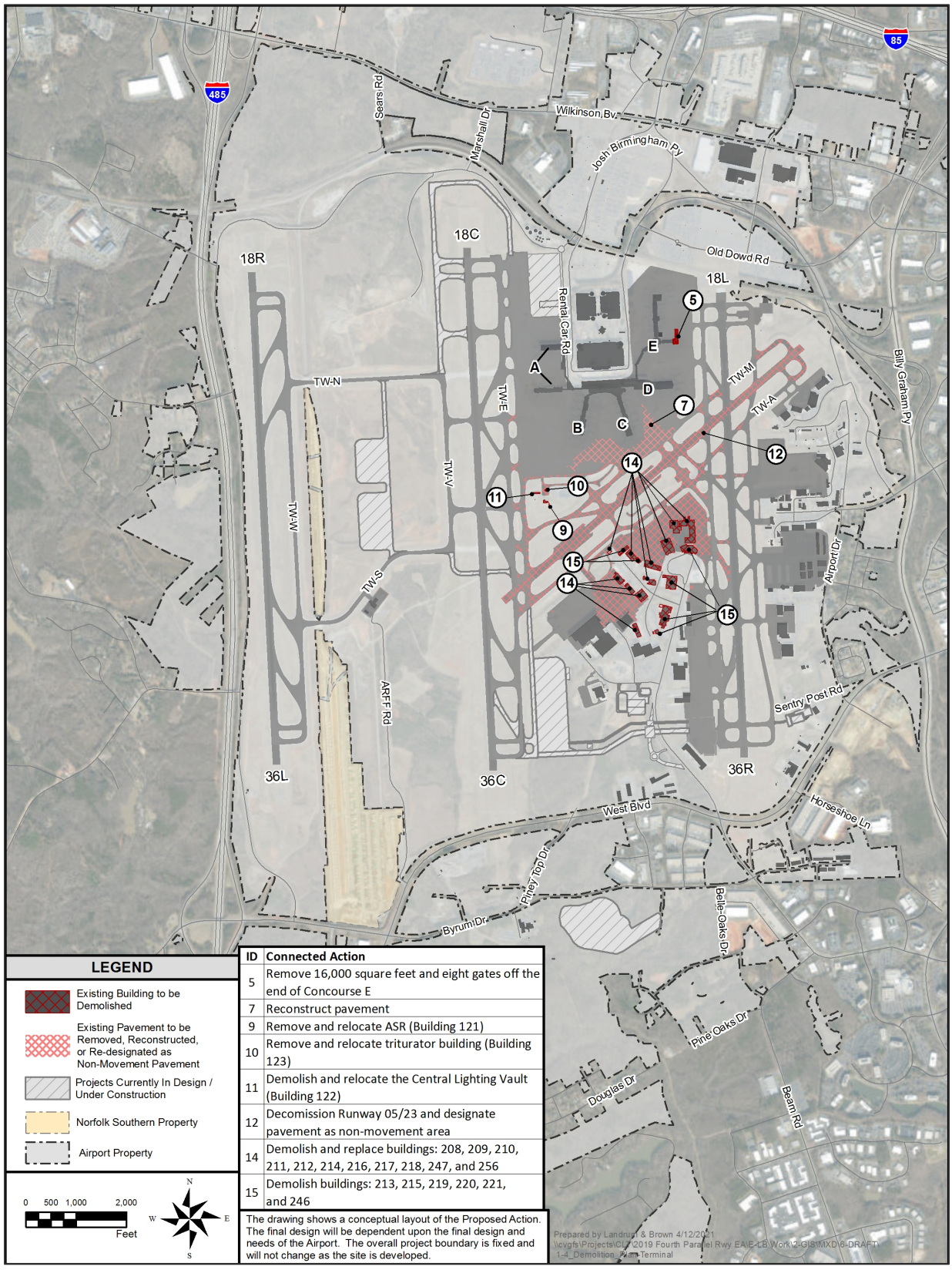
Source: Landrum & Brown, 2020

EXHIBIT 1-3, PROPOSED ACTION – TERMINAL ELEMENTS



Source: Landrum & Brown, 2020

EXHIBIT 1-4, PROPOSED ACTION – DEMOLITION ELEMENTS



Source: Landrum & Brown, 2020

1.3 Aviation Activity

As discussed in Section 1.2, the aviation activity forecasts were updated during the EIS process because the ACEP forecast was developed shortly after the merger of AA and US Airways was announced. The FAA determined it was necessary to update the aircraft operations and passenger forecasts that would be used in the NEPA analysis. As such, unconstrained, annual forecasts of passengers, aircraft operations and cargo tonnage for CLT for a 20-year period were prepared. The forecasts used 2016 as the base year, as this was the latest calendar year with a full year of available data when the NEPA process began. In addition, two benchmark years were examined more closely: 2028 (year when the Proposed Action is expected to open) and 2033 (opening year of the Proposed Action plus five years). **Table 1-2** summarizes the latest forecast for CLT for 2028 and 2033.

TABLE 1-2, SUMMARY OF CLT AVIATION ACTIVITY ANNUAL FORECAST

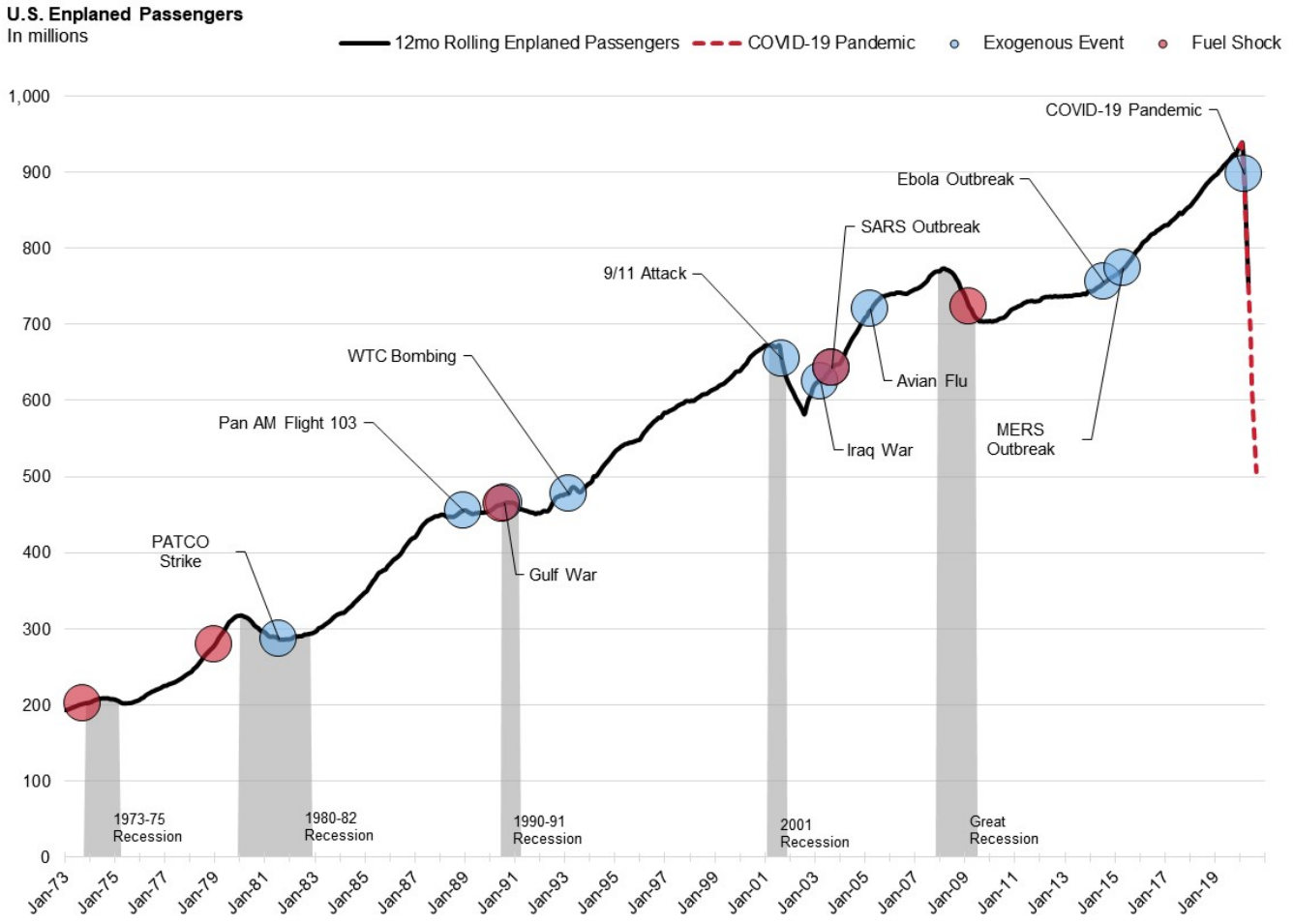
Aircraft Operations	2016	Opening Year 2028	Opening Year + 5 years 2033
Commercial	518,197	611,620	647,224
General Aviation	24,869	25,487	25,742
Military	2,676	2,676	2,676
Total Operations	**545,742**	**639,783**	**675,642**

Source: Forecast Technical Memorandum, Charlotte Douglas International Airport Environmental Impact Statement, prepared by VHB Engineering NC, P.C. in association with InterVISTAS, April 18, 2018

Since the forecast was prepared for the EIS in 2018, the COVID-19 pandemic has disrupted the aviation industry in an unprecedented manner. In the immediate aftermath of the spread of COVID-19 in 2020, travel restrictions were implemented, flights were suspended, business travel effectively disappeared, and airports were brought to a virtual halt in the U.S. and throughout the world. CLT was no exception to this trend. CLT had reached a record level of 50 million annual passengers in 2019 and was on track to have a record-breaking year in 2020 until the pandemic hit. In 2020, passengers were down 46 percent and operations were down 31 percent from 2019.

Although the magnitude of COVID-19's effect within the national aviation system has no precedent, the industry has experienced sudden system impacts before and has shown resilience for efficient recovery (see **Exhibit 1-5**). Every major worldwide incident, pandemic, or recession experienced in the aviation industry has had immediate and significant impacts to aviation. However, once the event has passed, the system has consistently recovered during subsequent years, showing resilience due to the underlying demand for air transportation for both leisure and business. Just as the national aviation system is expected to recover, CLT is as well; however, it is unknown how long it will take to return to pre-pandemic traffic levels. The FAA 2020 TAF shows that passengers and operations are forecasted to return 2019 levels around the year 2024.

EXHIBIT 1-5, AVIATION SYSTEM SHOCKS AND RECOVERIES



Note: Excludes non-revenue enplaned passengers.
Source: U.S. Bureau of Transportation Statistics, U.S. Air Carrier Traffic Statistics; Landrum & Brown, 2020

The timing of the EA projects could therefore potentially be delayed beyond the originally anticipated opening year of 2028. CLT officials will monitor actual trends in airport operations and passenger movements, in addition to short-term forecasts, to determine the most appropriate timing to implement the EA projects. As will be presented in later sections of this chapter, CLT was already experiencing gate shortages, terminal area taxiway/taxilane congestion, and runway delay levels that indicate the runway system was approaching capacity in 2016. Specifically, in 2016, the total annual of 545,742 aircraft operations used 87 percent of the airport's annual capacity. Given that the design of the EA projects is estimated to take approximately two years, with construction taking a minimum of five years, it is imperative that CLT does not delay the initiation of these projects. In addition, it is prudent to initiate design and construction before operations return to 2016 levels to take advantage of a less congested airport which would result in fewer operational impacts during construction.

1.4 Purpose and Need for Proposed Action

FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, states that the purpose and need of an EA presents the problem being addressed and describes what the FAA is trying to achieve with the proposed action. The purpose and need for the proposed action must be clearly explained and stated in terms that are understandable to individuals who are not familiar with aviation or commercial aerospace activities.

The purpose and need for the Proposed Action serve as the foundation for identifying reasonable alternatives to the Proposed Action and comparing the impacts of developing the various alternatives. In order for a potential alternative to be considered viable and carried forward for detailed evaluation with the NEPA process and the EA, that alternative must address the purpose and need and pass an alternatives evaluation process using screening criteria. This is further discussed in Chapter 2, Alternatives.

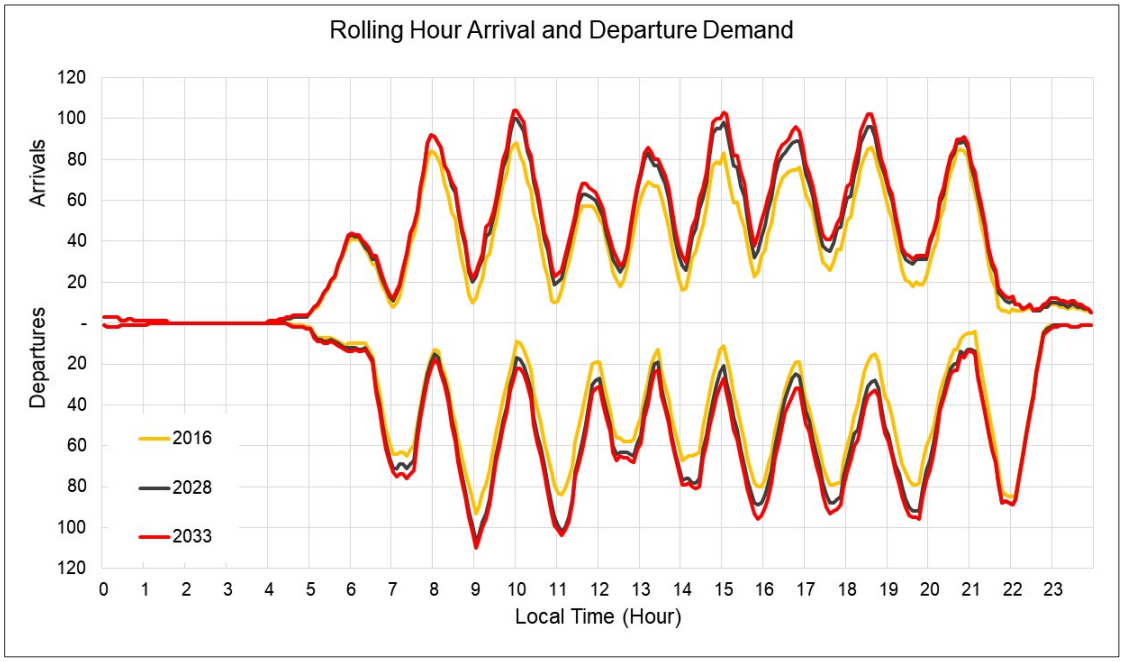
1.4.1 Need for the Project

CLT was the sixth busiest airport in the U.S. in terms of aircraft operations and the tenth busiest in terms of passenger enplanements in 2017,[7] making it an integral part of the National Airspace System (NAS). CLT is one of the primary commercial service airports in North Carolina and an essential transportation resource for the City of Charlotte (17th largest city in the U.S.) and the Charlotte Metropolitan Area (21st largest combined statistical area in the U.S.). In addition, many communities around the U.S. depend on efficient air service to and from CLT to connect to other, longer-haul flights to destinations worldwide, which is demonstrated by the fact that 41 small hubs[8] and 28 non-hubs[9] were served via CLT in 2016.

CLT is the second busiest hub operation for AA. Approximately 70 percent of the total passengers at CLT in 2016 were connecting[10] passengers. In this year, the airline connected approximately 58,000 passengers per day through CLT on a normal day; 67,000 passengers on a typical busy day, and even more during peak travel days.[11] In order to connect this volume of passengers through CLT, AA's schedule consists of nine arrival banks and nine departure banks throughout the day as shown on **Exhibit 1-6**. Given the level of connecting passengers and the high number of banks per day, AA personnel have indicated that schedule reliability is critical to maintaining minimum domestic connection times for passengers that range from 25 to 35 minutes.

7 2017 Airports Council International-North American Traffic Report.
8 The FAA defines a "small hub" as an airport that receives 0.05 to 0.25 percent of the annual U.S. commercial enplanements.
9 The FAA defines a "non-hub" as an airport that receives less than 0.05 percent but more than 10,000 of the annual U.S. commercial enplanements.
10 Passengers that stop at the hub airport to connect with another flight to their destination.
11 VHB Engineering NC, P.C. in association with Parish and Partners, Inc. and TransSolutions, July 31, 2018, Charlotte Douglas International Airport, Environmental Impact Statement, Purpose and Need Working Paper.

EXHIBIT 1-6, CLT HOURLY OPERATIONS



Source: 2016, 2028, and 2033 Design Day Flight Schedules

One way to measure schedule reliability is to look at on-time performance. A flight is defined as "on-time" if it arrived or departed the gate less than 15 minutes later than the scheduled time. The simulation analysis conducted for this EA (see Appendix B, *Purpose and Need and Alternatives*) shows that on-time performance is expected to deteriorate in the future as demand grows. In 2016, 27 percent of arrivals and 22 percent of departures were delayed by 15 minutes or more according to the 2016 simulations. In 2028, 31 percent of arrivals and 22 percent of departures are expected to be delayed by 15 minutes or more. By 2033, 39 percent of arrivals and 28 percent of departures would be delayed by 15 minutes or more. This level of schedule unreliability would make it difficult to maintain 25 to 35-minute minimum connection times in the future.

Another way of evaluating airport performance is to consider all-weather average delay and peak period delay. All-weather average delay reflects all times of the day, from times when there are a low number of operations (and low delays) to peak periods with high delays. It also reflects both good weather (when delays are typically lower) and poor weather (when delays tend to increase). **Table 1-3** shows that all-weather average delays are expected to grow at CLT by approximately ten percent from 2016 to 2028, and by approximately 27 percent from 2028 to 2033.

TABLE 1-3, CLT ALL WEATHER AVERAGE DELAYS

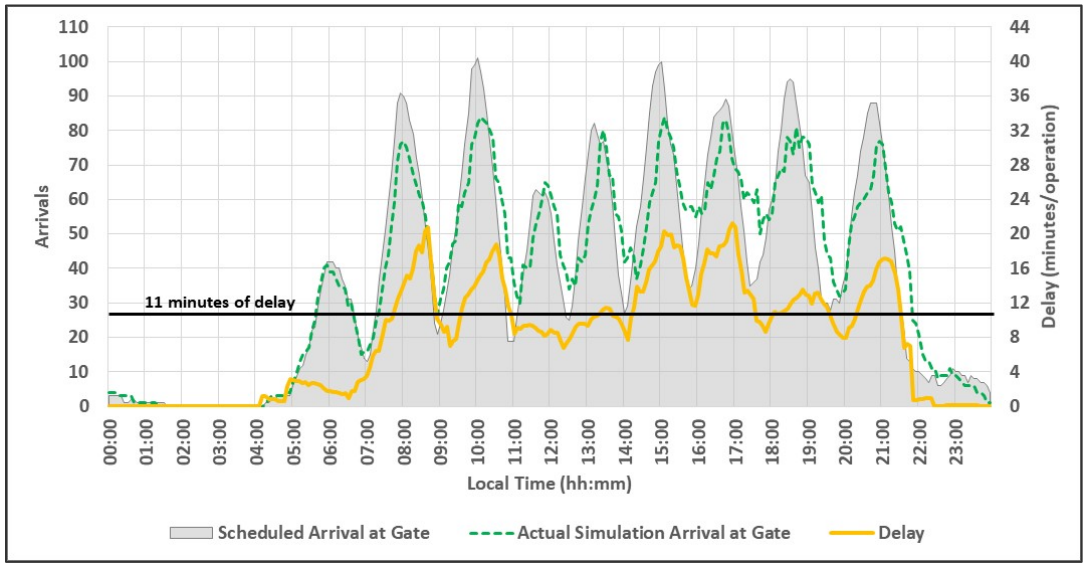
Year	Delay (minutes per operation)
2016	10.2
2028	11.2
2033	14.2

Source: Landrum & Brown analysis, 2020.

In 2028 when average all-weather delays reach approximately 11 minutes per operation, peak period delays in several of the banks reach 18 to 20 minutes per operation in Visual Meteorological Conditions

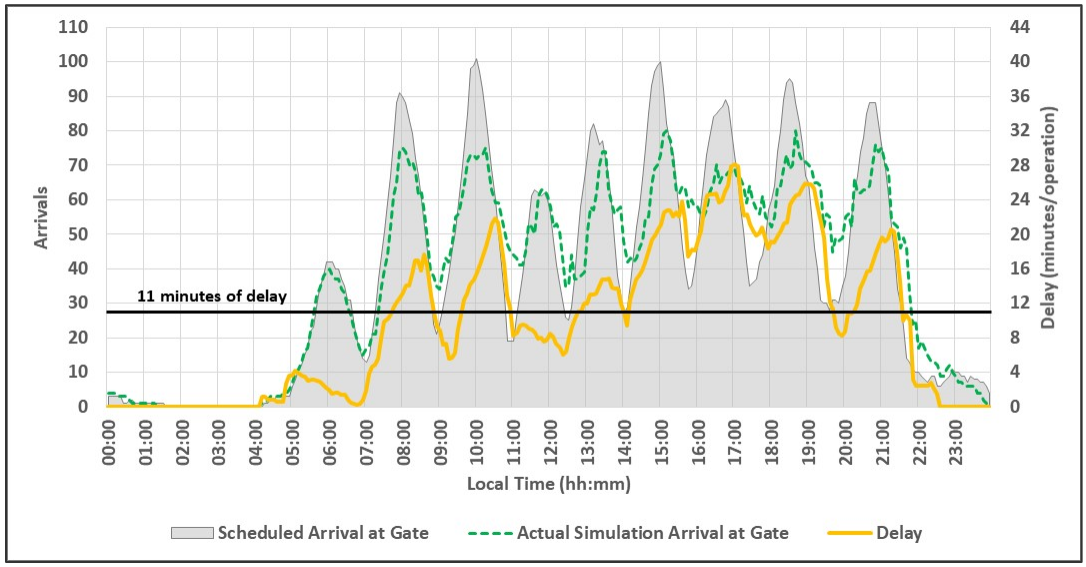
(VMC)[12] (see **Exhibit 1-7**) and regularly exceed 20 minutes per operation in Instrument Meteorological Conditions (IMC)[13] (see **Exhibit 1-8**). At this level of delay, the banking structure is disrupted, making it problematic to maintain the schedule integrity needed for the connecting bank structure.

EXHIBIT 1-7, 2028 NORTH FLOW VMC HOURLY PERFORMANCE



Source: Landrum & Brown analysis, 2020

EXHIBIT 1-8, 2028 NORTH FLOW IMC HOURLY PERFORMANCE



Source: Landrum & Brown analysis, 2020

According to the 2016 ACEP, the projected increase in average delays and decrease in on-time performance is a result of insufficient gates, ramp capacity/congestion, and runway capacity. If these deficiencies are not addressed, CLT's ability to maintain its critical transportation function, both now

[12] An aviation flight category in which visual flight rules (VFR) flight is permitted—that is, conditions in which pilots have sufficient visibility to fly the aircraft maintaining visual separation from terrain and other aircraft.

[13] An aviation flight category that describes weather conditions that require pilots to fly primarily by reference to instruments, and therefore under instrument flight rules (IFR), rather than by outside visual references under VFR. Typically, this means flying in cloudy or bad weather.

and in the near future, would be diminished. These issues must be addressed to ensure that CLT remains an efficient major airline hub in the future.

The following needs have been identified for this CLT EA, given the deficiencies at CLT and the impact on the FAA's purpose of enhancing safety, efficiency, and capacity on both the regional and national level:

- Insufficient terminal gate capacity and ramp congestion
- Insufficient runway capacity to meet future demand at acceptable levels of runway delay

1.4.1.1 Insufficient Terminal Gate Capacity and Ramp Congestion

The simulation analysis indicates that a lack of available gates and congestion on the terminal ramp, taxilanes, and taxiways generated delays in 2016. These delays are projected to increase as demand increases. These delays are primarily due to the existing terminal configuration and the constraints of the existing ramp areas and taxilane system, which decreases overall passenger terminal gate efficiency.

Aircraft Gates

A gating analysis was conducted using the design day flight schedule (DDFS) developed from the latest FAA-approved forecast. The results of the analysis are shown in **Table 1-4**.

TABLE 1-4, TOTAL GATE REQUIREMENTS

Year	Number of Gates			
	Widebody	Narrowbody	Regional	Total
2016	7	54	59	120
2028	7	61	72	140
2033	7	72	71	150

Source: Gating Analysis, Charlotte Douglas International Airport Environmental Impact Statement, VHB Engineering NC, P.C., in association with TransSolutions, LLC, May 8, 2019.

According to AA, gate utilization during the peak period was at 92 percent in 2016, which results in very few spare gates and an inability to react to flights that arrive early or remain on the gate past their scheduled departure time.[14] Another indication of the capacity of terminal gates is the number of flights accommodated per gate per day, referred to as turns per gate. CLT averaged seven turns per gate in 2016. According to the Airport Cooperative Research Program (ACRP) Research Report 163, *Guidebook for Preparing and Using Airport Design Day Flight Schedules*, "airlines rarely exceed 8 to 10 turns per gate." The report further says that the largest airports (like Atlanta or Chicago) can accommodate as many as eight turns per gate, whereas most other busy airports can accommodate six turns per gate. CLT's turns per gate is higher than a typical busy airport, indicating that gate usage is being maximized to the extent possible.

As demand increases in the future, the lack of available gates would worsen. Based on the gating analysis conducted for CLT, a total of 140 gates would be needed in 2028, a shortfall of 20 gates. The number of Remain Over Night (RON) positions expected to be needed in 2028 is 15.[15] The future gate shortage would result in an increasing number of arrivals that must wait for a gate, and an increase in the amount of time spent waiting for an available gate. The growing number of aircraft that must wait for a gate would result in increased ramp congestion. Excessive waiting for gates during the arrival peaks

[14] Conference call with FAA, AA ramp operators and the Consultant Team, January 30, 2018.
[15] RS&H, December 2018, Charlotte Douglas International Airport EIS Forecast Gate Analysis.

can adversely affect the hub airline's schedule integrity. In other words, the hub airline's on-time performance would be expected to degrade, and it may not be able to keep a banked schedule intact.

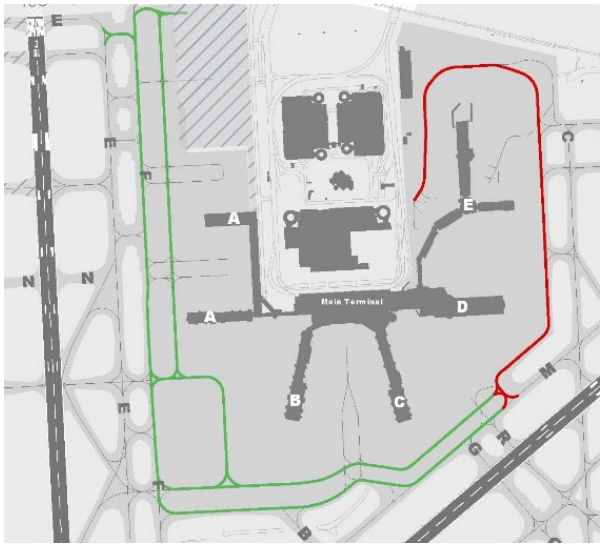
Ramp Movement Area (including Taxilanes)

Complicating the gate shortage is the ramp movement area serving the concourses at CLT, which creates an airside operating constraint. There are currently five concourses which are served by a series of taxilanes. The existing ramp area provides a combination of single taxilane capacity and dual taxilane capacity, as shown on **Exhibit 1-9**. The red taxilanes indicate single bidirectional taxilanes, which result in delays and congestion during peak operating times. The green taxilanes indicate dual parallel taxilanes, which provide the ability for aircraft to operate in opposite directions independently and allow for more operational flexibility for the movement of aircraft. One of the main causes of congestion in the ramp is the presence of the single bidirectional taxilane from Concourse D, north to Concourse E. Aircraft parking at the Concourse D and E gates must use this single taxilane to travel between the runways and gates. These two concourses have 55 gates (depending on fleet mix), or approximately half of the contact gate capacity at CLT, leading to high traffic volumes on the single taxilane. Additionally, Concourse E is a regional jet concourse. As a result, Concourse E experiences frequent movements and more turns per gate than the other concourses, adding to the congestion issues.

In addition, the taxilanes south of Concourse C do not have sufficient spacing to allow ADG V aircraft to taxi unrestricted. If an ADG V aircraft needs to taxi on this portion of the taxilanes, it must be treated as a single taxilane, causing congestion. To further exacerbate the ramp congestion, aircraft parked at the gates on the ends of Concourses D and E must push back onto the taxilane. These pushbacks to the taxilanes block aircraft on the taxilanes that are taxiing to and from the runway system, causing backups on the taxiways and taxilanes.

Lack of staging areas also contributes to the ramp congestion at CLT as there is not enough ramp space for arrival flights to wait for an open gate. When the ramp is full of waiting aircraft, additional arriving flights wait on taxilanes, taxiways, or arrival hold pads (currently observed daily at CLT), which in turn affects arrival taxi-in times, initiating a domino effect resulting in an increase in delay over time until the next arrival peak begins.

EXHIBIT 1-9, TERMINAL AREA TAXILANES



Source: Landrum & Brown, 2020

Taxiways

Another congestion issue is related to aircraft queuing for takeoff. The south flow (arriving from the north and departing to the south) operating configuration results in more congestion around the main terminal than north flow (arriving from the south and departing to the north), specifically due to the lack of departure queuing space for Runway 18C and 18L departures. For Runway 18L departures, Taxiway C is the primary departure queuing taxiway. However, the queuing space for the taxiway is limited, and as a result Runway 05/23 is utilized at times as a queuing taxiway to provide additional queuing space. The use of Runway 05/23 for queuing is not optimal as FAA Advisory Circular (AC) 150/5300-13A, *Airport Design*, recommends that dual purpose pavements be avoided: "Runways used as taxiways and taxiways used as runways can lead to confusion. A runway should be clearly identified as a runway and only a runway."[16] Queueing is less of an issue in north flow because departure aircraft are taxiing away from the main terminal area and have more queuing space on Taxiways C and E.

Conclusion

Additional gates, taxiway, and ramp expansion (taxilane improvements) are needed at CLT to meet terminal gate capacity and reduce congestion on the ramp. Providing the needed terminal area to accommodate additional gates and ramp improvements would increase terminal gate capacity and reduce congestion in the ramp area.

1.4.1.2 Insufficient Runway Capacity To Meet Future Demand At Acceptable Levels Of Delay

Average annual minutes of runway delay per operation is a general indicator of the ability of a runway system to meet existing and forecast aviation demand and can be used to determine when additional runway capacity is needed. There is no single, universally applied standard of acceptable delay in the airport industry. The delay threshold at an airport can vary depending on a number of factors including demand/peaking characteristics and the type of service (hub versus non-hub, international versus domestic, regional versus mainline aircraft). As a result, each airport must be examined individually to determine the most appropriate delay threshold.

In the case of CLT, it is a domestic hub airport for AA that is served mainly with regional jet and narrowbody aircraft. These types of aircraft have the ability to turn around quickly[17] which allows AA to schedule multiple banks throughout the day. In fact, CLT has nine distinct arrival banks and nine distinct departure banks each day. Due to the number of banks at CLT and how close they are together, AA targets minimum domestic connection times for passengers that range from 25 to 35 minutes. These short connection times mean that schedule reliability is very important to the hub's operation.

Delays

One way to determine the most appropriate delay threshold for an airport is to consider delays in the context of throughput. Generally, delay increases gradually as the runways accommodate an increasing number of operations until delays reach a certain point. When this occurs, delay tends to rise more rapidly as demand increases, oftentimes showing exponential growth in delay but modest increases in throughput.[18] The point where delays begin to increase rapidly without a corresponding increase in the amount of traffic that can be accommodated indicates that an airport has reached its

16 FAA Advisory Circular 150/5300-13A, Airport Design, page 117.

17 Refers to the amount of time it takes for an aircraft to unload arrival passengers, prepare the aircraft for departure, and load departing passengers.

18 Throughput is defined as the number of aircraft operations that can be reliably processed by the runways, given actual demand.

practical capacity. The delay level at which this occurs is often referred to as an acceptable delay threshold.

An analysis of runway delay versus runway throughput from the simulations of future operations forecast levels was used to determine the acceptable delay threshold at CLT. **Table 1-5** and **Exhibit 1-10** provide a summary of the simulation results. The delays shown in the table and graph reflect only runway delays; gate, ramp, and taxiway delays were excluded.

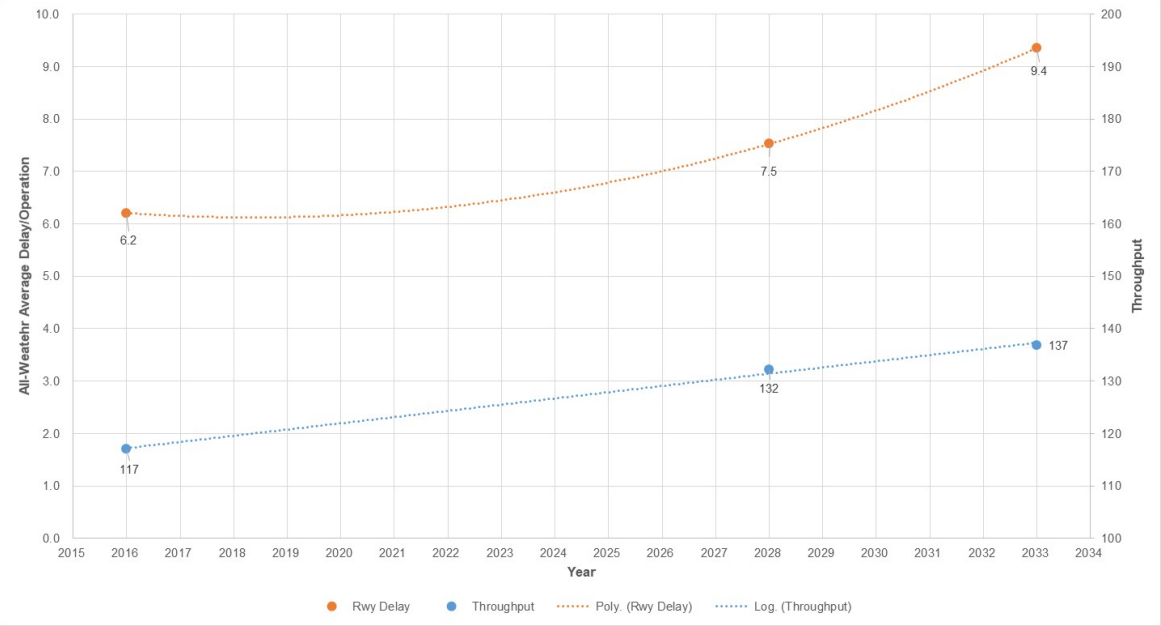
TABLE 1-5, FUTURE OPERATIONS FORECAST LEVELS – AVERAGE ANNUAL DELAY

Year	All Weather Average Throughput	All Weather Average Runway Delay (minutes per operation)	Percent Increase in Throughput	Percent Increase in Runway Delay
2016	117	6.2	n/a	n/a
2028	132	7.5	13%	21%
2033	137	9.4	4%	24%

Note: The throughput shown is that of the runways at the 90th percentile.
Source: Landrum & Brown analysis, 2020

The simulations show throughput increasing by 13 percent between 2016 and 2028, whereas all weather average delays increase by 21 percent. These changes in throughput and delay demonstrate that the runway system has the ability to achieve greater throughput beyond 2016, but it does so at the expense of rapidly increasing delays. The analysis indicates that aircraft operations utilized 87 percent of annual capacity in 2016. Between 2028 and 2033, the throughput improvement slows down to only a four percent increase while delays worsen at an even more rapid pace (24 percent increase). This relationship of throughput and delay indicates that the runway system at CLT would reach practical (or usable) capacity prior to 2028. Based on these results showing a diminishing level of returns, seven minutes per operation was identified as the acceptable runway delay threshold at CLT.

EXHIBIT 1-10, RUNWAY DELAY VS THROUGHPUT



Notes: The throughput shown is that of the runways at the 90th percentile, which is a measure of the sustainable or reliable throughput on a recurring basis. Delay represents runway delay only.
Source: Landrum & Brown analysis, 2020

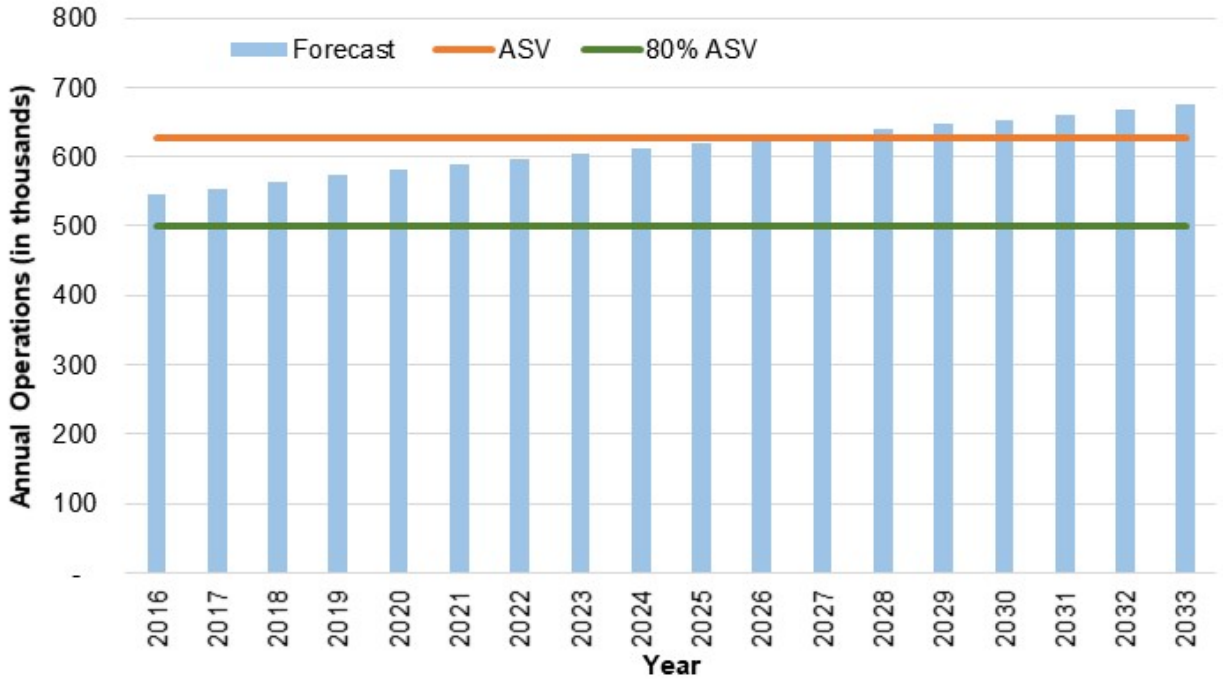
To evaluate if the seven-minute delay threshold can be considered reasonable, FAA guidance was reviewed. While FAA generally leaves it up to each airport to determine its delay threshold, FAA does provide general context on what can be considered an acceptable level of delay. FAA AC 150/5070-6B, *Airport Master Plans*, states that "four to six minutes of average delay per aircraft operation…can be considered as an acceptable level of delay." According to this advisory circular, delays of this magnitude indicate that "an airport is approaching its practical capacity and is generally considered congested." This rationale is consistent with what has been observed at CLT. CLT was at approximately six minutes of average delay per operation in 2016 and the analysis of throughput and delay showed that the airport was approaching capacity in 2016.

Demand to Capacity Ratio

FAA Order 5090.5, *Formulation of the National Plan of Integrated Airport Systems (NPIAS) and Airports Capital Improvement Plan (ACIP),* provides guidance on the activity levels that trigger the need for a new runway. In this order, FAA recommends beginning development of a new runway when operations reach 80 percent of an airport's annual service volume (ASV)[19] and within five years of operations reaching the ASV under an FAA-approved forecast. The ASV for CLT was determined to be 626,000 operations using the previously established seven-minute delay threshold. The 80 percent of ASV activity trigger is 501,000 operations at CLT. **Exhibit 1-11** shows CLT forecast operations compared to the ASV and 80 percent of ASV. CLT's annual operations already exceed the 80 percent ASV threshold in 2016 and operations are projected to exceed ASV in 2026 based on the most recent FAA-approved CLT forecast, thereby further demonstrating justification for a new runway at CLT.

[19] FAA Order 5090.5, *Formulation of the NPIAS and ACIP*, and AC 150/5070-6B, *Airport Master Plans*, define ASV as the number of annual operations that can reasonably be expected to occur at an airport based on a given level of delay.

EXHIBIT 1-11, FORECAST OPERATIONS VS CAPACITY



Source: Landrum & Brown analysis, 2020; EIS forecast

Conclusion

The analysis of the simulation results and forecast demand show that CLT will require additional runway capacity by 2026 in order to maintain delays below seven minutes per operation beyond 2028. The alternatives analysis will evaluate different means to reduce the delays at CLT to acceptable levels.

1.4.2 Purpose of the Project

Based on the various deficiencies (needs) previously discussed, the purposes of the Proposed Action are to:

- Enhance terminal gate capacity and reduce ramp congestion.
- Provide additional runway capacity to meet future demand at acceptable levels of runway delay.

1.5 Requested Federal Actions

The following are the major Federal actions subject to NEPA applicable to the Proposed Action.

- Unconditional approval of the Proposed Action on the ALP to depict the proposed improvements pursuant to 49 United States Code (U.S.C.) §§ 40103(b) and 47107(a)(16).
- Approval of construction, installation, and relocation of FAA-owned navigational and visual aids, including but not limited to glideslope equipment, localizers, approach lighting systems, taxiway edge lighting, signage, and all associated utility lines. The FAA is responsible for the navigational aid equipment necessary to ensure the safety of air navigation for aircraft operations. The FAA will make a determination regarding the installation and relocation of navigational aids associated with the Proposed Action. If FAA determines to not fund a navigational aid for the new runway (such as an Instrument Landing System or ILS), CLT may elect to install non-Federal equipment with local funding per FAA Order 6700.20.

- Determinations as to the eligibility of the Proposed Action for federal funding for construction of eligible components of the Proposed Action under (1) the Airport Improvement Program (AIP) (49 U.S.C §§ 47106 and 47107) and/or (2) through passenger facility charges (PFCs) (49 U.S.C. § 40117, as implemented by 14 C.F.R. § 158.25).
- Determination of eligibility for Federal assistance under the Federal grant-in-aid program authorized by the Airport and Airway Improvement Act of 1982, as amended (49 U.S.C. § 47101 et seq.).

In addition, the Sponsor requires the following approvals from the FAA before it can implement the Proposed Action.

- Determinations under14 C.F.R. Part 77, *Objects Affecting Navigable Airspace*, and 14 C.F.R. Part 157, *Notice of Construction, Alteration, Activation, and Deactivation of Airports*.
- Determination under 49 U.S.C. § 44502(b) that the airport development is reasonably necessary for use in air commerce or in the interests of national defense.
- Determination under 49 U.S.C. § 47106(a)(1) that the Selected Alternative is Reasonably Consistent with Existing Plans of Public Agencies Responsible for Development in the Area.
- Approval of a Construction Safety and Phasing Plan to maintain aviation and airfield safety during construction pursuant to FAA AC 150/5370-2G, *Operational Safety on Airports During Construction*, (14 C.F.R. Part 139 [49 U.S.C. § 44706]).
- Approval of changes to the airport certification manual pursuant to 14 C.F.R. Part 139.

1.6 Environmental Review Process and Timeframe of the Proposed Action

FAA's environmental review is done in compliance with environmental requirements and policies including NEPA, the *Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA* (40 C.F.R. §§1500-1508), and FAA Orders 1050.1F and 5050.4B. Throughout this process, FAA is directed to "[m]ake diligent efforts to involve the public in preparing and implementing [its] NEPA procedures."

Scoping for the NEPA process began with the publication of the NOI to prepare an EIS and conduct scoping meetings in Federal Register on March 22, 2018. The FAA held two governmental agency scoping meetings for Federal, state, and local regulatory agencies on April 24, 2018 and on April 25, 2018. In addition, two public scoping meetings for the general public were held on April 24 and 26, 2018. The FAA issued a Notice to Proceed for the EIS April 24, 2017. The EIS was cancelled on February 27, 2019 and the Sponsor held two public meetings on the conversion of the EIS to an EA on October 20 and 24, 2019. Construction of the Proposed Action is expected to take approximately eight years if approved.

1.7 EA Document Organization

In addition to the cover page, the EA contains the following content:

Table of Contents: The table of contents lists the chapters, exhibits, and tables presented throughout the EA. It also lists the appendices, and the acronym list, and glossary of terms/index.

Chapter 1 – Purpose and Need: This chapter briefly describes the underlying purpose and need for the Federal action. It presents the problem being addressed and describes what is trying to be achieved with the Proposed Action.

Chapter 2 –Alternatives: This chapter provides a comparative analysis of the No Action alternative, the Proposed Action, and other reasonable alternatives capable of fulfilling the purpose and need for the action, to sharply define the issues, and provide a clear basis for choice among options by the approving officials. This chapter provides a description of the Proposed Action and an overview of the identification and screening of alternatives considered, the process used to screen and evaluate reasonable alternatives, the alternatives carried forward for detailed environmental evaluation, and a brief description of those alternatives considered but dismissed, and the reason for their dismissal.

Chapter 3 – Affected Environment: This chapter describes the environmental conditions of the potentially affected Study Area or Areas. This chapter also describes the existing environmental conditions within the project Study Area(s), including a definition and description of the resource, regulatory setting, and region of influence.

Chapter 4 – Environmental Consequences and Mitigation Measures: This chapter forms the analytical basis for comparing the Proposed Action, the No Action alternative, and other alternatives retained for detailed analysis. This chapter describes the potential conditions that could be implemented by the FAA or appropriate authority to minimize harm from the Proposed Action. This chapter also includes cumulative impacts of the Proposed Action and alternatives when added to the impacts of past, present, and reasonably foreseeable future projects in the vicinity of the Airport.

Chapter 5 – Coordination and Public Involvement: This chapter discusses coordination and public involvement associated with the EA process. This chapter also presents a list of federal, state, and local agencies and other interested parties that have been consulted as part of preparing the EA, coordination efforts, and lists the agencies and persons to whom the EA has been distributed.

Chapter 6 – List of Preparers: This chapter includes the names, and qualifications (e.g., expertise experience, professional disciplines) of the individuals that were primarily responsible for preparing the EA or significant background material, and contractors who assisted in preparing the EA or associated environmental studies.

Chapter 7 – References: This chapter includes a list of all the various documents used to prepare the EA.

Appendices: The appendices of the EA consist of material that substantiates any analysis that is fundamental to the EA. The appendices contain information about formal and informal consultation conducted, and related agreement documents prepared, pursuant to other special purpose laws and requirements. The appendices contain detailed information about the agency and public coordination conducted for the EA. Appendices also contain a variety of technical reports that support the analysis of anticipated impacts.