August 2022 | Draft

West Virginia International Yeager Airport

Airfield, Safety, and Terminal Improvement Project EIS Purpose and Need Statement

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1. PURPOSE AND NEED

1.1 INTRODUCTION

The Federal Aviation Administration (FAA) is preparing an Environmental Impact Statement (EIS) to evaluate the potential environmental effects of a proposal by the Central West Virginia Regional Airport Authority (CWVRAA or Airport Authority), as the operator of the West Virginia International Yeager Airport (CRW or the Airport) in Charleston, West Virginia, to construct various airfield, safety, and terminal improvements (Proposed Project). In order to satisfy immediate (near-term) needs and long-term needs of the Airport, the Proposed Project would be developed in phases.

In the near-term (Phase 1), the CWVRAA proposes to shift[1] and extend Runway 5-23 to the northeast (Runway 23 end) to allow for a Runway Safety Area (RSA) that meets FAA standards on both ends of the runway and to meet existing runway length requirements of 7,000 feet. The CWVRAA also seeks to construct a new terminal complex to address terminal area inefficiencies that include an aging and poorly configured terminal facility; relocate taxiways adjacent to the terminal area that are not consistent with FAA design standards; and to provide modern amenities and allow for a better passenger experience.

To address long-term needs, Phase 2 of the Proposed Project would include a further shift and extension of Runway 5-23 to provide an 8,000-foot runway, relocation of the remaining portions of Taxiway A that do not meet FAA design standards, and development of an additional gate at the terminal facility, which may require the relocation of the existing Airport Traffic Control Tower. However, as further discussed in Section 1.3, these components, though similar or related to the actions considered in Phase 1, are dependent upon additional justification, developments, or design and will be analyzed at a "programmatic level"[2] in the EIS. Further project-level review of the long-term components will be conducted at a later date, when the additional justification, developments or design is imminent or has occurred.

FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures,*[3] which serves as the FAA's policy and procedures for compliance with the National Environmental Policy Act (NEPA) and implementing regulations issued by the Council on Environmental Quality (CEQ), requires that an EIS briefly describe the underlying purpose and need for the federal action by presenting the problem being addressed and describing what the FAA is trying to achieve with the proposed project. This Purpose and Need Statement has been developed to provide a concise statement of the

[1] The proposed Runway 5-23 shift would move both runway ends to the northeast by 1,125 feet along the same alignment. New pavement would be constructed beyond the existing Runway 23 end to accommodate the shift, while existing pavement to the southwest of the relocated Runway 5 end would be demolished.

[2] Text at 40 CFR 1508.28 defines tiering as covering a general program in a broader-focused EIS, then, preparing later EISs or EAs for specific, follow-on actions that are parts of that program. Tiered EISs or EAs move from a broad scope to narrow scope, or from "program analysis" to "project analysis." Incorporating information from the broader-focused EIS by reference into an EIS or EA addressing a specific action avoids repetitive discussions of similar issues common to various program elements at various locations. This allows the decision maker to focus on those actions that are ripe for decision (40 CFR 1500.4(i), 1502.4(d) and 1502.20).

[3] US Department of Transportation, Federal Aviation Administration, Order 1050.1F, *Environmental Impacts: Policies and Procedures*, July 16, 2015.

purpose and need for the Proposed Project, supported by data that the FAA, as the Lead Agency[4] for the CRW Airfield, Safety, and Terminal Improvement Project EIS, has determined to be relevant.

1.2 BACKGROUND

1.2.1 FEDERAL AVIATION ADMINISTRATION

The mission of the FAA is to provide the safest, most efficient aerospace system in the world. The role of the FAA Office of Airports division in meeting this goal is to provide leadership in planning and developing a safe and efficient national airport system to satisfy the needs of aviation interests of the United States. The safe operation of each airport and airway system is the highest aviation priority (49 U.S.C. §§ 47101(a)(1) and 40101).

The FAA's Airport Safety Program addresses general aviation airport safety; runway safety; and safety management systems (SMS) for all commercial service airports certificated under 14 Code of Federal Regulations (CFR) Part 139, *Certification and Operations: Land Airports Serving Certain Air Carriers* (such as CRW). In 1999, the FAA established the Runway Safety Area Program[5] with the objective that all RSAs at federally obligated airports[6] and all RSAs at airports certificated under 14 CFR Part 139 shall conform to FAA design standards to the extent practicable. The FAA's Runway Safety Area Program continues to evolve based on changes in airport design requirements and FAA metrics evaluating the severity of potential runway incursions in order to address safety risks and plan for future improvements. It remains FAA policy for RSAs at federally obligated airports and at airports certificated under 14 CFR Part 139 to conform to FAA design standards.

The FAA actively maintains several different types of policies, procedures, and guidance documents that govern airport development. The Advisory Circular (AC) system provides a single, uniform, agency-wide system that the FAA uses to deliver advisory and informational material to FAA customers, industry, the aviation community, and the public. ACs cover a broad range of topics within the FAA and can be directional, informational, or descriptive. The ACs that contain current FAA standards and recommendations for airport design are FAA AC 150/5300-13B, *Airport Design,* and FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design.*[7,8] FAA AC 150/5300-13B provides design standards for runways, runway associated elements and taxiways, as well as other airfield facilities. Design standards in these ACs are established for categories of aircraft with similar characteristics[9] and are used to design or update an airport facility. Key planning terms associated with runway design that are referenced in this EIS are defined in **Table 1**. **Exhibit 1** identifies the key planning terms, as applicable.

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4 As defined in 40 CFR 1501.7(a): A lead agency shall supervise the preparation of an environmental impact statement if more than one Federal agency either: (1) Proposes or is involved in the same action; or (2) Is involved in a group of actions directly related to each other because of their functional interdependence or geographical proximity.

5 US Department of Transportation, Federal Aviation Administration, Order 5200.8, *Runway Safety Area Program*, October 1, 1999.

6 Airports are designated as federally obligated when airport owners have accepted federal assistance to purchase land, or to develop or improve an airport. With the acceptance of federal assistance, airports agree to comply with certain obligations in the form of grant assurances, associated with their operation.

7 US Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design*, April 4, 2022.

8 US Department of Transportation Federal Aviation Administration, Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design,* July 1, 2005.

9 Based on FAA AC 150/5000-17, *Critical Aircraft and Regular Use Determination,* similar characteristics refers to the practice of grouping aircraft by comparable operational performance (i.e., approach speeds and runway length requirements) and/or physical dimensions (i.e., tail heights and wingspans).

FAA AC 150/5300-13B provides specific requirements based on an airport's existing or forecast critical aircraft. Critical aircraft are typically the tallest (tail height), widest (wingspan), and heaviest aircraft that regularly fly into and out of an airport. The critical aircraft currently operating at the Airport are the Bombardier CRJ-700 and CRJ-900 (see **Appendix A**). The long-range forecast indicates that by 2040, the Airbus A319/A320/A321 will become the critical aircraft.

TABLE 1 KEY PLANNING TERMS

TERM	DEFINITION
Critical Aircraft	An aircraft with characteristics that determine the application of airport design standards for a specific runway, taxiway, taxilane, apron, or other facility. This aircraft can be a specific aircraft model or a composite of several aircraft using, expected, or intended to use the airport or part of the airport on a regular basis (defined as a minimum of 500 annual aircraft operations). [1] (Also called "design aircraft" or "critical design aircraft.")
Runway Safety Area (RSA)*	The surface surrounding the runway (sides and ends) that is prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from the runway. The RSA provides a graded area in the event that an aircraft overruns, undershoots, or veers off the side of the runway. RSA dimensions depend on the type of aircraft operating at the airport. An RSA meeting full-dimensional standards is referred to as a full-dimension or standard RSA. However, in some cases, it is not practicable to achieve the full-dimension/standard RSA due to a lack of available land or obstacles such as bodies of water, highways, railroads, and populated areas or severe drop-off of terrain. In accordance with FAA Order 5300.1, *Modifications to Agency Airport Design, Construction, and Equipment Standards*, the FAA will not consider a "modification of standard" to address non-standard RSA dimensions. RSA dimensional standards remain in effect regardless of the presence of natural or man-made objects or surface conditions that preclude meeting full RSA standard dimensions. In these instances, the airport owner and the FAA must continually assess a non-standard RSA with respect to operational, environmental, and technological changes to determine whether an alternative method can be used to provide the equivalent safety of a standard RSA and/or whether incremental improvements can be made to bring the RSA closer to meeting FAA standards.
Runway Object Free Area (ROFA)*	An area centered on the runway centerline that should be clear of aboveground objects, except for allowable objects necessary for air navigation or aircraft ground maneuvering purposes, such as runway and taxiway lights and signage, runway status lights, approach lighting systems, lead-in lighting systems, and runway end identifier lighting. The ROFA is intended to protect the wings of an aircraft that enters the RSA.
Runway Protection Zone (RPZ)*	A trapezoidal area off the end of a runway and centered on the runway centerline. The primary purpose of the RPZ is to enhance the protection of people and property on the ground in the event an aircraft lands or crashes beyond the runway end. The RPZ begins two hundred feet beyond the end of the area usable for takeoff or landing. The RPZ dimensions depend on the type of aircraft operating at the airport and the approach visibility minimums associated with each runway end. Where practical, airport owners should own the property under the runway approach and departure areas to at least the limits of the RPZ. It is desirable to clear the entire RPZ of all above-ground objects. Where this is impractical, airport owners should maintain the RPZ clear of all facilities supporting incompatible activities.
Taxiway Object Free Area (TOFA)*	An area centered on a taxiway centerline that is provided to enhance the safety of aircraft operations by remaining clear of objects, except for objects that need to be located in the TOFA for air navigation or aircraft ground maneuvering purposes.
Taxiway Safety Area	The surface surrounding the taxiway (sides and ends) that is prepared and suitable for reducing the risk of damage to the aircraft deviating from the taxiway pavement and for supporting the passage of aircraft rescue and fire fighting (ARFF) equipment.
Runway Threshold*	The beginning of that portion of the runway available for landing. In some instances, the threshold may be displaced. Threshold always refers to landing, not the start of takeoff.

TERM	DEFINITION
Engineered Material Arresting System (EMAS)	EMAS uses crushable material placed at the end of a runway to stop or slow an aircraft that overruns the runway. The tires of the aircraft sink into the lightweight material and the aircraft is decelerated as it rolls through the material. A standard EMAS can stop an aircraft from overrunning the runway at 70 knots (approximately 80 miles per hour). EMAS is an alternative to mitigate overruns at airports when a full-dimension RSA is not practicable due to natural obstacles, local development, and/or environmental constraints. EMAS may also be used to maximize runway length. A standard EMAS provides a level of safety that is equivalent to a standard RSA. The presence of an EMAS system does not negate or diminish the standard RSA width but can reduce the length required if the EMAS bed is designed to provide an equivalent level of safety for the critical aircraft using that runway.
Declared Distances*	The distances an airport owner declares available for a turbine powered aircraft's takeoff run, takeoff distance, accelerate-stop distance, and landing distance requirements. The distances are the following: ▪ Takeoff Run Available (TORA) – the amount of runway available for the ground run of an aircraft taking off ▪ Takeoff Distance Available (TODA) – the TORA plus the amount of any remaining runway (or clearway)[2] beyond the end of the TORA. The full length of TODA may be shorter than the runway length depicted on the airport diagram because of obstacles in the departure area. ▪ Accelerate-Stop Distance Available (ASDA) – the amount of runway available for an aircraft to reach liftoff speed then decelerate without over-running the runway in the event takeoff is aborted. The ASDA typically ends 1,000 feet from any obstacle beyond the end of the runway. ▪ Landing Distance Available (LDA) – the amount of runway available for an aircraft to land and come to a complete stop on the runway.
Navigation Aid (NAVAID)	Electronic and visual aids to air navigation, such as lights, signs, and associated supporting equipment. Common NAVAIDS include instrument landing systems (ILS), distance measuring equipment (DME), Visual Approach Slope Indicator (VASIs), Runway End Identifier Lights (REIL), and Approach Lighting Systems.

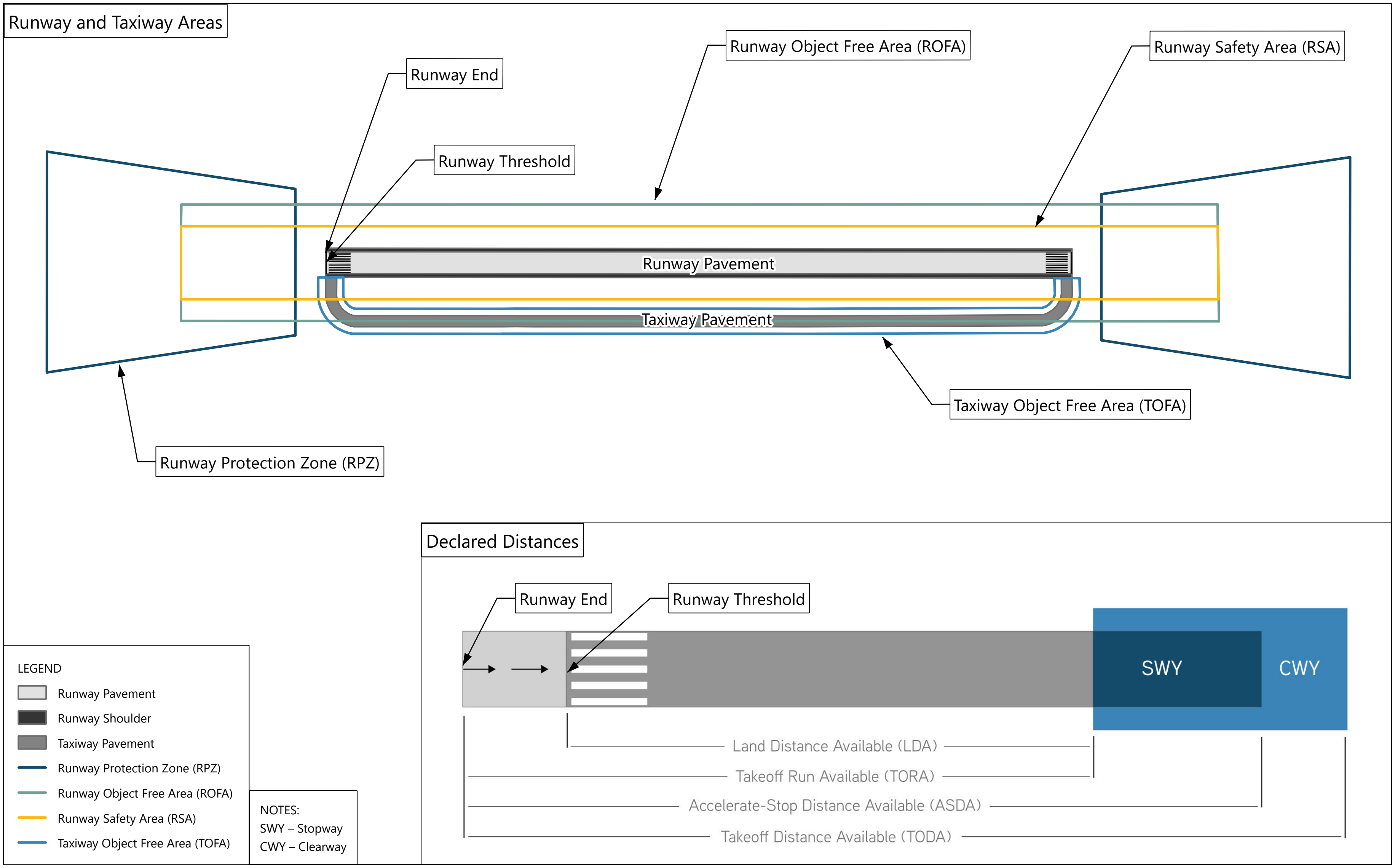
NOTE:

* Illustrated on Exhibit 1.

1 Aircraft operations refers to the total aircraft landings and takeoffs at an airport.

2 A clearway is a rectangular area beyond the runway not less than 500 feet wide and not longer than 1,000 feet, centrally located about the extended centerline of a runway and under the control of the airport authorities.

SOURCES: US Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design*, April 4, 2022; US Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5220-22B, *Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns*, September 27, 2012; US Department of Transportation, Federal Aviation Administration, *Engineered Material Arresting System (EMAS)*, January 5, 2022, https://www.faa.gov/newsroom/engineered-material-arresting-system-emas-0 (accessed February 17, 2022).



SOURCES: Ricondo & Associates, Inc., August 2022 (key conceptual planning terms elements).

EXHIBIT 1

KEY PLANNING TERMS

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Categories relevant to understanding FAA airport design standards within the AC applicable to the critical aircraft and the Airport airfield system are:

- **Aircraft Approach Categories (AAC)** classify aircraft into five groups, indicated by letters A-E, based on landing speed. The critical aircraft at the airport is classified as Category C, which corresponds to aircraft with approach speeds of at least 121 knots but less than 141 knots.
- **Airplane Design Groups (ADGs)** classify aircraft into six groups, indicated by Roman numerals I–VI, based on aircraft wingspan and tail height, which reflect the operating needs of an aircraft. The critical aircraft at the Airport is classified as ADG III, which corresponds to aircraft with a tail height of at least 30 feet but less than 45 feet and a wingspan of at least 79 feet but less than 118 feet.
- **Runway Design Categories (RDCs)**, which is a combination of the AAC and ADG, establish design standards for the runways and runway associated elements (defined in Table 1) including RSAs, Runway Object Free Areas (ROFAs), Runway Obstacle Free Zones (ROFZs), shoulders, blast pads, clearways, and stopways. Standard RSAs and ROFAs are based on the Airport Reference Code (ARC), which signifies the Airport's highest RDC. The ARC does not limit the aircraft that may be able to operate safely at the Airport but does incorporate the Airport's critical aircraft. Based on the existing critical aircraft operating on Runway 5-23, the runway has an RDC designation of C-III. The standard RSA for an RDC C-III runway is 500 feet wide (centered on the runway centerline), while a standard ROFA is 800 feet wide, and both extend 1,000 feet beyond the physical end of the runway. The RSA length prior to a landing threshold is 600 feet. In addition to dimensional requirements, FAA airport design standards require that RSAs are:
  - cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations;
  - drained by grading or storm sewers to prevent water accumulation;
  - capable, under dry conditions, of supporting snow removal equipment, Aircraft Rescue and Firefighting (ARFF) equipment, and the occasional passage of aircraft without causing damage to the aircraft; and,
  - free of objects, except for objects that need to be located in the RSA because of their function. Those objects fixed by function in the RSA must be frangible and meeting frangibility standards in FAA AC 150/5220-23A, *Frangible Connections*.[10]

  FAA airport design standards require that ROFAs are cleared of above-ground objects protruding above the nearest point of the RSA. However, it is acceptable to have objects within the ROFA that protrude above the nearest point of the RSA if they are for air navigation or aircraft ground maneuvering purposes. Taxiing and holding of aircraft are also permitted within ROFAs.
- **Taxiway Design Groups (TDGs)** classify taxiways by aircraft groups that define dimensional minimums needed to support groups of aircraft based on performance needs, indicated by numbers 1–7. All of the taxiways associated with the use of Runway 5-23 meet TDG 3 specifications with a width requirement of 50 feet. Two taxiways—Taxiway B between B4 and B5 and Taxiway B2—associated with the general aviation facilities and Marshall University Bill Noe Flight School, are limited to TDG 2 aircraft.

[10] US Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5220-23A, *Frangible Connections*, April 13, 2021.

- **Runway-to-Parallel-Taxiway Centerline Separation** is the distance between the runway centerline and parallel taxiway centerline. FAA AC 150/5300-13B identifies the required separation distance based on the ADG, the takeoff and landing flight path profiles, and the physical characteristics of the aircraft. The existing separation distance between Runway 5-23 and Taxiway A is approximately 284 feet near the Runway 5 end and approximately 328 feet between Taxiway D to the end of Runway 23. Based on the critical aircraft (ADG III) operating at the Airport and standards noted in FAA AC 150/5300-13B, the required separation distance between a runway and parallel taxiway is 400 feet.[11] Therefore, the Airport has an existing modification of standard (MOS) for the non-standard separation distance between the centerlines of Runway 5-23 and Taxiway A.

In addition, FAA AC 150/5325-4B provides guidelines in determining recommended runway lengths. Similar to above, this AC incorporates the critical aircraft as well as aircraft take off weights and runway end point elevations[12] as part of determining the appropriate runway length for an airport.

The FAA is also responsible for administering navigable airspace[13] under 14 CFR Part 77, *Safe, Efficient Use and Preservation of the Navigable Airspace* (Part 77). The FAA must act in the public interest as necessary to ensure the safety of aircraft and the efficient use of airspace. Part 77 establishes standards used to determine obstructions to air navigation and navigational and communication facilities; it also specifies the requirements for identifying potential hazardous effects to air navigation from any proposed construction or alteration on or near airports. Part 77 defines the primary, approach, transitional, horizontal, and conical surfaces for a runway, as shown on **Exhibit 2**. For civil airports which includes CRW, imaginary surfaces are established to evaluate and protect the approach and departure areas of a runway and are developed with relation to the specific airport and to each runway. The size of each such imaginary surface is based on the category of each runway according to the type of approach available or planned for that runway (that is, visual, instrument, etc.) and must be kept clear of objects that might damage an aircraft. Penetrations of fixed objects into the Part 77 surfaces are considered obstructions.

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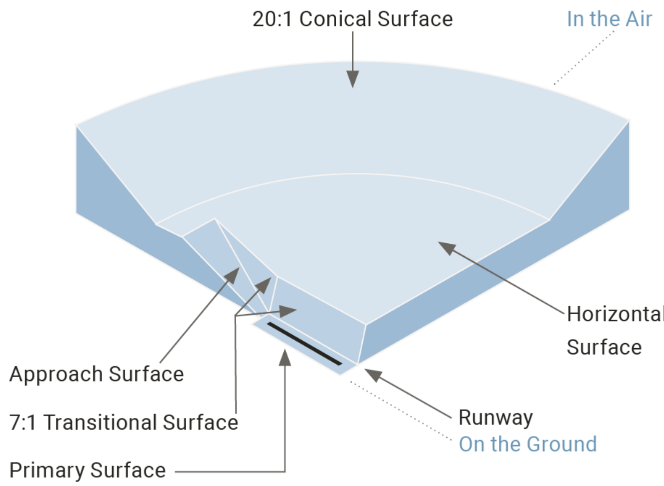
[11] FAA standards require a 400-foot runway-to-parallel taxiway standard separation distance for ADG C-III aircraft, which allows for adequate wingtip clearance for aircraft with wingspans up to 118 feet. FAA guidance in AC 150/5300-13B requires a minimum 26.5-foot wingtip clearance. The existing separation distance (approximately 328 feet) between Runway 23, from the Runway 23 end to Taxiway C, and Taxiway A provides sufficient wingtip clearance for the current critical aircraft that operate at CRW; thus, the need to relocate Taxiway A from between the Runway 23 end and Taxiway C is not evident at this time. However, based on a reduced separation distance of 284 feet on the Runway 5 end, the required wingtip clearances for the critical aircraft currently operating at CRW is less than required and is proposed to be corrected for Taxiway A from between the Runway 5 end and Taxiway C as part of Phase 1 of the Proposed Project, as described in greater detail in Section 1.3.1.

[12] Guidance in FAA AC 150/5325-4B suggests an assumed increase in required runway length of 10 feet for every 1 foot of elevation change.

[13] Navigable airspace is defined as the airspace at or above the minimum altitudes of flight that includes the airspace needed to ensure safety in the takeoff and landing of aircraft.

EXHIBIT 2 PART 77 SURFACES



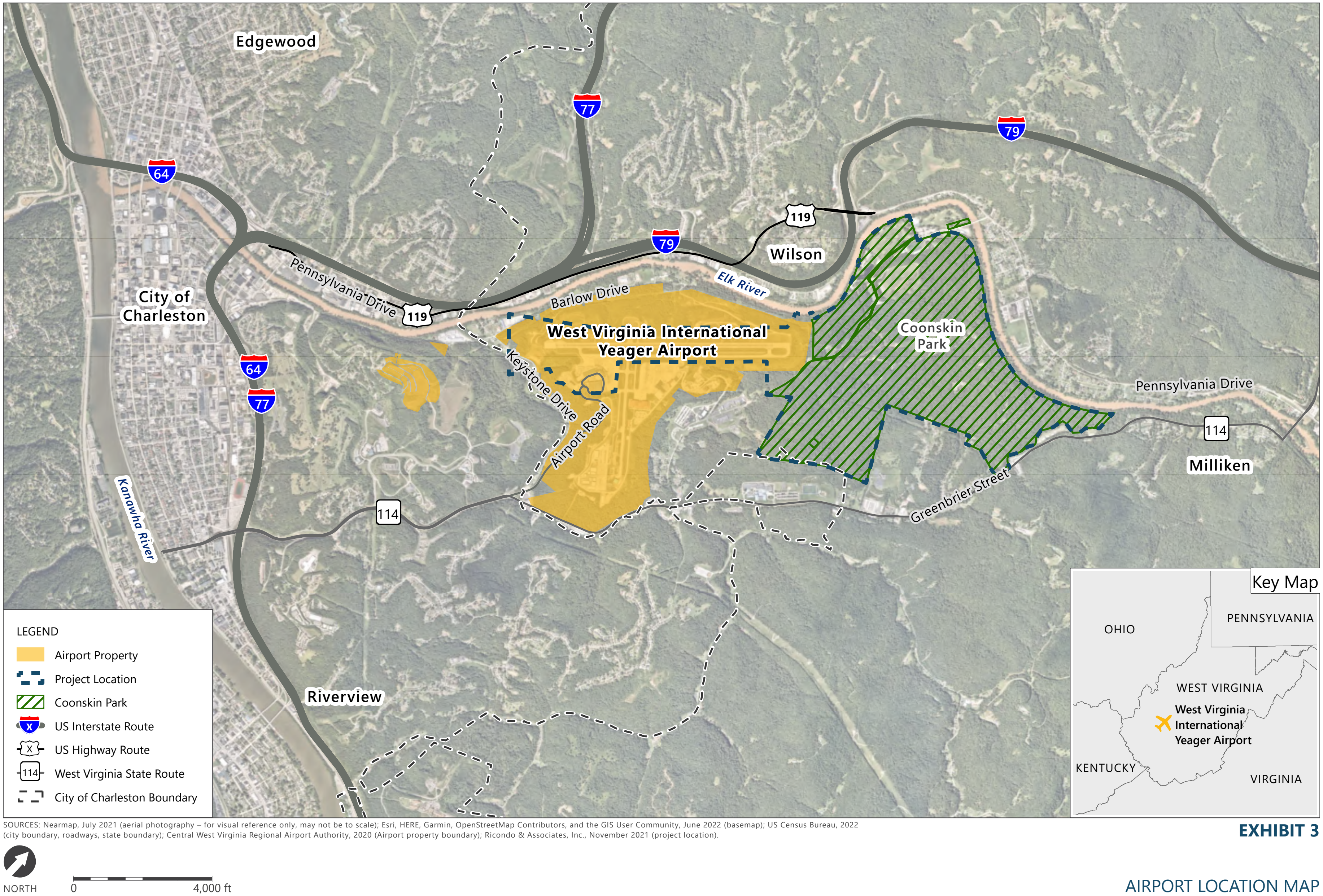
SOURCE: Ricondo & Associates, Inc., August 2022.

1.2.2 WEST VIRGINIA INTERNATIONAL YEAGER AIRPORT

The Airport comprises 767 acres and is a joint-use civil aviation/Air National Guard airport located three miles east of downtown Charleston in Kanawha County, West Virginia. The regional setting of the Airport and the project location is shown on **Exhibit 3**. The Airport is located on top of a hill at an elevation of approximately 940 feet above sea level, and is bordered by the Elk River to the west, Coonskin Park to the north, Greenbrier Street (West Virginia Route 114) to the east, and Keystone Drive to the south. Access to the Airport from the Charleston area is provided by three major interstates: Interstate 64 (I-64), I-77, and I-79; local roadways providing access include Airport Road via Greenbrier Street (West Virginia Route 114).

The Airport has a single runway (Runway 5-23) along with a passenger terminal, general aviation facilities, the Marshall University Bill Noe Flight School, and West Virginia Air National Guard (WVANG) facilities home to the WVANG 130th Airlift Wing and the Air Mobility Command unit. An overview of existing airport facilities is shown on **Exhibit 4.** The Airport is owned and operated by the Airport Authority and is the largest airport in the State of West Virginia with a statewide annual economic impact of $225 million dollars.[14]

[14] West Virginia Aeronautics Commission, *West Virginia Aviation Economic Impact Study*, 2022.



SOURCES: Nearmap, July 2021 (aerial photography – for visual reference only, may not be to scale); Esri, HERE, Garmin, OpenStreetMap Contributors, and the GIS User Community, June 2022 (basemap); US Census Bureau, 2022 (city boundary, roadways, state boundary); Central West Virginia Regional Airport Authority, 2020 (Airport property boundary); Ricondo & Associates, Inc., November 2021 (project location).

EXHIBIT 3

AIRPORT LOCATION MAP

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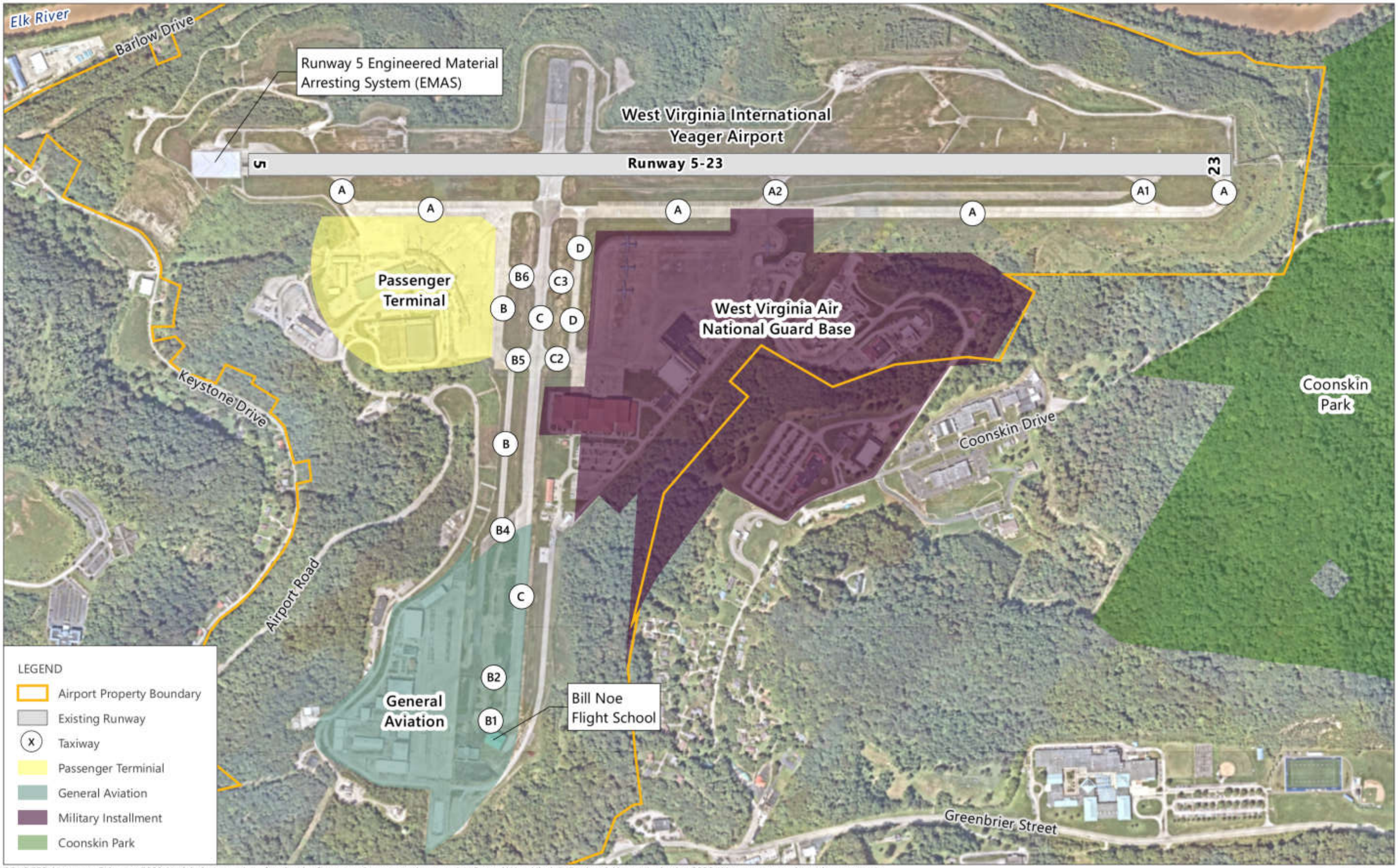

SOURCES: Nearmap, February 2022 (aerial photography – for visual reference only, may not be to scale); Central West Virginia Regional Airport Authority, 2020 (Airport property boundary, runway); West Virginia GIS Technical Center, 2020 (park boundary).

NORTH 0 1,000 ft

EXHIBIT 4

EXISTING AIRPORT FACILITIES

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1.2.2.1 AIRPORT HISTORY

The Airport opened for service in 1947, originally as the Kanawha Airport, following the closure of Wertz Field during World War II. The construction of the Airport took over three years and involved moving over nine million cubic yards of earth and rock. Construction of the central core of the existing terminal facility was completed in 1950. In 1985, the Airport was renamed Yeager Airport, after Brigadier General Chuck Yeager and his contributions to the aviation industry. With the construction and opening of a US Customs & Border Protection Facility in 2022, the Airport was renamed to the West Virginia International Yeager Airport.

Over the years the Airport has gone through several major renovations, expansions, and improvements, including:

- Construction of Concourse B gates and seating areas in 1970;
- Construction of an addition to the baggage claim area in 1974;
- Construction of Concourse A in 1984;
- Construction of Concourse C in 2001; and
- Major renovations to the terminal complex in 1984, 1997, 2001, and 2005.

The additions provided space for baggage reclaim, boarding gates with loading bridges, and passenger hold rooms. Renovations provided space for passenger and baggage security screening, communications infrastructure, and computer rooms.

The Airport originally operated two active runways, Runway 5-23 and 14-32 (later renamed 15-33). In 2003, the Airport Authority conducted an RSA Study in conjunction with the FAA in response to Public Law 109-115[15] as CRW did not meet modern FAA RSA design standards. The study recommended construction of an Engineered Material Arresting System (EMAS) (440-foot by 175-foot) off the end of Runway 5 and implementation of declared distances for Runway 23, both of which became operational in 2007. These projects improved the Runway 5-23 RSAs but did not completely bring them up to FAA design standards. Additionally, based on the shorter length of Runway 15-33 and the costs of making the runway compliant with revised FAA design standards, Runway 15-33 was decommissioned as a runway and converted to a taxiway in 2008, leaving Runway 5-23 as the only active runway.

Eight years later, on March 12, 2015, a slope failure occurred under the Runway 5 RSA and EMAS. The slope failure resulted in the loss of the usable RSA and EMAS, requiring the following in order to establish an equivalent level of safety at the Airport:

- displacement of the Runway 5 landing threshold
- shortening of the usable lengths of Runway 5-23 by up to 500 feet in both directions
- elimination of the vertical guidance for landing on Runway 5 (glideslope system rendered unusable)

[15] The Transportation, Treasury, Housing and Urban Development, the Judiciary, the District of Columbia, and Independent Agencies Appropriations Act, 2006 (Public Law [P.L.] 109-115) required completion of RSA improvements identified as part of the Runway Safety Area Program by December 31, 2015. In total, improvements were made to RSAs for over 1,000 runways at 500 airports through the Runway Safety Area Program.

To resolve these issues, the Airport Authority conducted an interim RSA study[16] (2018 Interim RSA Study), final RSA study[17] (2019 RSA Study), and the 2020 Master Plan.[18] A new 352-foot by 150-foot EMAS bed and retaining wall were constructed on the Runway 5 end in 2019 (RSA Restoration Project); however, these improvements did not address reduced runway length and do not provide for a standard RSA or a standard EMAS.

1.2.2.2 EXISTING AIRPORT FACILITIES

Functional areas of the Airport are generally divided into three areas: airfield, terminal, and landside[19] and are further described below. Existing Airport facilities are shown on Exhibit 4.

Airfield

The CRW airfield consists of Runway 5-23, taxiways, aircraft aprons, airport lighting, navigational aids (NAVAIDS), and vehicle service roads. Runway 5-23 is oriented in a northeast-southwest direction and has a parallel taxiway, Taxiway A, which extends from the Runway 23 end to approximately 500 feet from the Runway 5 end. Additional Taxiways A1 and A2, provide access between Taxiway A and Runway 5-23. Taxiways B and C are parallel taxiways that connect the general aviation apron and the Marshall University Bill Noe Flight School to the remainder of the airfield. Taxiways B, C, and D operate as parallel taxiways between the passenger terminal and the WVANG apron. The old Runway 15-33 pavement is now used as Taxiway C.

Runway 5-23 is 150 feet wide and has a physical length of 6,715 feet. As a result of the slope failure, the Airport Authority instituted declared distances to meet operational safety requirements, which reduce the Accelerate Stop Distance Available (ASDA) and Landing Distance Available (LDA).[20] The ASDA represents the amount of runway available for an aircraft to reach liftoff then decelerate without over-running the runway in the event an aircraft aborts on takeoff. The LDA represents the amount of runway available for an aircraft to land and come to a complete stop on the runway. **Table 2** shows the existing runway length and declared distances. As noted above, a 352-foot by 150-foot EMAS bed and retaining wall exist at the Runway 5 end.

TABLE 2 EXISTING RUNWAY LENGTH IN FEET

	RUNWAY 5	RUNWAY 23
Takeoff Run Available	6,715	6,715
Takeoff Distance Available	6,715	6,715
Accelerate Stop Distance Available	6,215	6,715
Landing Distance Available	6,215	6,215

SOURCE: Federal Aviation Administration, *CRW Airport 5010,* December 2021.

[16] Central West Virginia Regional Airport Authority, *Interim Runway Safety Area Study,* January 2018.

[17] Central West Virginia Regional Airport Authority, *Runway Safety Area Study,* August 2019.

[18] Central West Virginia Regional Airport Authority, *Airfield Maser Plan,* July 2020.

[19] Landside areas are accessible to the public and include roadway networks, parking lots, rental car operations, and public transportation facilities. Airside areas, or the airfield, are restricted areas with access only to authorized personnel and ticketed passengers that have undergone security screening; airside areas include passenger handling facilities, runways, taxiways, apron areas and service roads.

[20] Prior to the slope failure, the runway was 6,800 feet in length. This reduction in runway length has resulted in operational changes to airlines using the Airport.

CRW has a variety of lighting and NAVAIDS that are used to guide aircraft approaches and to better identify the runway environment at night and during poor visibility conditions. Runway 5-23 is equipped with high intensity runway edge lights,[21] and centerline lights.[22] In addition to runway lighting, approach lighting systems are used in the vicinity of runway thresholds in conjunction with electronic NAVAIDS to guide approaches to the runways. These systems provide the basic means for pilots to transition from instrument flight rules (that is, when the weather conditions are not clear enough to see) to visual flight (that is, when weather conditions are clear enough to allow the pilot to see where the aircraft is going) for landing. The approach lighting system supplies the pilot with visual cues concerning aircraft alignment, height, and position relative to the runway threshold.

Runway 23 is equipped with an Approach Lighting System with Sequenced Flashers-Category 1 (ALSF-1)[23] as well as a four-bar Visual Approach Slope Indicator (VASI).[24] The Runway 23 ALSF-1 extends 2,400 feet into Coonskin Park, located atop towers up to 220 feet tall. The Runway 5 end does not have an approach lighting system, but it does have Precision Approach Path Indicators (PAPI)[25] and Runway End Identifier Lights (REIL). A summary of the existing Runway 5-23 lighting is included in **Table 3**.

TABLE 3 EXISTING RUNWAY LIGHTING

	RUNWAY END	
LIGHTING SYSTEM	5	23
Runway Edge Lighting	High-Intensity	
Centerline Lighting	Yes	
Approach Lighting System	None	ALSF-1
Runway End Identifier Lights	Yes	No
Visual Glide Slope Indicators	PAPI	VASI

NOTES: PAPI – Precision Approach Path Indicators VASI – Visual Approach Slope Indicate ALSF – Approach Lighting System with Sequenced Flashing Lights

[21] Runway edge lights are used to outline the edges of runways during periods of darkness or restricted visibility conditions. The runway edge lights are white. The lights marking the ends of the runway emit red light toward the runway to indicate the end of runway to a departing aircraft and emit green outward from the runway end to indicate the threshold to landing aircraft.

[22] Runway centerline lights are used to facilitate landing under adverse visibility conditions. They are located along the runway centerline and are spaced at 50-foot intervals. When viewed from the landing threshold, the runway centerline lights are white until the last 3,000 feet of the runway. The white lights begin to alternate with red for the next 2,000 feet, and are red for the last 1,000 feet of the runway.

[23] An Approach Lighting System (ALS) is a configuration of lights positioned symmetrically along the extended runway centerline. It begins at the runway threshold and extends towards the approach. The approach lighting is usually controlled by the airport traffic control tower (ATCT). ALSF-1 is a high-intensity ALS with light stations positioned every 100 feet (30 meters). These systems also include sequenced flashing lights, which appear to the pilot as a ball of light traveling towards the runway at high speed (twice a second).

[24] The Visual Approach Slope Indicator (VASI) is a system of lights arranged to provide visual descent guidance information during the approach to a runway. These lights are visible from 3 to 5 miles during the day and up to 20 miles or more at night. Each light unit projects a beam of light having a white segment in the upper part of the beam and red segment in the lower part of the beam. The light units are arranged so that the pilot using the VASIs during an approach will see the combination of red and white lights that indicate if the aircraft is below, on, or above the appropriate glide slope.

[25] Precision Approach Path Indicators (PAPI) are a system consisting of four horizontal light boxes arranged perpendicular to the edge of the runway that provide guidance information to assist pilots in acquiring and maintaining the correct approach. It projects a pattern of red and white lights that provide visual approach slope information to guide the aircraft on the desired descent path to the touchdown point. The light units are arranged so that the pilot using the PAPI during an approach will see the combination of red and white lights that indicate if the aircraft is below, on, or above the appropriate glide slope.

SOURCES: Federal Aviation Administration, *CRW Airport 5010,* December 2021; Central West Virginia Regional Airport Authority, August 2022.

CRW also has several NAVAIDS, which are visual or electronic devices that provide point-to-point guidance information or position data to aircraft in flight. NAVAIDS related to Runway 5-23 include:

- Runway Visual Range (RVR): refers to the length of visible runway and is used to ensure safe landings at an airport. The RVR value is determined by instruments located alongside and approximately 14 feet higher than the centerline of the runway. Minimum RVR values are established to maintain safe landing procedures at airport facilities. Equipment used to calculate RVR for Runway 5-23 includes two transmissometers[26] located on the northwest sides of each runway end.
- Instrument Landing System (ILS): An ILS provides vertical guidance through a glide slope antenna and horizontal guidance through a localizer antenna. It works in conjunction with a runway's approach lighting system and distance measuring equipment or marker beacons. Runway 5 has the localizer and glide slope components of an ILS; and while temporarily disabled as a result of the relocation of the Runway 5 threshold after the 2015 slope failure, was returned to service as part of the RSA Restoration Project that was completed in 2019.

Terminal

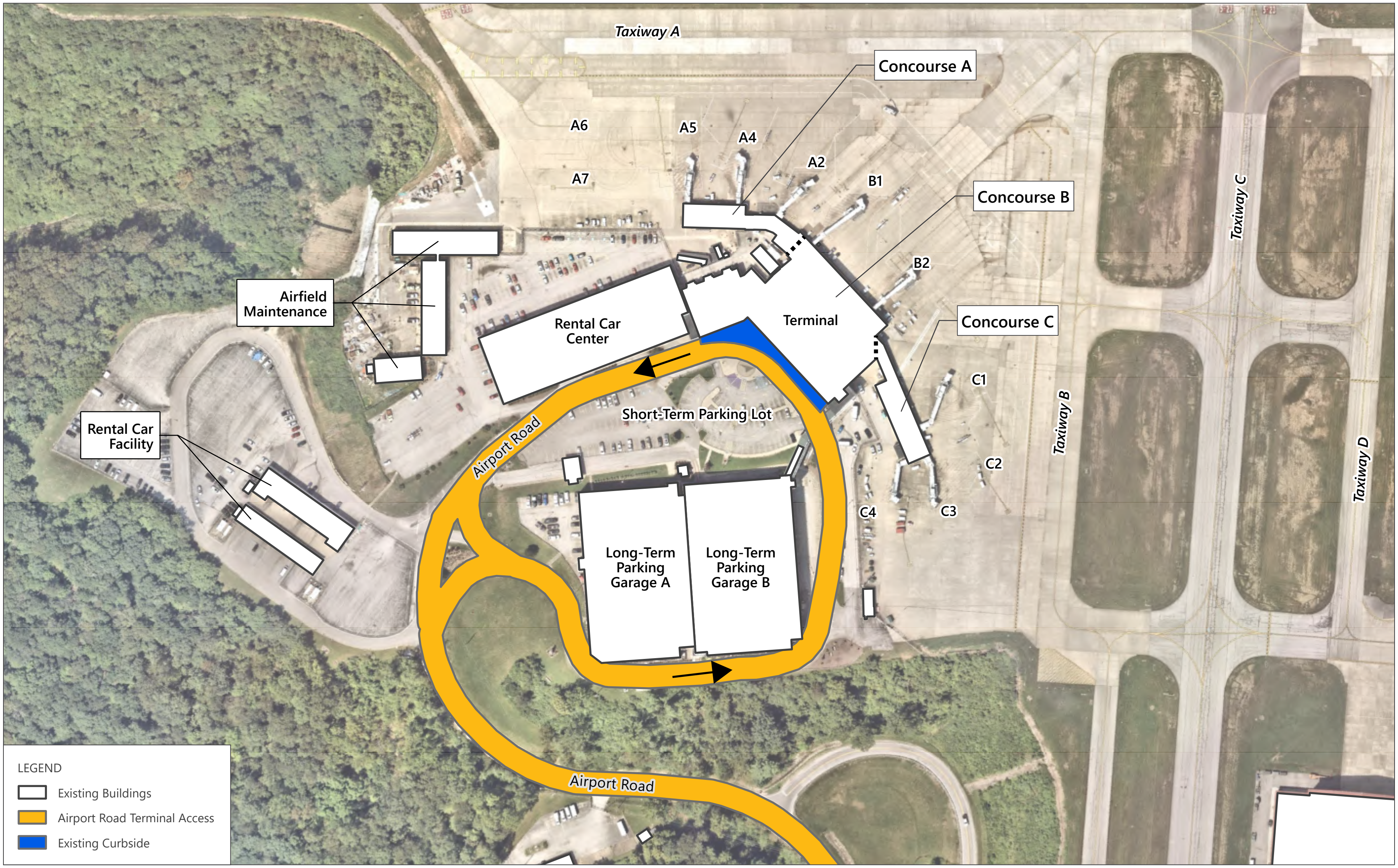
The existing passenger terminal is comprised of three separate concourses and a total of 11 gates: Concourse A (5 gates), Concourse B (2 gates), and Concourse C (4 gates). The concourses and passenger terminal comprise three separate levels. The existing gate configuration is included in **Table 4** and shown on **Exhibit 5**. Concourse A and C have ground-level holdrooms, while Concourse B holdrooms are located on the second level. Ticketing, passenger security screening and baggage claim are provided on the ground level, although at different elevations, accessible via an existing ramp and stairs. The third level consists of Airport Authority administration and offices.

TABLE 4 EXISTING GATE CONFIGURATION

EXISTING GATES	AIRPORT DESIGN GROUP	AIRCRAFT EQUIVALENT
A2	Small ADG III	CRJ-900
A4	Small ADG III	B717
A5	Small ADG III	B717
A6*	Small ADG III	CRJ-900
A7*	Small ADG III	CRJ-900
B1	ADG III	A321
B2	ADG III	A321
C1*	ADG II	CRJ-700
C2**	ADG II	CRJ-700
C3**	ADG II	CRJ-700
C4	Small ADG III	CRJ-900

Notes:
* Hardstand; No Pedestrian Boarding Bridge
** Gates C2 and C3 have operational restrictions
SOURCE: Landrum & Brown, "Taxiway A Relocation Project," May 16, 2022.

[26] Transmissometers are typically installed at the runway ends and are used to determine the visual range of the runway based on visibility deterioration factors, including fog and rain for flight control safety systems including Runway Visual Ranges.



SOURCES: Nearmap, July 2021 (aerial photography – for visual reference only, may not be to scale); Central West Virginia Regional Airport Authority, 2020 (existing buildings); Ricondo & Associates, Inc., July 2022 (terminal access, curbside).

EXHIBIT 5

NORTH 0 250 ft

EXISTING TERMINAL AND LANDSIDE CONFIGURATION

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Landside

Access to the Airport is provided via Airport Road from Greenbrier Street (West Virginia Route 114). Upon entering the terminal area, Airport Road splits via an existing intersection providing access to the terminal, two long-term parking garages, short-term surface parking, and the rental car center via one way traffic to the north (see Exhibit 5). Roadway users then exit the terminal area via the same one-way traffic to the south. The terminal curbside is approximately 260 feet long, located on a single level with an inner curb. The curbside is not linear and curves to follow the terminal front.

Additional landside facilities include two long-term parking garages and the rental car center. Long-term parking garage A (Garage A) was constructed in 1991 and long-term parking garage B (Garage B) in 2005. Garage A is an open-air structure comprised of five levels. Garage B is an open-air structure comprising of four levels. Access to the terminal is provided via a covered passenger connector on the third level of the parking garage. The rental car center is a two-story open-air structure, attached to the terminal building to the south, providing direct access to the terminal through the baggage claim area.

1.2.2.3 AIRPORT PASSENGERS AND OPERATIONS

The Airport is served by four airlines—American Airlines, Delta Air Lines, Spirit Airlines, and United Airlines—with non-stop service to five cities as of July 2022. In addition to this commercial airline activity, CRW serves general aviation aircraft. General aviation includes activities such as individual or business transportation, recreational flying, flight training, for-hire charter activity, and other non-commercial and non-military activities. CRW is also home to the WVANG 130th Airlift Wing, operating C-130s at CRW, and the Marshall University Bill Noe Flight School. The flight school opened in 2021 and offers programs to prepare students to earn a commercial pilot's license using single and multi-engine aircraft.

A forecast of aviation activity was prepared in 2017 for the Airfield Master Plan[27] (2017 Forecast), with a base year of 2017 and forecast through 2037. The forecast of passengers and operations was based on historical and projected demographic and socioeconomic data, industry trends, aircraft fleet mix, and aircraft load factor[28] assumptions. The 2017 Forecast included two passenger forecasts, a base and a high passenger demand forecast, to display the range of activity the Airport could accommodate over the forecast period. The number of commercial passenger aircraft operations was forecast to increase between 0.4 percent and 0.8 percent annually. The base passenger operations forecast shows an increase from 11,700 in 2016 to 12,600 in 2037. The high passenger operations forecast shows an increase from 11,700 in 2016 to 13,700 in 2037. The 2017 Forecast also indicated that between 313,000 and 354,000 enplaned passengers[29] would be served at the Airport in 2037, for the base passenger operations forecast and the high passenger operations forecast, respectively.

Since the completion of the 2017 Forecast, the COVID-19 pandemic has had a profound impact on the aviation industry overall, as well as at the Airport. Thus, a revised forecast was developed in support of the EIS for enplaned passengers and operations with a base year of 2020 and forecast through 2040. The updated forecast (EIS Forecast) is included as **Appendix B**.

In preparing the EIS Forecast, Ricondo analyzed activity at the Airport from 2011 to 2021 to identify principal drivers of changes during this period. **Table 5** shows historical enplaned passengers, passenger airline operations, and total

27 Central West Virginia Regional Airport Authority, *Airfield Master Plan,* July 2020.

28 Load factor is a metric measuring the percentage of available flight seating capacity that will be filled with passengers.

29 Enplaned passengers are the passengers boarding an aircraft.

operations which includes passenger, cargo, general aviation/air taxi, and military operations at the Airport. Both enplaned passenger activity and passenger airline landings at the Airport during this period were characterized by a declining trend, with a turn toward growth in enplaned passengers in 2018 and 2019 before the COVID-19 pandemic. Further discussion of passenger airline activity trends for 2020 to present, including the post-COVID-19 pandemic onset, is included in Section 3.2 of Appendix B.

TABLE 5 HISTORICAL ENPLANED PASSENGERS AND OPERATIONS

YEAR	ENPLANED PASSENGERS	PASSENGER AIRLINE OPERATIONS	TOTAL OPERATIONS
2011	284,842	17,304	56,491
2012	270,199	15,668	47,776
2013	250,350	14,332	48,661
2014	239,852	13,236	47,920
2015	225,489	12,154	47,426
2016	213,514	11,338	43,467
2017	202,581	11,344	35,977
2018	215,731	11,640	31,462
2019	224,929	10,338	31,712
2020	89,244	5,830	24,066
2021	146,355	6,764	32,808
CAGR			
2011 – 2019	-2.9%	-6.2%	-7.0%
2011 – 2021	-6.4%	-9.0%	-5.3%

NOTE:
CAGR – Compound Annual Growth Rate
SOURCE: Central West Virginia Regional Airport Authority, May 2022.

Given the uncertainty of the duration and impacts of COVID-19 pandemic-related factors affecting the aviation industry, including various quarantine requirements, return-to-work policies, and passenger confidence, the timing of a return to pre-COVID-19 pandemic capacity and passenger levels is unknown. However, over the long-term, US demand for air travel and airline capacity are expected to grow in line with the US Gross Domestic Product (GDP), a relationship that has been in place since before airline industry deregulation in 1978.[30] In the EIS Forecast, COVID-19 pandemic-related factors were modeled to continue influencing passenger activity through 2025 (short-term forecast), with traditional drivers of demand (socioeconomic factors) primarily influencing activity from 2026 through 2040 (long-term forecast).

Projected enplaned passengers and passenger airline operations for the short-term recovery forecast, defined as 2019 to 2025, is shown in **Table 6**. The short-term forecast was developed based on an evaluation of existing and forecast aircraft operations and passenger enplanements, estimates of the percentage of scheduled flights that would be operated, and passenger load factors. The scheduled passenger operations forecast was also informed by recent changes in fleet mix, as airlines have accelerated the retirement of smaller regional jets (that is, 50-seat aircraft) and have advanced transitioning to larger aircraft (mainly 70-seat aircraft) during the COVID-19 pandemic.

[30] US Department of Transportation Bureau of Transportation Statistics, May 2020 (airline capacity); Woods & Poole Economics, Inc., June 2020 (US GDP).

This "up-gauging" is one of the factors contributing to a quicker short-term passenger recovery than passenger airline operations. The EIS forecast indicates enplanement number of approximately 265,000 by 2025.

TABLE 6 SHORT-TERM RECOVERY FORECAST ENPLANED PASSENGERS AND PASSENGER AIRLINE OPERATIONS

YEAR	ENPLANED PASSENGERS	PERCENT OF 2019	PASSENGER AIRLINE OPERATIONS	PERCENT OF 2019
2019 (Actual)	224,929	100.0%	10,338	100.0%
2020 (Actual)	89,244	39.7%	5,830	56.4%
2021 (Actual)	146,355	65.1%	6,764	65.4%
2022	177,854	79.1%	7,147	69.1%
2023	233,668	103.9%	8,633	83.5%
2024	258,516	114.9%	9,422	91.1%
2025	265,334	118.0%	9,872	95.5%
CAGR				
2019 – 2025	2.8%		1.1%	-

NOTE:
CAGR – Compound Annual Growth Rate
SOURCES: Central West Virginia Regional Airport Authority, November 2021; Ricondo & Associates, Inc., May 2022.See Appendix B.

The passenger airline operations for the long-term forecast, defined as 2026 to 2040, were based on the enplaned passenger forecast, average seats per departure, and estimated load factors. The forecast of operations by route and aircraft type was based on an assessment of the current and expected future fleet mix of each airline, taking into consideration expected aircraft retirements as well as aircraft on order. The determination of aircraft type also considered the appropriate aircraft size for the market to accommodate future demand as well as the range of the aircraft with regard to the distance of each route. It is expected that the up-gauging of aircraft identified in the short-term forecast would continue, and that over time airlines would incorporate larger regional jets. The long-term forecast also assumes service to two destinations not served as of December 2021 would return during the forecast period: American Airlines' service to Philadelphia International Airport (PHL) and United Airlines' service to George Bush Intercontinental Airport (IAH).[31]

The EIS Forecast for enplaned passengers and commercial passenger aircraft operations is summarized in **Table 7**. The EIS Forecast for all (passenger and non-passenger airlines) operations is presented in **Table 8**.[32] By 2040, the forecast projects enplaned passengers to reach 287,957 and commercial passenger aircraft operations to reach 9,529. Total operations are anticipated to remain fairly steady through the forecast period, but as previously discussed, it is assumed that smaller commercial passenger aircraft would be replaced by larger aircraft resulting in fluctuations in the number of commercial passenger aircraft operations even as the number of enplaned passengers is forecast to steadily increase over the forecast period.

31 The Central West Virginia Regional Airport Authority is also engaged in ongoing discussions with American Airlines regarding additional future service to Dallas/Fort Worth International Airport. American Airlines, March 11, 2022, letter to Central West Virginia Regional Airport Authority.

32 The Central West Virginia Regional Airport Authority is engaged in marketing efforts to bring additional airlines, markets, and destinations to the Airport. CRW has also received a Small Community Air Service Development Grant from the Department of Transportation to reintroduce service to George Bush Intercontinental Airport (IAH) in Houston and/or Dallas Fort Worth International Airport (DFW).

TABLE 7 UPDATED AVIATION FORECAST – ENPLANED PASSENGERS AND COMMERCIAL PASSENGER AIRCRAFT OPERATIONS

YEAR	ENPLANED PASSENGERS	COMMERCIAL PASSENGER AIRCRAFT OPERATIONS
Historical		
2011	284,842	17,304
2012	270,199	15,668
2013	250,350	14,332
2014	239,852	13,236
2015	225,489	12,154
2016	213,514	11,338
2017	202,581	11,344
2018	215,731	11,640
2019	224,929	10,338
2020	89,244	5,830
2021	146,355	6,764
Forecast		
2022	177,854	7,147
2023	233,668	8,633
2024	258,516	9,422
2025	265,334	9,872
2026	267,036	9,935
2027	268,710	9,760
2028	270,354	9,820
2029	271,972	9,879
2030	273,563	9,704
2031	275,134	9,759
2032	276,655	9,813
2033	278,155	9,638
2034	279,627	9,689
2035	281,064	9,739
2036	282,503	9,565
2037	283,905	9,612
2038	285,281	9,659
2039	286,625	9,485
2040	287,957	9,529
CAGR		
2011 – 2020	-12.1%	-11.4%
2020 – 2030	11.9%	5.2%
2030 – 2040	0.5%	-0.2%
2020 – 2040	6.0%	2.5%

NOTE:
CAGR – Compound Annual Growth Rate
SOURCES: Central West Virginia Regional Airport Authority, November 2021; Federal Aviation Administration, *2021 Terminal Area Forecast*, March 2022; Ricondo & Associates, Inc., May 2022. See Appendix B.

TABLE 8 UPDATED AVIATION FORECAST – TOTAL OPERATIONS

YEAR	PASSENGER	CARGO	GA/AIR TAXI	MILITARY	TOTAL
Historical					
2011	17,304	1,062	31,645	6,480	56,491
2012	15,668	1,114	24,832	6,162	47,776
2013	14,332	1,120	26,434	6,775	48,661
2014	13,236	992	27,343	6,349	47,920
2015	12,154	742	27,990	6,540	47,426
2016	11,338	740	24,140	7,249	43,467
2017	11,344	742	18,189	5,702	35,977
2018	11,640	742	14,706	4,374	31,462
2019	10,338	752	16,126	4,496	31,712
2020	5,830	738	13,564	3,934	24,066
2021	6,764	730	21,090	4,224	32,808
Forecast					
2022	7,147	820	22,089	4,800	34,856
2023	8,633	860	22,864	4,800	37,157
2024	9,422	900	23,174	4,800	38,296
2025	9,872	940	23,318	4,800	38,930
2026	9,935	980	23,388	4,800	39,104
2027	9,760	1,020	23,459	4,800	39,039
2028	9,820	1,040	23,530	4,800	39,190
2029	9,879	1,060	23,602	4,800	39,340
2030	9,704	1,080	23,674	4,800	39,257
2031	9,759	1,100	23,746	4,800	39,405
2032	9,813	1,120	23,819	4,800	39,552
2033	9,638	1,140	23,892	4,800	39,470
2034	9,689	1,160	23,966	4,800	39,615
2035	9,739	1,180	24,040	4,800	39,759
2036	9,565	1,200	24,115	4,800	39,679
2037	9,612	1,220	24,190	4,800	39,822
2038	9,659	1,240	24,265	4,800	39,964
2039	9,485	1,260	24,341	4,800	39,886
2040	9,529	1,280	24,418	4,800	40,026
CAGR					
2019 – 2025	-0.8%	3.8%	6.3%	1.1%	3.5%
2025 – 2040	-0.2%	2.1%	0.3%	0.0%	0.2%
2019 – 2040	-0.4%	2.6%	2.0%	0.3%	1.1%

NOTE:
CAGR – Compound Annual Growth Rate
SOURCES: Central West Virginia Regional Airport Authority, November 2021; Ricondo & Associates, Inc., May 2022. See Appendix B.

1.2.2.4 METEOROLOGICAL CONDITIONS

Weather conditions play an important role in the operational capabilities of an airport. For example, temperature is a key factor in determining the length of runway required by aircraft for takeoffs and landings. In addition, wind speed and direction determine runway orientation and dictate the amount of time a runway can be in use. Periods of low visibility due to weather conditions, such as fog or snow, are factors in determining the need for navigational aids.

Because aircraft land and depart into the wind, the direction and speed of prevailing winds relative to the orientation of a runway can result in crosswinds and/or tailwinds that make that runway unsuitable for landing and/or departing aircraft. As discussed in the 2020 Master Plan, historical wind data at CRW identified that winds at CRW predominantly occur from the south and southwest, consistent with the orientation of Runway 5-23. **Table 9** shows the percentage of time each individual runway direction provides coverage for each crosswind limit. Table 9 also shows the total runway coverage, which indicates the total percent coverage provided by the two runway directions at CRW.

TABLE 9 RUNWAY COVERAGE

CROSSWIND LIMIT	RUNWAY 5	RUNWAY 23	TOTAL RUNWAY COVERAGE [1]
10.5 knots	71.8%	89.3%	97.8%
13 knots	72.6%	90.7%	99.3%
16 knots	72.8%	91.1%	99.8%
20 knots	72.9%	91.3%	99.9%

NOTE:
1 Total runway coverage is defined as when at least one runway is available but not necessarily both.
SOURCE: Central West Virginia Regional Airport Authority, *Airfield Master Plan,* July 2020

Independent of wind direction, the cloud ceiling[33] and visibility[34] conditions at an airport determine the Air Traffic Control (ATC) procedures in effect. Ceiling and visibility may vary with cloud conditions, fog, precipitation, and haze. Visual meteorological conditions (VMC) and instrument meteorological conditions (IMC) are defined by measured levels of ceiling and visibility. These conditions, shown in **Table 10**, set the standards that permit or prohibit various ATC procedures. Cloud ceiling heights of 1,000 feet AGL or greater and visibility 3 miles or greater is considered VMC, allowing the use of visual flight rules (VFR). When cloud ceiling heights and/or visibility fall below the 1,000 foot and 3-mile minimums, conditions are considered IMC and instrument flight rules (IFR) are in effect.

IMC are further subdivided into three categories for the purposes of determining airfield infrastructure requirements and certifying aircraft and flight crew to conduct ILS approach procedures. ILS Category (CAT) I approaches require at least a 200-foot cloud ceiling height and 0.5-mile visibility. ILS CAT II approaches require at least a 100-foot cloud ceiling height and a runway visual range (RVR) of 1,200 feet.[35] A cloud ceiling height and/or visibility less than CAT II is considered CAT III.

[33] Cloud ceiling is the height above the earth's surface of the lowest layer of clouds not classified as "thin" or "partial."

[34] Visibility is the ability to see and identify prominent, unlighted objects by day and prominent lighted objects at night.

[35] Runway visual range is the horizontal distance that a pilot should be able to see down the runway; it is reported in feet.

TABLE 10 WEATHER CONDITIONS

CATEGORY		CEILING ABOVE GROUND LEVEL (AGL)		VISIBILITY	PERCENT OCCURRENCE AT CRW
Visual Meteorological Conditions (VMC)		1,000 feet or greater	and	3 miles or greater	89.3%
Instrument Meteorological Conditions (IMC)	Cat I	Less than 1,000 feet and greater than or equal to 200 feet	and/or	Less than 3.0 miles and greater than or equal to 0.5 miles	7.8%
	Cat II	Less than 200 feet and greater than or equal to 100 feet	and/or	Less than 0.5 miles and greater than or equal to 1,200 feet RVR[1]	2.3%
	Cat III	Less than 100 feet	and/or	Less than 1,200 feet RVR[1]	0.7%
		Subtotal (All Weather Conditions)			**100.0%**

NOTES:
Values may not add to 100 due to rounding.
CAT – Category
RVR – Runway Visual Range
1 The 1,200-foot RVR was considered 0.25 miles for compatibility with the hourly weather observation's visibility unit of measurement.
SOURCE: Central West Virginia Regional Airport Authority, *Airfield Master Plan,* July 2020.

1.3 NEED FOR THE PROJECT

CRW is a critical component of the transportation network of West Virginia. It is the objective of both the Airport Authority and the FAA to provide safe and efficient airport facilities for the traveling public and users of the Airport. The Proposed Project encompasses several components and is needed to address various safety and operational deficiencies at the Airport.

The overall project includes development that identifies separate objectives for the near-term and long-term, allowing justification for approval of Phase 1 (near-term) regardless of the timing of implementation of the remainder of the project.

- Phase 1 would address the specific need to improve safety areas to meet FAA design guidelines and provide a runway length that allows for the operation of the existing critical aircraft to existing and forecast destinations through 2030 (see **Table 11**). Phase 1 would also address the need to modernize the terminal complex.
- The need for the long-term development (Phase 2) is dependent on and in support of a change in the critical aircraft serving CRW and/or forecast destinations that are anticipated to occur between 2030 and 2040. Some of these aircraft already operate at the Airport today, but not with sufficient frequency to justify a runway extension beyond 7,000 feet at this time.[36] **Table 12** identifies the existing and future critical aircraft operations for CRW.

[36] Due to the uncertainty of timing for an increase in operations by aircraft needing a longer runway or additional gates, the Phase 2 project elements are not considered ripe for decision and will be analyzed at a programmatic level in the EIS. Further project-level review will be conducted at a later date when a clear need for these project elements is evident.

TABLE 12 COMMERCIAL PASSENGER AIRCRAFT FORECAST FLEET MIX

DESTINATION	AIRCRAFT	OPERATIONS				
		2020	2021	2025	2030	2040
Atlanta (ATL)	717-200	49	0	0	0	0
	A220-300	0	0	0	0	158
	CRJ-200	1,858	713	0	0	0
	CRJ-900	124	1,362	2,398	2,110	1,770
	EMB-175	0	0	821	950	1,102
Charlotte (CLT)	A319/A320/A321	0	0	0	0	147
	CRJ-200	214	0	0	0	0
	CRJ-700	1,555	2,080	2,140	2,042	1,238
	CRJ-900	368	225	0	0	0
	EMB-175	0	0	715	850	1350
Chicago O'Hare (ORD)	A319/A320/A321	0	0	0	0	89
	CRJ-200	1,168	1,203	0	0	0
	CRJ-700	0	0	1,220	1,090	890
	EMB-175	0	0	540	630	803
Houston (IAH)	A319/A320/A321	0	0	0	26	50
	CRJ-700	0	0	150	102	50
	EMB-175	0	0	364	384	401
Myrtle Beach (MYR)	A319/A320/A321	19	71	72	70	69
Orlando (MCO)	A319/A320/A321	86	274	317	311	304
Philadelphia (PHL)	CRJ-200	11	0	0	0	0
	CRJ-700	204	231	300	205	145
	CRJ-900	0	0	26	0	0
	EMB-175	0	0	183	307	351
Washington DC (DCA)	CRJ-200	174	0	0	0	0
	CRJ-700	0	605	429	305	170
	EMB-175	0	0	197	322	442
Total		**5,830**	**6,764**	**9,872**	**9,704**	**9,529**

NOTES:
ATL – Hartsfield-Jackson Atlanta International Airport
CLT – Charlotte Douglas International Airport
DCA – Ronald Reagan Washington National Airport
ORD – Chicago O'Hare International Airport
IAH – George Bush Intercontinental Airport (Houston)
MCO – Orlando International Airport
MYR – Myrtle Beach International Airport
SOURCES: Central West Virginia Regional Airport Authority, November 2021; US Department of Transportation, T-100 Database, November 2021; Federal Aviation Administration, OPSNET, November 2021; Ricondo & Associates, Inc., May 2022.

TABLE 13 EXISTING AND FUTURE CRITICAL AIRCRAFT

	YEAR	AIRCRAFT TYPE	RUNWAY DESIGN CATEGORY (RDC) AAC+ADG	TAXIWAY DESIGN GROUP	ANNUAL OPERATIONS
Phase 1	2020	Bombardier CRJ-700	C-III	2	1,759
	2021	Bombardier CRJ-900	C-III	2	1,587
	2025	Embraer E-175	C-III	3	2,820
Phase 2	2030	Embraer E-175	C-III	3	3,443
	2040	Airbus A319/A320/A321	C-III	3	659

NOTES: AAC – Aircraft Approach Category
ADG – Airplane Design Group

SOURCES: Federal Aviation Administration, Traffic Flow Management System Counts 2020 and 2021, January 2021; Central West Virginia Regional Airport Authority, November 2021; US Department of Transportation, T-100 Database, November 2021; Ricondo & Associates, Inc., May 2022.

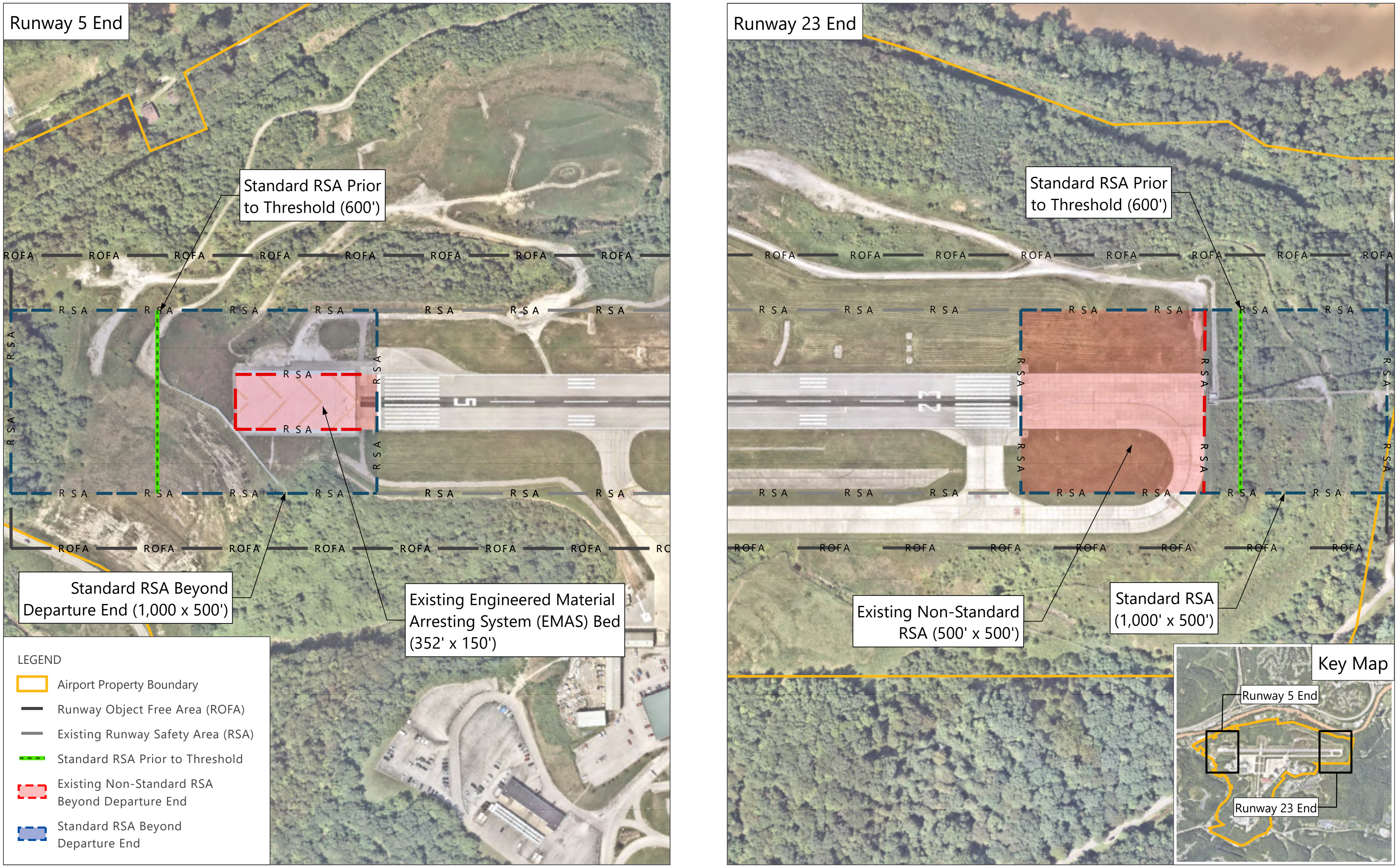
1.3.1 EXISTING NEED

The immediate and primary need of the Proposed Project is to enhance safety as the existing RSAs do not meet current FAA design standards as identified in FAA Advisory Circular 150/5300-13B, *Airport Design*. As discussed in Section 1.2.2.1, there have been multiple studies over the last 20 years to address the RSA deficiencies at CRW as FAA design standards have continued to evolve. Additionally, the 2015 slope failure beneath the Runway 5 EMAS resulted in the loss of the useable RSA and EMAS, as well as reductions in the physical and operational lengths of the runway, resulting in operational restrictions to airlines and aircraft using the Airport. Immediate action was taken to stabilize the area and the Airport Authority subsequently constructed a retaining wall to prevent further degradation of the slope and RSA. The Airport Authority also immediately initiated planning efforts to identify a permanent solution to address the RSA deficiencies, which were addressed in both the 2020 Master Plan and the 2019 RSA Study. Those planning efforts are the subject of this EIS.

There is also a need to improve and enhance the efficiency of aircraft and passenger movement in the terminal area. The existing terminal complex, which was originally constructed in the 1950s, is not configured for current airline passenger processing needs or the needs of the existing aircraft fleet, resulting in an inefficient and low level of service (LOS) for passengers.

1.3.1.1 NON-STANDARD RUNWAY SAFETY AREAS

As noted in Sections 1.2.1 and 1.2.2, the existing RSA and ROFA do not meet FAA design standards. The existing RSA and ROFA in comparison to a standard RSA and ROFA are shown on **Exhibit 6** and summarized in **Table 14**. Additional RSA deficiencies associated with Runway 5-23 include the existence of draining structures spanning from Taxiway D to Taxiway A that create transverse grades within this area greater than the allowable 3 percent, and the presence of lighting and NAVAIDS that are not fixed by function at both ends of Runway 5-23. Lighting and NAVAIDS on the Runway 5 end include distance measuring equipment, the Runway 23 localizer, the Runway 5 glide slope, the ROFA wind cone and the PAPI system. Lighting and NAVAIDS on the Runway 23 end include the Runway 5 localizer, VASI system, and the Runway 23 end-fire glide slope.



SOURCES: Nearmap, July 2021 (aerial photography – for visual reference only, may not be to scale); Central West Virginia Regional Airport Authority, 2020 (airport property boundary); Ricondo & Associates, Inc., February 2022 (safety areas).

NORTH

0 400 ft

EXHIBIT 6

EXISTING RUNWAY SAFETY AREAS

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TABLE 14 EXISTING AND STANDARD RUNWAY SAFETY AREAS

	EXISTING		
	RUNWAY 5[1]	RUNWAY 23	FAA DESIGN STANDARD
Runway Safety Area			
Width (based on Runway Centerline)	500 ft	500 ft	500 ft
Length Beyond Runway End [2]	500 ft	387 ft EMAS	1,000 ft
Length Prior to Threshold [2]	387 ft EMAS	500 ft	600 ft
Runway Object Free Area			
Width (based on Runway Centerline)	800 ft	800 ft	800 ft
Length Beyond Runway End	387 ft EMAS	500 ft	1,000 ft

NOTES:

1 The EMAS bed is approximately 352 feet long and 150 feet wide. Located between the EMAS bed and the Runway 5 threshold is a 35-foot "run-in area," which increases the RSA length to 387 feet. However, per the FAA 150/1500-13B Advisory Circular, *Airport Design*, the presence of the EMAS does not diminish the standard RSA width. Further, based on FAA Order 5300.1 a modification of standard cannot be utilized to correct a non-standard RSA. The RSA beyond the Runway 5 end is irregularly shaped due to the terrain and the drop off associated with the retaining wall. Thus, the RSA width varies between 455 feet (at the Runway 5 threshold) and 230 feet (at the end of the Runway 5 EMAS). The length of the RSA prior to the threshold is less than 400 feet.

2 The RSA length that is beyond the runway end is for aircraft arriving on the opposite end. Therefore, for aircraft landing on Runway 5, the RSA length beyond the runway end is the length beyond the Runway 23 end. Similarly, the RSA length prior to the threshold is for arriving aircraft. Therefore, for aircraft landing on Runway 5, the RSA length prior to the threshold is referring to the Runway 5 threshold.

SOURCES: Central West Virginia Airport Authority, *Airport Layout Plan, Airport Data Sheet*, January 2020; Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design,* March 31, 2022.

Additionally, as noted in Table 14 above, based on FAA Order 5300.1, the CWVRAA cannot apply for a MOS to address the existing non-standard RSAs as the FAA will not consider an MOS to address non-standard RSA dimensions. As a result, the existing RSAs at the Airport would continue to remain non-compliant with FAA standards until modifications to their deficiencies occur. Further, the CWVRAA and the FAA must continually assess the non-standard RSA with respect to operational, environmental, and technological changes to determine whether an alternative method, such as the installation of EMAS, can be used to provide the equivalent safety of a standard RSA and/or whether incremental improvements can be made to bring the RSA closer to meeting FAA standards.

1.3.1.2 AIRFIELD ACCIDENTS AND INCIDENTS

CRW has had a number of aircraft-related airfield incidents. Within the past 12 years, the following accidents and incidents related to the runway and RSA have occurred:

- In January 2010, three years after the installation of the EMAS on the Runway 5 end, a US Airways CRJ 200 aborted takeoff and skidded 1,921 feet before entering the EMAS bed. The EMAS successfully stopped the aircraft approximately 130 feet into the EMAS bed, resulting in no injuries to the 30 passengers and 3 crew members. As a result of the accident, Runway 5-23 was closed for approximately 8 hours. After this accident, the EMAS was reconstructed.
- On March 12, 2015, a slope failure occurred under the Runway 5 RSA and EMAS. While no aircraft were involved, the failure did result in destruction of the EMAS. The EMAS was eight years old and sat atop approximately 1 million cubic yards of engineered fill. In addition to the damage on the Airport, the slope failure destroyed off-Airport power, and sanitary sewer lines, trees, and a nearby church. It also blocked the Elk Twomile Creek and portions of Keystone Drive. As a result of the stream blockage, one house was destroyed and there was major flood damage to upstream homes.

- In March 2016, a Cessna 172 attempted takeoff on Runway 5 for an instructional flight, flipped on the runway, caught on fire, and came to rest in the RSA. This accident tragically killed 1 person and seriously injured another. Runway 5-23 was closed for approximately 5 hours after this accident.
- In February 2017, a landing regional jet overran the declared landing distance and used the entire runway and stopway[37] to come to a complete stop.
- On May 5, 2017, a twin-engine turboprop Short 330 cargo plane crashed while landing on Runway 5, tragically killing two people. The left wing of the aircraft struck the runway first, then the fuselage, which sheared off the wing. The aircraft skidded 380 feet off the side of the runway and went down a steep embankment, coming to rest approximately 85 feet below runway elevation. As a result of the accident, Runway 5-23 was closed for approximately 26 hours.
- On September 4, 2019, a Cessnas 182J landed short of the Runway 5 threshold in the EMAS bed. No injuries or fatalities occurred, however, after this accident the EMAS bed was damaged and required repairs. Runway 5-23 was closed for 6 hours during the investigation of the incident and the removal of the aircraft from the EMAS bed.
- On September 25, 2020, a pilot taxied a Piper PA46-500TP onto the EMAS bed. The pilot further conducted a 180 degree turn on the EMAS bed and began his departure from the Airport without incident. The incident did not result in the closure of Runway 5-23; however, the incident did damage 75 EMAS blocks and four deflector shields.

Based on the location of the Airport within mountainous terrain, CRW has unique safety and rescue considerations. If there is an overshoot or underrun on Runway 5-23, that has the potential to result in severe accidents due to the terrain and dramatic elevation changes surrounding the Airport. Additionally, there are potential accessibility constraints and response time delays with any aircraft excursion (that is, an aircraft that deviates from the runway pavement). In the case of the May 2017 crash where two pilots died, the aircraft went over the hillside and into very steep terrain. It took rescuers approximately 90 minutes to reach the aircraft and begin extracting the pilots due to the terrain and thick vegetation. Officials had to drive on public roads around the Airport and single dirt lanes on Airport property, and then walk to the crash site. Other rescuers tied off with ropes from the airfield and cut their way down the mountain with chain saws. The provision of standard RSAs would enhance the overall safety of the airfield.

1.3.1.3 INSUFFICIENT RUNWAY LENGTH

As discussed in Section 1.2.2, Runway 5-23 has a physical length of 6,715 feet, and as a result of the slope failure in 2015, the Airport Authority instituted declared distances to meet operational safety requirements, which further reduce the usable length of Runway 5-23 in both directions. The reductions in the usable runway lengths have resulted in operational changes to airlines using the Airport.

As part of the 2018 Interim RSA Study, the Airport Authority conducted outreach to the four commercial airlines operating at CRW. The input from these key stakeholders indicated that additional ASDA length for Runway 5-23 was needed in both directions to allow the airlines to serve their existing markets from CRW without weight restrictions. The 2018 Interim RSA Study determined that the ASDA requirement for Runway 23 was 6,820 feet. However, with the proposed runway shift, an additional adjustment needs to be made to account for the further change in runway end point elevations (see Section 1.2.1). Guidance in FAA AC 150/5325-4B suggests an assumed

[37] A stopway is the area beyond a runway which can be used for deceleration in the event of an aborted takeoff.

increase in required runway length of 10 feet for every 1 foot of elevation change. As identified in the 2019 RSA Study, the takeoff requirement was increased to 7,000 feet to account for the runway gradient.[38] This proposed runway length will be analyzed as part of the Phase 1 project in the EIS. An analysis of the proposed Phase 1 runway length was conducted to confirm the required runway length for existing and future users and aircraft fleet mix at CRW using the methodologies outlined in FAA AC 150/5325-4B. The runway length analysis is calculated based on the most demanding aircraft, referred to as the critical aircraft, under the most demanding conditions.

The EIS Forecast was used to determine the future critical aircraft based on the projected operations for 2025, 2030, and 2040. For purposes of this analysis, Phase 1 considers the existing and future aircraft fleet mix anticipated to operate at CRW up to 2030; Phase 2, which is further discussed in Section 1.3.2.1, considers a potential future aircraft fleet mix anticipated to operate at CRW between 2030 and 2040. Operations data identify the Bombardier CRJ-700 and CRJ-900 as the existing (2020/2021) critical aircraft for air carrier operations. These aircraft require a RDC of C-III and a TDG of 2. The critical aircraft for 2025 and 2030 was identified as the Embraer E-175.

According to FAA AC 150/5325-4B, the design objective for an airport's primary runway is to provide a runway length for all aircraft that will regularly use it without causing operational weight restrictions. FAA AC 150/5325-4B also specifies that long-haul routes should set the operating takeoff weight equal to the maximum certified takeoff weight (MTOW) while short-haul routes should apply the actual operating takeoff weight. As identified in the EIS Forecast (see Appendix B) and further discussed in the Planning Studies Memo (see Appendix A), all forecast destinations from CRW are less than 1,000 nautical miles (nm), which are considered to be short-haul flights. However, the airplane manufacturers Airport Planning Manuals have limited data for this range, and it is difficult to determine changes in payload under 1,000 nm. As a result, the Standardized Computer Aircraft Planning (SCAP) software[39] was used to determine allowable[40] takeoff weight and estimated actual[41] takeoff weight required for each critical aircraft and its farthest forecast destination. The determined allowable takeoff weight was then compared to the estimated actual takeoff weight for each scenario to determine if the proposed runway length was sufficient. Detailed methodology information, assumptions, and results are included in Appendix A. The results of the analysis for Phase 1 are summarized in **Table 15**.

[38] The new Runway 23 end is proposed to be additional 10 feet lower, adding 100 feet to the takeoff runway length requirement. This results in a runway length requirement of 7,000 feet (6,920 feet rounded up to the nearest 100).

[39] The SCAP software was developed by aircraft manufacturers as part of the FAA and European Union Aviation Safety Agency aircraft-engine type certification. It is part of the operational systems used by airline flight dispatch departments to calculate the legal maximum allowable takeoff weight prior to each flight. For airport planning purposes, the SCAP data can provide an accurate and reliable representation of the aircraft takeoff weight limitations in lieu of the availability of data in the airplane manufacturers Airport Planning Manuals.

[40] The allowable takeoff weight is independent of any particular destination or allocation of weight between empty weight, fuel, and payload. It is the lesser of the manufacturer's Maximum Structural Takeoff Weight and a calculated takeoff weight based on all aircraft performance-based criteria, such as runway field length, obstacle clearance, engine-out climb performance and more than a dozen other criteria.

[41] The actual takeoff weight needed for identified destinations based on fuel requirements, desired payload, and other factors.

TABLE 15 PHASE 1 RUNWAY LENGTH ANALYSIS RESULTS

AIRCRAFT	FARTHEST DESTINATION	RUNWAY END	TAKEOFF WEIGHT (LBS)			
			MAXIMUM	ALLOWABLE[1]	ESTIMATED ACTUAL[2] REQUIRED	DIFFERENCE BETWEEN ACTUAL AND ALLOWABLE
CRJ-700	IAH (975 nm)	5	75,000	75,000	74,305	695
		23	75,000	75,000	74,305	695
CRJ-900	ATL (363 nm)	5	84,500	78,820	77,526	1,294
		23	84,500	79,520	77,526	1,994
EMB-175	IAH (975 nm)	5	89,000	81,060	81,060	0
		23	89,000	82,740	82,740	0

NOTES:
ATL – Hartsfield-Jackson Atlanta International Airport
IAH – George Bush Intercontinental Airport (Houston)
nm – nautical miles
1 The allowable takeoff weight (ATOW) is independent of any particular destination or allocation of weight between empty weight, fuel, and payload. It is the lesser of the manufacturer's Maximum Structural Takeoff Weight and all aircraft performance-based criteria such as runway field length, obstacle clearance, engine-out climb performance, temperature conditions, airport elevation, and more than a dozen other criteria. For all aircraft considered, the ATOW was limited by engine-out obstacle clearance requirements or the Maximum Structural Takeoff Weight. Some cases were simultaneously limited by field length and obstacle clearance criteria due to how ATOW optimization is done within the manufacturer's software. Even these cases should be considered obstacle limited since lower obstacles would improve ATOW more than a marginally longer runway.
2 The actual takeoff weight needed for the destinations based on fuel requirements, desired payload, and other factors is one of the outputs of the commercial flight plans that were run to determine allowable payload.
SOURCES: Aircraft Manufacturer's Airport Planning Manuals; Ricondo & Associates, Inc., January 2022; Flight Engineering LLC, March 2022.

As shown in Table 15, the runway length analysis indicates that under Phase 1, the estimated actual takeoff weight for the EMB-175 to IAH is equal to the allowable takeoff weight, and would require the full 7,000-foot runway based on runway field length, obstacle clearance, engine-out climb performance, full passenger load, fuel requirements, cargo allowance, and other SCAP criteria. It is important to note that the SCAP software is intended for planning purposes and that individual airlines have specific operating procedures, which may include more stringent policies and/or protocols, that are not accounted for in the analysis. These differences may require additional runway length than what is depicted in this planning analysis or could result in weight restrictions under certain conditions.

However, based on the analysis presented in Appendix A and summarized in Table 15, it was determined that CRW would require a runway length of 7,000 feet, as proposed in Phase 1 of the Proposed Project, to accommodate the operations of the Airport's existing critical aircraft.[42]

1.3.1.4 TERMINAL FACILITY DEFICIENCIES

As discussed in Section 1.2.2.1, the central core of the existing passenger terminal building opened in 1950, prior to the jet era. Since then, the Airport has gone through several additions and renovations including the construction of Concourse B in 1970, Concourse A in 1984, and Concourse C in 2001. As a result, many functions of a modern passenger terminal were provided through building additions and renovations. The incremental expansion of a 1950s building, constructed while remaining operational and accommodating demand, has resulted in numerous

[42] During certain weather conditions (for example, high temperature, rain, and/or snow), aircraft operating at CRW may need to take a weight penalty in order to operate in accordance with an airlines flight safety procedures. Each airline determines the allowable takeoff weight for their aircraft based on aircraft type, runway length, field, and weather conditions.

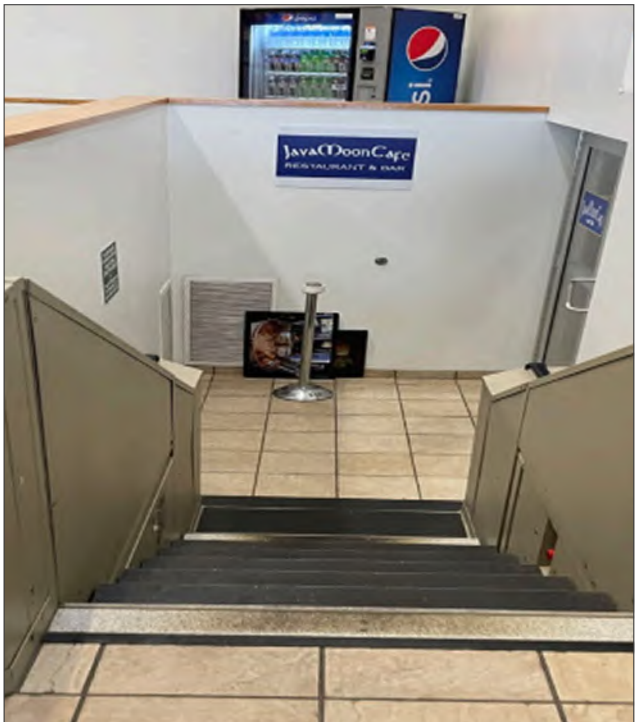
inefficiencies and a low LOS for passengers. Additionally, the existing building violates the Part 77 obstruction surfaces for Runway 5-23 and four existing gates are impacted by the Taxiway A TOFA.

Specific existing terminal complex deficiencies are summarized in **Table 16** and shown on **Exhibit 7**. The existing and forecast terminal space program is shown in **Table 17**.

TABLE 16 EXISTING TERMINAL COMPLEX ISSUES AND INEFFICIENCIES

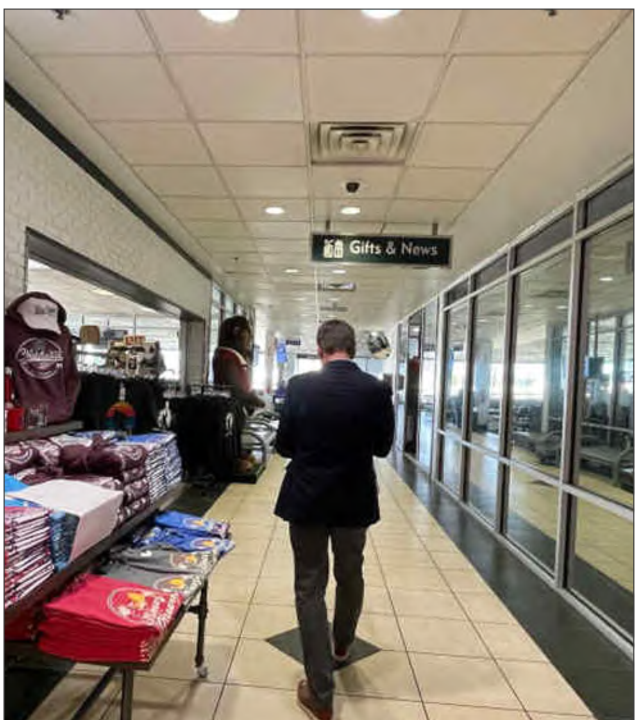
FACILITY/AREA	PROBLEM	RESULTING ISSUES
General	Existing overall footprint violates Part 77 obstruction surfaces for Runway 5-23	▪ The use of Part 77 impacted gates are restricted by aircraft size
	Four existing gates are impacted by the Taxiway A TOFA	▪ The use of TOFA impacted gates are restricted by aircraft size
	Low ceilings	▪ Difficulty to place signage
	Level changes with numerous ramps or steps to connect area on multiple levels	▪ Terminal facility is not compliant with ADA regulations
	Building HVAC systems are old and energy inefficient	▪ High operation and maintenance costs
	Support spaces, including telecommunications and computer rooms, are inefficient	▪ Cramped, scattered, inefficiently placed and difficult ▪ to secure
	Insufficient number of passenger restrooms	▪ Does not provide an optimum passenger level of service
	Passenger and airline baggage areas are small and inefficiently located	▪ Baggage reclaim space does not meet existing demand ▪ Airline outbound baggage area is not sufficient to meet existing demand at an adequate level of service ▪ TSA baggage screening areas do not meet TSA design standards
	Security screening areas are inefficient and do not meet TSA space standards	▪ Single security lane precludes establishing a separate TSA Pre-Check screening process and cannot accommodate new credential authentication technology (CAT)
Concourse A	Comprised of a variety of different levels and is nearing the end of its life cycle use	▪ Concourse A is not compliant with ADA regulations ▪ Does not provide an optimum passenger level of service
Concourse B	Comprised of a variety of different levels and is nearing the end of its life cycle use	▪ Concourse B is not compliant with ADA regulations ▪ Does not provide an optimum passenger level of service
Concourse C	The holdroom area is insufficient to support the existing four gates	▪ Does not provide an optimum passenger level of service ▪ No dedicated holdroom area for Gate C1 ▪ Circulation area is limited and becomes filled with passengers waiting or queue ▪ Gates C2 through C4 share a common holdroom area
	Gates C2 and C3 are operationally limited during power in/power out operations[1]	Only one gate can be used at a time

NOTE
1 Power in/power out refers to situations where an aircraft parks or departs under its own power without power from the terminal or the use of any towing vehicle.
SOURCES: Landrum & Brown, "Terminal Planning Study," June 2022; Landrum & Brown, "Taxiway A Relocation Project," May 16, 2022.

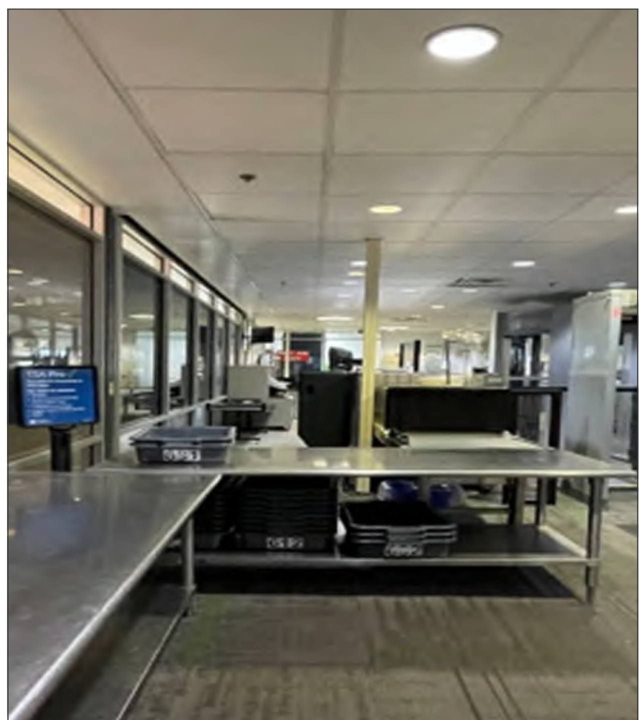


Restaurant Half a Level Below the Concourse

Restaurant Inaccessible from B Gates



Concession Areas Along Security Side Hallway



Narrow TSA Passenger Security Checkpoint

SOURCE: Central West Virginia Regional Airport Authority, Terminal Planning Study – Technical Report, June 2022

EXHIBIT 7

EXISTING TERMINAL COMPLEX DEFICIENCIES

ricondo:Shared:oDrive:Corporate:Creative Services:01 Projects:01 Client Projects:2022:FAA:21011217-05_Exhibit-6:FAA_CRW_Airfield_Exhibit-6.indd

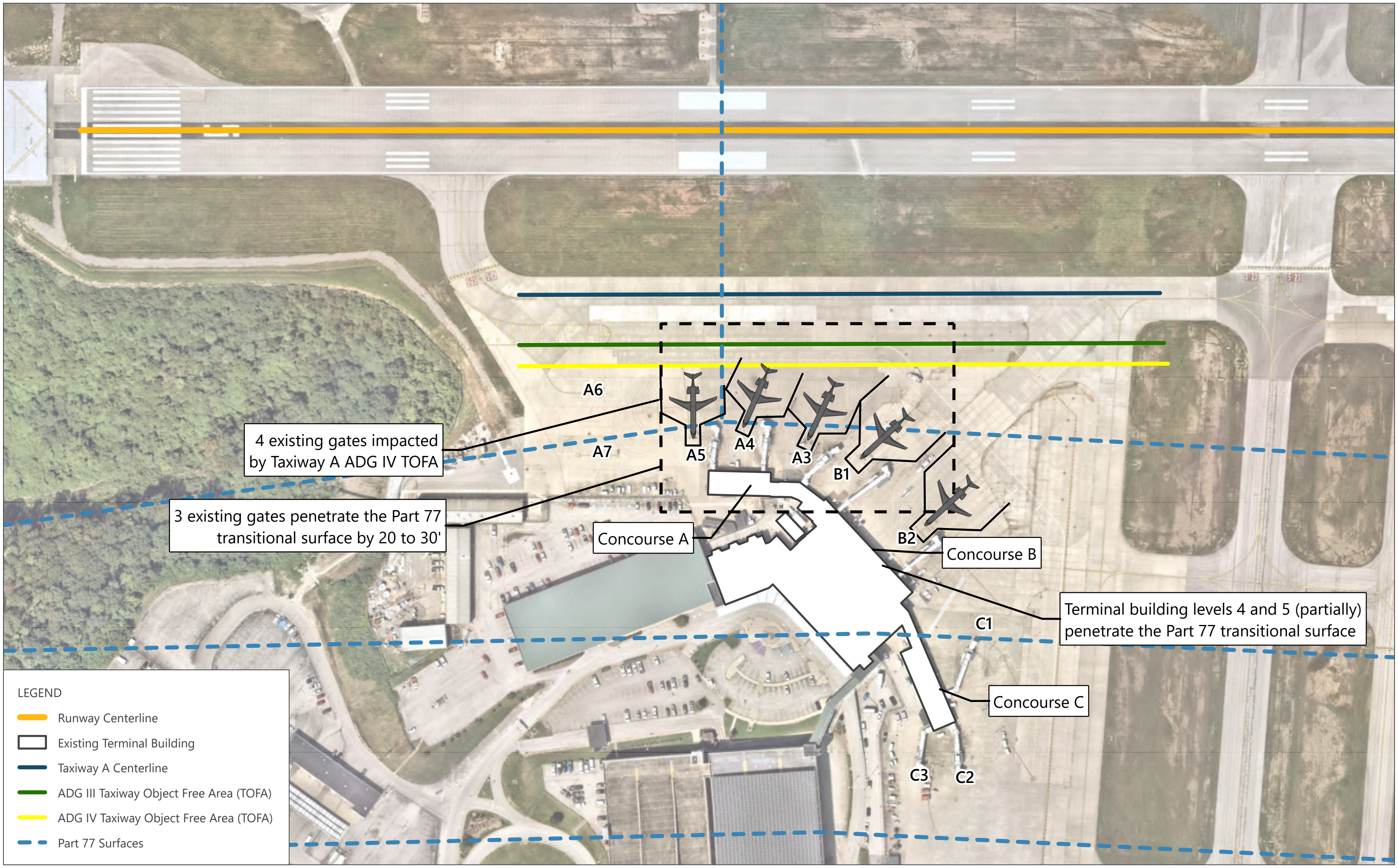
TABLE 17 EXISTING AND FORECAST SPACE PROGRAM

SPACE DESIGNATION	EXISTING		2021 PROGRAM		PROGRAM 2037 HIGH	
	UNIT	SQUARE FEET	UNIT	SQUARE FEET	UNIT	SQUARE FEET
Check-in	16	5,074	8	2,740	12	4,010
Airline Offices		3,297		750		1,050
Baggage Make-up / Drop-off		5,263		21,210		26,360
CBIS/CBRA Checked BagScreening		1,938		7,050		7,200
Baggage Claim	1	3,873	2	8,430	2	8,450
Hold rooms		14,410		7,800		13,800
Business Lounge				3,240		5,220
Airline Operations		1,166		5,320		7,760
Non-Secure Circulation / Lobbies		13,497		5,166		8,414
Secured Circulation		3,486		19,458		29,187
Restrooms		3,592		4,850		5,750
Security Screening Checkpoint	2	1,813	2	3,600	2	5,400
TSA Offices		2,391		620		920
Concessions		4,434		2,590		6,260
Airport Operations / Administration		11,233		7,557		11,733
Tenant Spaces		13,451		-		
Vertical Circulation		4,568		1,690		4,060
MEP/Support		5,689		6,750		16,210
Loading Dock				750		750
Total Areas	**99,175**		**109,570**		**162,534**	

NOTE:
Red numbers indicate existing spaces that are too small to accommodate existing (2021) demand at an acceptable level of service.
SOURCE: Landrum & Brown, "Taxiway A Relocation Project," May 16, 2022.

Part 77 Obstructions

As discussed in Section 1.2.1, Part 77 establishes standards used to determine obstructions to air navigation, and navigational and communication facilities. Imaginary surfaces are established at each airport in relation to that airport's runway approach category to protect the navigable airspace. As shown on Exhibit 1, there are five types of imaginary surfaces defined by 14 CFR Part 77: horizontal surface, conical surface, primary surface, approach surface, and transitional surface. The existing terminal building and four gates penetrate surfaces defined by Part 77, as shown on **Exhibit 8**. Three gates violate the primary runway surface, while the fourth gate results in aircraft penetrating the transitional surface by 20 to 30 feet, depending upon the type of aircraft using the gate. The passenger terminal building itself violates the transitional surface defined by Part 77.



SOURCES: Nearmap, July 2021 (aerial photography – for visual reference only, may not be to scale); Central West Virginia Regional Airport Authority, 2020 (terminal building, centerlines); Ricondo & Associates, Inc., July 2022 (TOFA, Part 77).

NORTH 0 250 ft

EXHIBIT 8

PART 77 PENETRATIONS

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Taxiway Object Free Area Impacts

As noted in Table 1, TOFAs are provided to enhance the safety of aircraft operations by remaining clear of objects, except for objects that need to be located in the TOFA for air navigation or aircraft ground maneuvering purposes. Therefore, the TOFA clearing standards prohibit service vehicle roads and parked aircraft, among other objects. However, four of the existing gates at Concourse A are located within the Taxiway A ADG III and IV[43] TOFAs.

Aircraft Gates

The current and forecast critical aircraft at the Airport are ADG III aircraft. Based on the Airport's critical aircraft and aviation trends, it is anticipated that the existing gate configuration is not adequate to efficiently meet existing and forecast aircraft needs. As noted in Table 4 in Section 1.2.2.2, the existing aircraft gates at the Airport were originally designed for ADG II and small ADG III aircraft, with Concourse B containing the only two gates capable of accommodating larger ADG III aircraft. As discussed in Section 1.2.2.3, airlines have accelerated the retirement of many smaller regional jets (mostly ADG II aircraft) and have accelerated transitioning to larger aircraft during the COVID-19 pandemic, requiring a shift from mostly ADG II aircraft gates to more ADG III aircraft gates. Based on the EIS Forecast, over 50 percent of Airport operations will be ADG III aircraft by 2030. Furthermore, full-sized ADG III aircraft gates are required to accommodate aircraft operated by Ultra-Low-Cost-Carriers (ULCC), such as Spirit. The existing gate configuration can only accommodate ULCCs at two gates, which is inadequate for forecast aircraft operations.

In addition to an up-gauging of aircraft gates, the number of gates required at the Airport is also dependent on how the gates are operated. In general, airports lease gates to air carriers under one of three options: exclusive-use,[44] preferential-use,[45] and common-use[46] arrangements. An airport's gate leasing policy is at the discretion of the airport's owner/operator. For CRW, the Airport Authority has indicated a need for at least 6 aircraft gates to accommodate existing and forecast aircraft needs and allow for flexibility in gate leasing arrangements.

Concourses

The incremental nature of construction for terminal expansions and improvements have resulted in operational and connectivity inefficiencies, including various additions being built on different levels. Concourse A and Concourse C gate areas provide ground level holdrooms, while the Concourse B gates provide second level holdrooms. Furthermore, the second level Concourse B gate areas are lower than the ground level ticketing hall located in the original terminal building. Additionally, the baggage claim area, while at ground level, is lower than the ticketing hall. However, the most prominent level change is the restaurant, which is half a floor lower than the gate areas immediately adjacent to it. These level changes and ramps make passenger flow circuitous and inefficient.

Additionally, Concourses A and B are nearing the end of their useful lives and the existing spaces for many of the terminal functions are insufficient to accommodate existing demand at an acceptable passenger LOS. In general, the existing terminal complex has excess space for Airport operations/administration as well as tenant, airline, and TSA support functions. However, much of this space does not directly support passenger operations and the Airport is currently operating under a space shortage for passenger services of approximately 35 percent. Specific

[43] Existing military aircraft using Taxiway A are ADG IV.

[44] Exclusive-use gates are those designated by an airport that gives individual airlines the sole authority to use a particular gate.

[45] Preferential-use gates are those designated by an airport that gives individual airlines preferential use to the gate and holdroom space.

[46] Common-use gates are those designated by an airport to be used in common by multiple airlines and are not directly leased to any individual airline.

deficiencies include insufficient holdroom space in Concourse C; no dedicated holdroom area for Gate C1; and Gates C2 and C4 share an inadequately sized common holdroom area. Further, circulation area within the concourse is limited and often becomes filled with passengers waiting to board or queue.

Security Checkpoints and Infrastructure

With more than 60 percent of the facility being constructed in 1950, the existing terminal complex was completed prior to modern airport security screening requirements. There is one existing security checkpoint in operation at CRW. The checkpoint provides approximately 1,800 square feet for passenger screening and includes one baggage screening device and two passenger screening devices. While the number of devices is sufficient based on TSA requirements and passenger levels, the square footage of the area is below TSA standards, as a minimum of approximately 3,600 square feet is needed based on current (2021) passenger levels and approximately 5,400 square feet is needed for forecast (2037) passenger levels. As a result, the space is crowded and insufficiently sized to provide adequate space for passengers and TSA personnel. Furthermore, congestion at the security checkpoint is expected to increase as passenger levels rise, as the existing space only provides 33 percent of 2037 requirements. Furthermore, there is no room to establish a separate TSA Pre-Check screening line and the existing space cannot accommodate new technology. Thus, spaces for passenger screening and baggage screening are inadequate based on TSA spatial requirements.[47]

Baggage Areas and Handling Systems

Similar to the security checkpoint space constraints, the checked baggage screening areas, while functional, do not meet TSA design and space standards. Based on current (2021) and forecast (2037) passenger levels, the Airport should have approximately 7,000 to 7,200 square feet of baggage screening space, respectively. However, the baggage screening areas at the Airport currently only provide a total of approximately 1,900 square feet. which is only 27 percent of the space required, based on the current (2021) passenger levels.

Both the airline outbound baggage space and the baggage reclaim space are insufficient to meet existing demand. The Airport currently operates one baggage claim system in an approximately 3,900-square foot area. However, the Airport should operate at least two baggage claim systems and the baggage claim area should be approximately 8,450 square feet, more than double the existing size, to provide an acceptable passenger LOS for both existing (2021) and forecast (2037) passenger levels, respectively. The Airport currently has approximately 5,300 square feet of space for outbound baggage space, approximately 25 percent of the needed 21,200 square feet to achieve an acceptable passenger LOS for existing (2021) passenger levels and approximately 20 percent of the needed 26,360 square feet to achieve an acceptable passenger LOS for forecast (2037) passenger levels.

ADA Compliance

The existing terminal complex is not compliant with ADA standards. Several areas within the current facility are inaccessible to handicapped passengers or employees as a result of sloped floors, lack of ADA compliant ramps, nonadherence to building codes and standards, and lack of alternative options to access various portions of the terminal complex. Specific areas of concern within the terminal complex include:

- The lobby area of the existing terminal building, which contains pre-security concessions, is only accessible via an existing staircase; there is not an ADA-compliant ramp.

[47] U.S. Department of Homeland Security, Transportation Security Administration, *Aviation Security, Security Checkpoint Layout Design/Reconfiguration Guide*, November 7, 2006.

- The queueing area for the security checkpoint, as well as portions of Concourse A within the vertical transition, are located on sloped floors or ramps that are not ADA-compliant.
- Concourse C is only accessible by an elevator and stairs, which creates ADA accessibility issues when the elevator is inoperable for maintenance.
- Access to the administration and upper levels is provided via an elevator and stairs. The existing staircase does not comply with code requirements for staircase height.

Heating and Cooling Systems

Most of the existing terminal complex is uninsulated and many of its heating and cooling system components are over 30 years old. While existing building HVAC systems have been well maintained, duct work and piping date to the 1950 construction of the original portion of the terminal. Although the main heating and cooling units have been updated, half of the HVAC units are over 30 years old, and the rest are approximately 20 years old. The typical life expectancy for HVAC units in commercial buildings is 15 to 25 years. Therefore, about half of the units for the CRW terminal are overdue for replacement and the remaining units will need replacing over the next five years. Additionally, the only portions of the passenger terminal building that have insulation are half of the holdrooms for Concourse A and all of the holdrooms in Concourse C. However, these areas only comprise approximately 15 percent of the terminal complex.

1.3.1.5 NON-STANDARD TAXIWAY SEPARATION DISTANCES

Based on airport design requirements in FAA AC 150/5300-13B, the required separation distance between a runway and parallel taxiway for C-III aircraft is 400 feet. The current separation distance between Runway 5-23 and Taxiway A is 284 feet near the end of Runway 5, and 328 feet from Taxiway D to the end of Runway 23, which does not meet FAA AC 150/5300-13B standards. Although FAA has issued an MOS[48] for the non-standard separation distance between the centerlines of Runway 5-23 and Taxiway A, FAA policy is to incrementally approve non-standard design issues, when possible, as further identified in the Taxiway A MOS.

FAA standards require a 400-foot runway-to-parallel taxiway standard separation distance for ADG C-III aircraft, which allows for adequate wingtip clearance for aircraft with wingspans up to 118 feet. FAA guidance in AC 150/5300-13B requires a minimum 26.5-foot wingtip clearance. The existing separation distance (approximately 328 feet) between Runway 23, from the Runway 23 end to Taxiway C, and Taxiway A provides sufficient wingtip clearance for the current critical aircraft that operate at CRW; thus, the need to relocate Taxiway A from between the Runway 23 end and Taxiway C is not evident at this time. However, based on a reduced separation distance of 284 feet on the Runway 5 end, the required wingtip clearances for the critical aircraft currently operating at CRW is less than required and is proposed to be corrected for Taxiway A from between the Runway 5 end and Taxiway C as part of Phase 1 of the Proposed Project.

1.3.2 LONG-TERM NEED

The need for the long-term development (Phase 2) is dependent on and in support of a change in the critical aircraft serving CRW and/or forecast destinations that are anticipated to occur between 2030 and 2040. Although some of these aircraft already operate at the Airport today, there is not sufficient frequency to justify a runway extension of beyond 7,000 feet at this time.

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[48] The FAA has temporarily granted a Modification of Standards which enables the continued operation of Runway 5-23 and Taxiway A despite the non-standard centerline separation distance between the two components.

To accommodate a future change in critical aircraft and/or forecast destinations, various Airport facilities would need to be enhanced, including a further runway extension, additional aircraft gate(s), and the shift of the remaining portions of existing Taxiway A to meet FAA design standards. These improvements would allow for larger and/or different aircraft types and to allow more aircraft to operate at the Airport than they would under Phase 1. The need for Phase 2 of the Proposed Project is dependent on implementation of Phase 1.

1.3.2.1 INSUFFICIENT RUNWAY LENGTH

As detailed in the 2020 Master Plan, the Airport Authority has identified a long-term need of extending Runway 5-23 an additional 1,000 feet to the northeast to meet runway requirements based on potential future aircraft operations, resulting in a total runway length of 8,000 feet. This proposed runway length will be analyzed as part of the Phase 2 project in the EIS.

A runway length analysis for the proposed 8,000-foot runway was conducted to confirm the required runway length for future users and aircraft fleet mix at CRW using the methodologies outlined in FAA AC 150/5325-4B. The runway length methodology for Phase 2 follows the same process as identified for Phase 1 (see Section 1.3.1.3). For purposes of this analysis, Phase 2 considers a potential future aircraft fleet mix anticipated to operate at CRW between 2030 and 2040. The critical aircraft for 2040 was identified as the Airbus A320 family (A319, A320, and A321) with an RDC of C-III and TDG-3. The results of the analysis for Phase 2 are summarized in **Table 18**.

TABLE 18 PHASE 2 RUNWAY LENGTH ANALYSIS RESULTS

			TAKEOFF WEIGHT (LBS)			
AIRCRAFT	FARTHEST DESTINATION	RUNWAY END	MAXIMUM	ALLOWABLE[1]	ESTIMATED ACTUAL[2] REQUIRED	DIFFERENCE BETWEEN ACTUAL AND ALLOWABLE
A319	IAH (975 nm)	5	166,449	141,700	141,700	0
		23	166,449	146,300	146,300	0
A320	MCO (686 nm)	5	171,961	158,300	153,176	5,124
		23	171,961	162,400	153,176	9,224
A320neo	MCO (686 nm)	5	174,165	167,000	155,787	11,213
		23	174,165	172,600	155,787	16,813

NOTES:
IAH – George Bush Intercontinental Airport (Houston)
MCO – Orlando International Airport
nm – nautical miles
1 The allowable takeoff weight (ATOW) is independent of any particular destination or allocation of weight between empty weight, fuel, and payload. It is the lesser of the manufacturer's Maximum Structural Takeoff Weight and all aircraft performance-based criteria such as runway field length, obstacle clearance, engine-out climb performance, temperature conditions, airport elevation, and more than a dozen other criteria. For all aircraft considered, the ATOW was limited by engine-out obstacle clearance requirements or the Maximum Structural Takeoff Weight. Some cases were simultaneously limited by field length and obstacle clearance criteria due to how ATOW optimization is done within the manufacturer's software. Even these cases should be considered obstacle limited since lower obstacles would improve ATOW more than a marginally longer runway.
2 The actual takeoff weight needed for the destinations based on fuel requirements, desired payload, and other factors is one of the outputs of the commercial flight plans that were run to determine allowable payload.
SOURCES: Aircraft Manufacturer's Airport Planning Manuals; Ricondo & Associates, Inc., January 2022; Flight Engineering LLC, March 2022.

As shown in Table 18, the runway length analysis indicates that under Phase 2, the estimated actual takeoff weight of the A319 to IAH is equal to the allowable takeoff weight and would require an 8,000-foot runway based on runway field length, obstacle clearance, engine-out climb performance, full passenger load, fuel requirements, and other SCAP criteria.[49] Therefore, based on the EIS Forecast fleet mix, a future runway length of 8,000 feet (Phase 2) would be required to meet the takeoff runway length needs of the potential future aircraft fleet mix and future trip length distances at CRW.[50,51]

1.3.2.2 TERMINAL FACILITY DEFICIENCIES

To support a change in critical aircraft at CRW, including larger and/or different aircraft types and to allow more aircraft to operate at the Airport than they would under Phase 1, an additional aircraft gate may be required. For purposes of the EIS, it is assumed that one additional gate is needed to support future aircraft operations under Phase 2.

The opening of the seventh gate is an optional component of Phase 2 of the Proposed Project and depends upon the potential relocation of the ATCT that is located within the existing terminal building, and the need for an additional gate during peak activity periods at CRW. The potential relocation of the ATCT is not necessary for Phase 1 of the Proposed Project. The portion of the existing terminal that supports the ATCT can remain with the replacement terminal using six gates.

1.3.2.3 NON-STANDARD TAXIWAY SEPARATION DISTANCES

As noted in Section 1.3.1.5, *Non-Standard Taxiway Separation Distances*, based on airport design requirements in FAA AC 150/5300-13B, the required separation distance between a runway and parallel taxiway for C-III aircraft is 400 feet; however, the existing separation distance between Runway 5-23 and Taxiway A varies along the length of the runway and does not meet standard separation requirements. As discussed in Section 1.3.1.5, a portion of Taxiway A (from the Runway 5 end to Taxiway C) would be relocated under Phase 1 of the Proposed Project, as the required wingtip clearances for the critical aircraft currently operating at CRW is less than required. However, the existing separation distance (approximately 328 feet) between Runway 5-23 and Taxiway A on the Runway 23 end (from Taxiway C to the Runway 23 end) provides sufficient wingtip clearance for the current/existing critical aircraft that operate at CRW.

However, to accommodate a future change in critical aircraft and/or forecast destinations, the remaining portion of Taxiway A, between Taxiway C and the Runway 23 end, would also need to be relocated to provide a standard separation distance of 400 feet.. Although FAA has issued an MOS[52] for the non-standard separation distance between the centerlines of Runway 5-23 and Taxiway A, this improvement would resolve the need for the MOS.

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[49] As indicated in Section 1.3.1.3, the SCAP software is intended for planning purposes and that individual airlines have specific operating procedures, which may include more stringent policies and/or protocols, that are not accounted for in the analysis. These differences may require additional runway length than what is depicted in this planning analysis or could result in weight restrictions under certain conditions.

[50] As noted in Section 1.1, Phase 2 components, though similar or related to the actions considered in Phase 1, are dependent upon additional justification, developments, or design and will be analyzed programmatically within the EIS. Further project-level review of the long-term components will be conducted at a later date, when the additional justification, developments or design is imminent or has occurred.

[51] The Central West Virginia Regional Airport Authority is engaged in marketing efforts to bring additional airlines, markets, and destinations to the Airport. CRW has also received a Small Community Air Service Development Grant from the Department of Transportation to reintroduce service to George Bush Intercontinental Airport (IAH) in Houston and/or Dallas Fort Worth International Airport (DFW).

[52] The FAA has temporarily granted a Modification of Standards which enables the continued operation of Runway 5-23 and Taxiway A despite the non-standard centerline separation distance between the two components.

1.3.2.4 RUNWAY 5 NAVIGATIONAL AIDS

As indicated in Section 1.2.2.2, the Airport operates a single runway, Runway 5-23, with various NAVAIDS. While Runway 23 is equipped with a CAT I ILS, Runway 5 is limited as it does not have an approach lighting system. The instrumentation and lighting systems available on a runway determine the ability of an aircraft to land in poor weather conditions. The lack of an approach lighting system on Runway 5 limits the amount of time the runway can be used. Installation of a CAT I ILS for Runway 5 would allow Runway 5 to remain open in all but CAT II and CAT III conditions, increasing the availability of the runway. In order to accommodate an ILS, the Runway 5 threshold would need to be shifted approximately 280 feet to the northeast.

1.4 PURPOSE OF THE PROJECT

1.4.1 PHASE 1

The primary purpose of Phase 1 of the Proposed Project is to enhance airfield safety at CRW by improving the existing RSAs in accordance with 14 CFR Part 139.309 and as recommended by FAA AC 150/5300-13B and to provide the appropriate runway and parallel taxiway separation distance based on wingtip clearance for the existing critical aircraft. Phase 1 of the Proposed Project would also extend the runway to meet the takeoff runway length requirements of the existing and forecast future aircraft fleet mix at the Airport. Phase 1 of the Proposed Project would also provide a gate configuration that adequately and efficiently meets the existing and forecast aircraft needs; improve and enhance the efficiency of aircraft and passenger movement in the terminal area; and modernize the terminal complex to improve the passenger LOS.

1.4.2 PHASE 2

The purpose of Phase 2 of the Proposed Project would be to provide airfield, safety, and terminal improvements that would support a change in critical aircraft at CRW, including larger and/or different aircraft types and to allow more aircraft to operate at the Airport than they would under Phase 1. Phase 2 of the Proposed Project would further extend the runway to meet the takeoff runway length requirements of the forecast future aircraft fleet mix and/or destinations that are anticipated to occur between 2030 and 2040. Phase 2 of the Proposed Project would also provide an approach lighting system for Runway 5 to increase availability of the runway and a standard runway to parallel taxiway separation distance and adequate aircraft gates to support a change in future critical aircraft.

1.5 PROPOSED PROJECT

The Proposed Project, as put forward by the CWVRAA, would include the shift and extension of Runway 5-23 to the northeast (Runway 23 end), construction of a new terminal complex, relocation Taxiway A and portions of Taxiway B, and connected actions and enabling projects to support the Proposed Project.

To separately satisfy immediate and long-term needs of the Airport, the Proposed Project would be developed in two separate phases. A list of project components by phase is provided below. Additional detail is included in **Appendix C**.

1.5.1 PHASE 1

Phase 1 of the Proposed Project would include the following components:

- shifting Runway 5-23 to the northeast by 1,125 feet and an extension of Runway 5-23 to the northeast by 285 feet, resulting in a total runway length of 7,000 feet. The runway shift and extension would also include:
    - standard 1,000-foot by 500-foot graded RSAs on both runway ends;

- — extension of Taxiway A parallel to the new portions of Runway 5-23 at a standard 400-foot separation distance;
- — construction of new entrance and exit taxiways;
- — construction of new vehicle service roads;
- — relocation of associated Runway 5-23 navigational aids (NAVAIDs); and
- — demolition of or marking unusable existing airfield pavement.

- A new three-level terminal facility to replace the existing terminal and concourses. The new proposed terminal is anticipated to provide 6 aircraft gates (2 ADG II gates and 4 ADG III gates). Additional components associated with the terminal facility include:
  - — elevated pedestrian connectors from the terminal to the existing parking garage and to the existing rental car center;
  - — terminal roadway improvements;
  - — new apron pavement;
  - — a new loading dock and associated landside pavement; and
  - — demolition of the existing terminal, including the existing aircraft gates.
- Relocations of portions of Taxiways A and B adjacent to the terminal area;
- Connected actions to allow construction of the Proposed Project, including:
  - — acquisitions of portions of Coonskin Park to facilitate construction of the Proposed Project;
  - — movement of up to approximately 25.6 million cubic yards of fill, requiring construction of three retaining walls[53] and a culvert for Coonskin Branch;
  - — removal of facilities and obstructions within Coonskin Park; and
  - — new and relocated utilities.

1.5.2 PHASE 2

Phase 2 of the Proposed Project would include:

- An additional 280-foot shift of Runway 5-23 to the northeast and extension of Runway 5-23 an additional 1,000 feet to the northeast (along the existing alignment), resulting in a total runway length of 8,000 feet. The Runway shift and extension would also include:
  - — standard 1,000-foot by 500-foot graded RSAs on both runway ends;
  - — extension of Taxiway A parallel to the new portion of Runway 5-23 at a standard 400-foot separation distance;
  - — construction of new entrance and exit taxiways;
  - — construction of new vehicle service roads;

[53] Locations of the proposed retaining walls would be (1) adjacent to the Elk River parallel to and west of Runway 5-23; (2) within Coonskin Park parallel to and east of the proposed Runway 5-23 extension; and (3) adjacent to the terminal area, east of the existing apron pavement.

- relocation of associated Runway 5-23 navigational aids (NAVAIDs); and
- demolition of existing airfield pavement.

- The addition of a 7th gate to the replacement terminal facility;
- Relocation of the remaining portions of Taxiway A, between the Taxiway C and existing Runway 23 end;
- Connected actions to allow construction of the second phase of the Proposed Project include:
  - potential relocation of the Airport Traffic Control Tower; and
  - movement of up to approximately 4 million cubic yards of fill and construction of a retaining wall, to support the relocation of Taxiway A.

APPENDIX A

Planning Studies Memorandum

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1. INTRODUCTION

The West Virginia International Yeager Airport Airfield, Safety, and Terminal Improvement Project (Proposed Project), as proposed by the Central West Virginia Regional Airport Authority (Airport Authority), would construct various airfield, safety, and terminal improvements at the Airport. In order to satisfy immediate (near-term) needs and long-term needs of the Airport, the Proposed Project would be developed in phases.

In the near-term (Phase 1), the CWVRAA proposes to shift[1] and extend Runway 5-23 to the northeast (Runway 23 end) to allow for a Runway Safety Area (RSA) that meets FAA standards on both ends of the runway and to meet existing runway length requirements of 7,000 feet. The CWVRAA also seeks to construct a new terminal complex to address terminal area inefficiencies that include an aging and poorly configured terminal facility; relocate taxiways adjacent to the terminal area that are not consistent with FAA design standards; and to provide modern amenities and allow for a better passenger experience.

To address long-term needs, Phase 2 of the Proposed Project would include a further shift and extension of Runway 5-23 to provide an 8,000-foot runway, relocation of the remaining portions of Taxiway A that do not meet FAA design standards, and development of an additional gate at the terminal facility, which may require the relocation of the existing Airport Traffic Control Tower. However, these components, though similar or related to the actions considered in Phase 1, are dependent upon additional justification, developments, or design and will be analyzed at a "programmatic level"[2] in the EIS. Further project-level review of the long-term components will be conducted at a later date, when the additional justification, developments or design is imminent or has occurred.

Currently, the FAA is initiating preparation of an Environmental Impact Statement (EIS) for the Proposed Project pursuant to the provisions of the National Environmental Policy Act (NEPA). In support of the forthcoming EIS, Ricondo & Associates, Inc. (Ricondo), the prime environmental consultant for the FAA's EIS document, has been tasked with reviewing and updating previously developed planning studies by the Airport Authority and its consultant. Specifically, Ricondo has performed the following analyses:

- Updated Forecast: a review and update of the aviation demand forecast that was included in the 2020 Airfield Master Plan.[3] As the Airfield Master Plan forecast was based on 2016 existing conditions, Ricondo has evaluated historical activity and existing forecasts, as well as updated the activity forecast based on 2021 conditions.
- Critical Aircraft Analysis: a critical aircraft analysis analyzing operations data to determine the most demanding aircraft type with over 500 annual operations.

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1 The proposed Runway 5-23 shift would move both runway ends to the northeast by 1,125 feet along the same alignment. New pavement would be constructed beyond the existing Runway 23 end to accommodate the shift, while existing pavement to the southwest of the relocated Runway 5 end would be demolished.

2 Text at 40 CFR 1508.28 defines tiering as covering a general program in a broader-focused EIS, then, preparing later EISs or EAs for specific, follow-on actions that are parts of that program. Tiered EISs or EAs move from a broad scope to narrow scope, or from "program analysis" to "project analysis." Incorporating information from the broader-focused EIS by reference into an EIS or EA addressing a specific action avoids repetitive discussions of similar issues common to various program elements at various locations. This allows the decision maker to focus on those actions that are ripe for decision (40 CFR 1500.4(i), 1502.4(d) and 1502.20).

3 Landrum & Brown, prepared for: Central West Virginia Regional Airport Authority, *Airfield Master Plan, Final*, July 2020.

- Runway Safety Area Requirements: verification/determination of RSA requirements based on the category of the critical aircraft, using the FAA's Runway Design Standards Matrix online tool and FAA Advisory Circular (AC) 150-5300-13B, *Airport Design*.[4]
- Runway Length Analysis: a runway length analysis using the methodologies outlined in FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*.[5]

This Consolidated Planning Studies Memorandum summarizes the previous planning studies conducted by the Airport Authority, as well as provides the assumptions, methodologies, and results of the verified/updated analyses. The conclusions from this assessment will be used in identifying the purpose of and need for the Proposed Project and to develop alternatives for evaluation in the EIS.

2. BACKGROUND

2.1 RUNWAY SAFETY AREA STANDARDS

The mission of the FAA is to provide the safest, most efficient aerospace system in the world. The role of the FAA Office of Airports division in meeting this goal is to provide leadership in planning and developing a safe and efficient national airport system to satisfy the needs of aviation interests of the United States. The safe operation of each airport and airway system is the highest aviation priority (49 U.S.C. §§ 47101(a)(1) and 40101).

The FAA's Airport Safety Program addresses general aviation airport safety, runway safety, airports certificated under 14 Code of Federal Regulations (CFR) Part 139, *Certification and Operations: Land Airports Serving Certain Air Carriers* (such as CRW), and safety management systems (SMS). In 1999, the FAA established the Runway Safety Area Program[6] to inventory, determine the feasibility of, and make practicable improvements to the RSAs for priority runways throughout the US.[7] While the order identified that RSA improvements could be constructed at any time,[8] the *Transportation, Treasury, Housing and Urban Development, the Judiciary, the District of Columbia, and Independent Agencies Appropriations Act, 2006* (Public Law [P.L.] 109-115) required completion of these RSA improvements by December 31, 2015. In total, improvements were made to RSAs for over 1,000 runways at 500 airports through the Runway Safety Area Program.[9] Although the original RSA improvement projects identified as part of the Runway Safety Area Program are complete, the program continues to evolve based on changes in airport design requirements and FAA metrics evaluating the severity of potential runway incursions.

An RSA meeting full-dimensional standards is referred to as a full-dimension or standard RSA. Standard RSA dimensions are defined based on the Airport Reference Code (ARC) and are established in FAA AC 150/5300-13B. The ARC, which signifies the Airport's highest Runway Design Code (RDC) minus the visibility component of the

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4 US Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design* March 31, 2022.

5 US Department of Transportation Federal Aviation Administration, Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design,* July 1, 2005.

6 US Department of Transportation, Federal Aviation Administration, Order 5200.8, *Runway Safety Area Program*, October 1, 1999.

7 The objective of the Runway Safety Area Program is that all RSAs at federally obligated airports and all RSAs at airports certificated under 14 CFR Part 139 shall conform to the standards contained in FAA AC 150/5300-13, *Airport Design*, to the extent practicable.

8 US Department of Transportation, Federal Aviation Administration, Order 5200.8, *Runway Safety Area Program*, October 1, 1999.

9 US Department of Transportation, Federal Aviation Administration, *Engineered Material Arresting System (EMAS)*, https://www.faa.gov/newsroom/engineered-material-arresting-system-emas-0 (accessed March 16, 2022).

RDC, is based on the critical aircraft for an airport, which can be a specific aircraft or a composite of several aircraft that are using, expected, or intended to use the airport on a regular basis. In addition to establishing the standard RSA dimensions, RDCs also establish design standards for the runways and other runway associated elements, including, Runway Object Free Areas (ROFAs), Runway Obstacle Free Zones (ROFZs), shoulders, blast pads, clearways, and stopways.

In some cases, it is not practicable to achieve the full dimension/standard RSA due to a lack of available land or obstacles such as bodies of water, highways, railroads, and populated areas or severe terrain changes. In accordance with FAA Order 5300.1, *Modification to Agency Airport Design, Construction, and Equipment Standards*,[10] the FAA will not consider a "modification of standard" to address non-standard RSA dimensions. RSA dimensional standards remain in effect regardless of the presence of natural or man-made objects or surface conditions that preclude meeting full RSA standard dimensions. In these instances, the airport owner and the FAA must continually assess a non-standard RSA with respect to operational, environmental, and technological changes to determine whether an alternative method can be used to provide the equivalent safety of a standard RSA and/or whether incremental improvements can be made to bring the RSA closer to meeting FAA standards.

2.2 AIRPORT HISTORY

The West Virginia International Yeager Airport (CRW or the Airport) is a joint-use civil aviation/Air National Guard airport located three miles east of Charleston, West Virginia. The Airport has a single runway (Runway 5-23)[11] along with a passenger terminal, general aviation facilities, and Air National Guard (ANG) facilities. CRW is also home to the WVANG 130th Airlift Wing operating C-130s at CRW and the Marshall University Bill Noe Flight School.

In 2003, the Airport Authority conducted an RSA Study in conjunction with the FAA to identify options for improving the RSAs to meet updated FAA design standards in response to P.L. 109-115. The study recommended construction of an Engineered Materials Arresting System (EMAS)[12] off the end of Runway 5 and implementation of declared distances for the Runway 23 end. In 2007, a 440-foot by 175-foot EMAS was installed on the Runway 5 end and declared distances were applied to Runway 23. These projects improved the Runway 5-23 RSA at CRW but did not fully meet FAA design standards. Eight years after installation of the EMAS, on March 12, 2015, a slope failure occurred under the Runway 5 RSA and EMAS. The slope failure resulted in the loss of the useable RSA and EMAS, requiring the following in order to establish an equivalent level of safety at the Airport:

- displacement of the Runway 5 threshold
- shortening of the usable lengths of Runway 5-23 by up to 500 feet in both directions
- elimination of the vertical guidance for Runway 5 (glideslope system rendered unusable)

[10] US Department of Transportation, Federal Aviation Administration, Order 5300.1, *Modifications to Agency Airport Design, Construction, and Equipment Standards,* September 29, 2017.

[11] The Airport originally operated two active runways, Runway 5-23 and 14-32 (later renamed 15-33). However, per the recommendations of the 2007 Airport Master Plan, Runway 15-33 was closed in 2008 because it had a shorter length as compared to Runway 05-23, the cost of making the runway comply with more recent RSA standards was prohibitive, and to make room for additional general aviation hangar development and expansion of the Air National Guard apron.

[12] A EMAS uses crushable material placed at the end of a runway to stop or slow an aircraft that overruns the runway. The tires of the aircraft sink into the lightweight material and the aircraft is decelerated as it rolls through the material. EMAS is an alternative to mitigate overruns at airports when a full-dimension RSA is not practicable due to natural obstacles, local development, and/or environmental constraints.

The physical runway length is currently 6,715 feet, with further reductions for usable runway length (see Section 6.1). Prior to the slope failure, the runway was 6,802 feet in length. This reduction in runway length has resulted in operational changes to airlines using the Airport, including operational weight restrictions and aircraft passenger number limitations.[13]

To resolve these issues, CWVRAA conducted an interim RSA study[14] (2018 Interim RSA Study), final RSA study[15] (2019 RSA Study), and the 2020 Master Plan.[16] A new 352-foot by 150-foot EMAS and retaining wall were constructed on the Runway 5 end in 2019. However, these improvements do not address reduced runway length and do not provide for a standard RSA or a standard EMAS. Therefore, the Airport Authority is planning to correct the runway and RSA deficiencies through completion of the Proposed Project.

3. UPDATED FORECAST SUMMARY

To aid the FAA in the review and verification of existing planning studies, to understand the potential future demand and aircraft fleet mix at the Airport, and in consideration of the COVID-19 pandemic and its impact on the aviation industry overall and at the Airport, Ricondo performed the following tasks:

- A review of the aviation demand forecast completed by Landrum & Brown in 2017 (the 2017 Forecast) and included in the 2020 Airfield Master Plan.[17]
- A review of activity patterns at the Airport historically (2011-2021) and from the onset of the COVID-19 pandemic in early 2020.
- An update of the aviation demand forecast, including enplaned passengers and passenger, all-cargo, general aviation, air-taxi, and military operations.

The 2017 Forecast of passengers and operations was developed by Landrum & Brown based on historical and projected demographic and socioeconomic data, industry trends, aircraft fleet mix, and aircraft load factor assumptions. The 2017 Forecast, with a base year of 2017 and forecast through 2037, included two passenger forecasts, a base and a high passenger demand forecast, to display the range of activity the Airport could accommodate over the forecast period. The number of commercial passenger aircraft operations was forecast to increase between 0.4 percent and 0.8 percent annually. The base passenger operations forecast showed an increase from 11,700 in 2016 to 12,600 in 2037. The high passenger operations forecast showed an increase from 11,700 in 2016 to 13,700 in 2037. The 2017 Forecast also indicated that between 313,000 and 354,000 enplaned passengers[18] would be served at the Airport in 2037, for the base passenger operations forecast and the high passenger operations forecast, respectively.

However, since the completion of the 2017 Forecast, the COVID-19 pandemic has had a profound impact on the aviation industry overall, as well as at the Airport. Thus, a revised forecast was developed in support of the EIS for

[13] Central West Virginia Regional Airport Authority, *Interim Runway Safety Area Study,* January 2018.

[14] Central West Virginia Regional Airport Authority, *Interim Runway Safety Area Study,* January 2018.

[15] Central West Virginia Regional Airport Authority, *Runway Safety Area Study,* August 2019.

[16] Landrum & Brown, prepared for Central West Virginia Regional Airport Authority, *Airfield Maser Plan*, Final, July 2020.

[17] Landrum & Brown, prepared for Central West Virginia Regional Airport Authority, *Airfield Master Plan*, Final, July 2020.

[18] Enplaned passengers are the passengers boarding an aircraft.

enplaned passengers and operations with a base year of 2021 and forecast through 2040. The updated forecast (EIS Forecast) is included as **Appendix A**.

In preparing the EIS Forecast, Ricondo analyzed activity at the Airport from 2011 to 2021 to identify principal drivers of changes during this period. **Table 1** shows historical enplaned passengers and passenger airline landings at the Airport. Both enplaned passenger activity and passenger airline operations at the Airport during this period were characterized by a declining trend, with a turn toward growth in enplaned passengers in 2018 and 2019 before the COVID-19 pandemic.

TABLE 1 HISTORICAL ENPLANED PASSENGERS AND PASSENGER AIRLINE OPERATIONS

YEAR	ENPLANED PASSENGERS	PASSENGER AIRLINE OPERATIONS
2011	284,842	17,304
2012	270,199	15,668
2013	250,350	14,332
2014	239,852	13,236
2015	225,489	12,154
2016	213,514	11,338
2017	202,581	11,344
2018	215,731	11,640
2019	224,929	10,338
2020	89,244	5,830
2021	146,355	6,764
CAGR		
2011 – 2019	-2.9%	-6.2%
2011 – 2021	-6.4%	-9.0%

NOTE:
CAGR – Compound Annual Growth Rate
SOURCE: Central West Virginia Regional Airport Authority, May 2022.

Given the uncertainty of the duration and impacts of COVID-19 pandemic-related factors affecting the aviation industry, including various quarantine requirements, return-to-work policies, and passenger confidence, the timing of a return to pre-COVID-19 pandemic capacity and passenger levels is unknown. However, over the long-term, US demand for air travel and airline capacity are expected to grow in line with the US Gross Domestic Product (GDP), a relationship that has been in place since before airline industry deregulation in 1978.[19] In the EIS Forecast, COVID-19 pandemic-related factors were modeled to continue influencing passenger activity through 2025 (short-term forecast), with traditional drivers of demand (socioeconomic factors) primarily influencing activity from 2026 through 2040 (long-term forecast).

Projected enplaned passengers and passenger airline operations for the short-term recovery forecast, defined as 2019 to 2025, is shown in **Table 2**. The short-term recovery forecast was developed based on an evaluation of existing and forecast airport operations and passenger enplanements, The scheduled passenger operations forecast

[19] US Department of Transportation Bureau of Transportation Statistics, May 2020 (airline capacity); Woods & Poole Economics, Inc., June 2020 (US GDP).

was informed by recent changes in fleet mix as airlines have accelerated the retirement of smaller regional jets (that is, 50-seat aircraft) and have advanced transitioning to larger aircraft (mainly 70-seat aircraft) during the COVID-19 pandemic This "up-gauging" is one of the factors contributing to a quicker short-term passenger recovery than passenger airline operations. The EIS forecast indicates recovery to 2019 enplanement numbers of approximately 225,000 by 2023.

TABLE 2 SHORT-TERM RECOVERY FORECAST ENPLANED PASSENGERS AND PASSENGER AIRLINE OPERATIONS

YEAR	ENPLANED PASSENGERS	PERCENT OF 2019	PASSENGER AIRLINE OPERATIONS	PERCENT OF 2019
2019 (Actual)	224,929	100.0%	10,338	100.0%
2020 (Actual)	89,244	39.7%	5,830	56.4%
2021 (Actual)	146,355	65.1%	6,764	65.4%
2022	177,854	79.1%	7,147	69.1%
2023	233,668	103.9%	8,633	83.5%
2024	258,516	114.9%	9,422	91.1%
2025	265,334	118.0%	9,872	95.5%
CAGR				
2019 – 2025	2.8%		1.1%	-

NOTE: CAGR – Compound Annual Growth Rate
SOURCES: Central West Virginia Regional Airport Authority, November 2021; Ricondo & Associates, Inc., May 2022.

The passenger airline operations for the long-term forecast, defined as 2026 to 2040, were based on the enplaned passenger forecast, average seats per departure, and estimated load factors. The forecast of operations by route and aircraft type was based on an assessment of the current and expected future fleet mix of each airline, taking into consideration expected aircraft retirements as well as aircraft on order. The determination of aircraft type also considered the appropriate aircraft size for the market to accommodate future demand as well as the range of the aircraft with regard to the distance of each route. It is expected that the up-gauging of aircraft identified in the short-term forecast would continue, and that over time airlines would incorporate larger regional jets. The long-term forecast also assumes service to two destinations not served as of December 2021 will return during the forecast period: American Airline's service to Philadelphia International Airport (PHL) and United Airline's service to George Bush Intercontinental Airport (IAH).

The EIS Forecast for all (passenger and non-passenger airlines) operations is presented in **Table 3.** The EIS Forecast for enplaned passengers and commercial passenger aircraft operations is summarized in **Table 4**. By 2040, the forecast projects enplaned passengers to reach 287,957 and commercial passenger aircraft operations to reach 9,529. Total operations are anticipated to remain fairly steady through the long-term forecast period, but as previously discussed, it is assumed that smaller commercial passenger aircraft will be replaced by larger aircraft resulting in fluctuations in the number of commercial passenger aircraft operations even as the number of enplaned passengers is forecast to steadily increase over the forecast period. The passenger airlines forecast fleet mix for existing years 2020 and 2021, and forecast years 2025, 2030, and 2040, is shown in **Table 5**. A summary of annual operations by aircraft for existing and forecast years is shown in **Table 6**.

TABLE 3 UPDATED AVIATION FORECAST – TOTAL OPERATIONS

YEAR	PASSENGER	CARGO	GA/AIR TAXI	MILITARY	TOTAL
Historical					
2011	17,304	1,062	31,645	6,480	56,491
2012	15,668	1,114	24,832	6,162	47,776
2013	14,332	1,120	26,434	6,775	48,661
2014	13,236	992	27,343	6,349	47,920
2015	12,154	742	27,990	6,540	47,426
2016	11,338	740	24,140	7,249	43,467
2017	11,344	742	18,189	5,702	35,977
2018	11,640	742	14,706	4,374	31,462
2019	10,338	752	16,126	4,496	31,712
2020	5,830	738	13,564	3,934	24,066
2021	6,764	730	21,090	4,224	32,808
Forecast					
2022	7,147	820	22,089	4,800	34,856
2023	8,633	860	22,864	4,800	37,157
2024	9,422	900	23,174	4,800	38,296
2025	9,872	940	23,318	4,800	38,930
2026	9,935	980	23,388	4,800	39,104
2027	9,760	1,020	23,459	4,800	39,039
2028	9,820	1,040	23,530	4,800	39,190
2029	9,879	1,060	23,602	4,800	39,340
2030	9,704	1,080	23,674	4,800	39,257
2031	9,759	1,100	23,746	4,800	39,405
2032	9,813	1,120	23,819	4,800	39,552
2033	9,638	1,140	23,892	4,800	39,470
2034	9,689	1,160	23,966	4,800	39,615
2035	9,739	1,180	24,040	4,800	39,759
2036	9,565	1,200	24,115	4,800	39,679
2037	9,612	1,220	24,190	4,800	39,822
2038	9,659	1,240	24,265	4,800	39,964
2039	9,485	1,260	24,341	4,800	39,886
2040	9,529	1,280	24,418	4,800	40,026
CAGR					
2019 – 2025	-0.8%	3.8%	6.3%	1.1%	3.5%
2025 – 2040	-0.2%	2.1%	0.3%	0.0%	0.2%
2019 – 2040	-0.4%	2.6%	2.0%	0.3%	1.1%

NOTE:
CAGR – Compound Annual Growth Rate
SOURCES: Central West Virginia Regional Airport Authority, November 2021; Ricondo & Associates, Inc., May 2022.

TABLE 4 UPDATED AVIATION FORECAST – ENPLANED PASSENGERS AND COMMERCIAL PASSENGER AIRCRAFT OPERATIONS

YEAR	ENPLANED PASSENGERS	COMMERCIAL PASSENGER AIRCRAFT OPERATIONS
Historical		
2011	284,842	17,304
2012	270,199	15,668
2013	250,350	14,332
2014	239,852	13,236
2015	225,489	12,154
2016	213,514	11,338
2017	202,581	11,344
2018	215,731	11,640
2019	224,929	10,338
2020	89,244	5,830
2021	146,355	6,764
Forecast		
2022	177,854	7,147
2023	233,668	8,633
2024	258,516	9,422
2025	265,334	9,872
2026	267,036	9,935
2027	268,710	9,760
2028	270,354	9,820
2029	271,972	9,879
2030	273,563	9,704
2031	275,134	9,759
2032	276,655	9,813
2033	278,155	9,638
2034	279,627	9,689
2035	281,064	9,739
2036	282,503	9,565
2037	283,905	9,612
2038	285,281	9,659
2039	286,625	9,485
2040	287,957	9,529
CAGR		
2019 – 2025	2.8%	-0.8%
2025 – 2040	0.5%	-0.2%
2019 – 2040	1.2%	-0.4%

NOTE: CAGR – Compound Annual Growth Rate

SOURCES: Central West Virginia Regional Airport Authority, November 2021; Federal Aviation Administration, *2021 Terminal Area Forecast*, March 2022; Ricondo & Associates, Inc., May 2022.

TABLE 5 PASSENGER AIRLINES FORECAST FLEET MIX

AIRLINE	DESTINATION	AIRCRAFT	OPERATIONS				
			2020	2021	2025	2030	2040
American	Charlotte (CLT)	CRJ-200	214	0	0	0	0
		CRJ-700	1,555	2,080	2,140	2,042	1,238
		CRJ-900	368	225	0	0	0
		EMB-175	0	0	715	850	1,350
		A319	0	0	0	0	147
	Washington DC (DCA)	CRJ-200	174	0	0	0	0
		CRJ-700	0	605	429	305	170
		EMB-175	0	0	197	322	442
	Chicago O'Hare (ORD)	CRJ-200	182	0	0	0	0
	Philadelphia (PHL)	CRJ-200	11	0	0	0	0
		CRJ-700	204	231	300	205	145
		CRJ-900	0	0	26	0	0
		EMB-175	0	0	183	307	351
Delta	Atlanta (ATL)	717-200	49	0	0	0	0
		CRJ-200	1,858	713	0	0	0
		CRJ-900	124	1,362	2,398	2,110	1,770
		EMB-175	0	0	821	950	1,102
		A220-300	0	0	0	0	158
Spirit	Orlando (MCO)	A319	58	12	16	0	0
		A320	28	250	206	155	137
		A320neo	0	12	95	140	152
		A321neo	0	0	0	16	15
	Myrtle Beach (MYR)	A319	19	0	4	0	0
		A320	0	71	54	42	35
		A320neo	0	0	14	28	31
		A321neo	0	0	0	0	3
United	Houston (IAH)	CRJ-700	0	0	150	102	50
		EMB-175	0	0	364	384	401
		A319	0	0	0	26	50
	Chicago O'Hare (ORD)	CRJ-200	986	1,203	0	0	0
		CRJ-700	0	0	1,220	1,090	890
		EMB-175	0	0	540	630	803
		A319	0	0	0	0	89
	Total Passenger Airlines		**5,830**	**6,764**	**9,872**	**9,704**	**9,529**

SOURCES: Central West Virginia Regional Airport Authority, November 2021; US Department of Transportation, T-100 Database, November 2021; Ricondo & Associates, Inc., May 2022.

TABLE 6 TOTAL OPERATIONS FORECAST FLEET MIX

AIRCRAFT	OPERATIONS				
	2020	2021	2025	2030	2040
Commercial Passenger Aircraft	5,830	6,764	9,872	9,704	9,529
717-200	49	0	0	0	0
A220-300	0	0	0	0	158
A319/A320/A321	105	345	389	407	659
CRJ-200	3,425	1,916	0	0	0
CRJ-700	1,759	2,916	4,239	3,744	2,493
CRJ-900	492	1,587	2,424	2,110	1,770
EMB-175	0	0	2,820	3,443	4,449
All-Cargo	738	730	940	1,080	1,280
General Aviation/Air Taxi	13,564	21,090	23,318	23,674	24,418
Single Engine	2,378	3,697	4,088	4,150	4,281
Multi Engine	959	1,491	1,649	1,674	1,726
Jet	10,227	15,901	17,581	17,850	18,410
Military	3,934	4,224	4,800	4,800	4,800
Airport Total	**24,066**	**32,808**	**38,930**	**39,257**	**40,026**

SOURCES: Central West Virginia Regional Airport Authority, November 2021; US Department of Transportation, T-100 Database, November 2021; Federal Aviation Administration, OPSNET, November 2021; Ricondo & Associates, Inc., May 2022.

4. CRITICAL AIRCRAFT

The FAA provides guidance on the determination of critical aircraft for an airport in FAA AC 150/5000-17, *Critical Aircraft and Regular Use Determination*.[20] The critical aircraft is defined as the most demanding aircraft, or group of aircraft, with at least 500 annual operations.

The 2018 Interim RSA Study indicated that the existing (2017) ARC for CRW was C-III, based on a composite of multiple C-III aircraft operating at CRW in 2017. These aircraft included the A319, B717, B737-700, and CRJ 900, totaling over 800 combined operations. In May 2020, the Airport Authority conducted an updated runway length analysis,[21] which identified the B717 as the existing critical aircraft at CRW with a projected 562 operations in 2020. However, this aircraft no longer operates at the Airport and is not forecast to operate at the Airport in the future, as shown in Table 6. The 2020 Master Plan identified the B737-700 and CS-100 as the future critical aircraft. These two aircraft were the most demanding aircraft projected to operate at CRW that together were projected to have 744 annual operations in 2037. However, the 2020 Master Plan identified the CRJ-900 as having the longest runway length requirement in the forecast fleet, projected to have over 1,400 annual operations in 2037.

[20] US Department of Transportation Federal Aviation Administration, Advisory Circular 150/5000-17, *Critical Aircraft and Regular Use Determination*, June 20, 2017.

[21] Landrum & Brown, prepared for Central West Virginia Regional Airport Authority, *Advanced Planning Technical Report*, Draft, May 2020.

In order to determine the current critical aircraft for the airfield at CRW, Traffic Flow Management System Counts (TFMSC) were collected from the FAA's Aviation System Performance Metrics (ASPM) website. FAA AC 150/5000-17 suggests using the most recent 12-months of data when determining the critical aircraft which, for this analysis, is the 2021 calendar year. The Updated Forecast (see Section 3) was used to determine the future critical aircraft based on the projected operations for 2025, 2030, and 2040. **Table 7** shows the critical aircraft based on 2020 and 2021 FAA TFMSC as well as forecast future operations for 2025, 2030, and 2040 at the Airport for commercial air carriers. In addition to commercial operations, CRW is also home to the ANG, which operates several military aircraft. However, federal law prohibits the FAA from funding projects that solely benefit another federal agency, therefore any project that is expected to use Airport Improvement Program (AIP) grants or Passenger Facility Charge (PFC) revenues must exclude any military operations from the critical aircraft determination. Military aircraft can still be identified for planning purposes, but AIP or PFC funding will be based on the civilian aeronautical need.

Operations data identify the Bombardier CRJ-700 and CRJ-900 as the existing (2020/2021) critical aircraft for air carrier operations. These aircraft require a RDC of C-III and a Taxiway Design Group (TDG)[22] of 2. The critical aircraft for 2025 and 2030 was identified as the Embraer E-175 and the critical aircraft for 2040 was identified as the Airbus A320 family (A319, A320, and A321) with an RDC of C-III and TDG-3. Furthermore, based on the TFMSC, the Lockheed C130 Hercules is the most demanding military aircraft operated on a regular basis by the ANG at CRW, with approximately 836 operations in 2020 and 539 operations in 2021. The Lockheed C130 Hercules requires an RDC of C-IV and a TDG of 2.

TABLE 7 EXISTING AND FUTURE CRITICAL AIRCRAFT

	YEAR	AIRCRAFT TYPE	RUNWAY DESIGN CATEGORY (RDC) AAC+ADG	TAXIWAY DESIGN GROUP	ANNUAL OPERATIONS
Phase 1	2020	Bombardier CRJ-700	C-III	2	1,759
	2021	Bombardier CRJ-900	C-III	2	1,587
	2025	Embraer E-175	C-III	3	2,820
Phase 2	2030	Embraer E-175	C-III	3	3,443
	2040	Airbus A319/A320/A321	C-III	3	659

NOTES: AAC – Aircraft Approach Category
ADG – Airplane Design Group

SOURCES: Federal Aviation Administration, Traffic Flow Management System Counts 2020 and 2021, January 2021; Central West Virginia Regional Airport Authority, November 2021; US Department of Transportation, T-100 Database, November 2021; Ricondo & Associates, Inc., May 2022.

5. TAXIWAY SEPARATION REQUIREMENTS

Runway-to-parallel-taxiway centerline separation describes the area between the runway centerline and parallel taxiway centerline that is based on the ADG and the takeoff and landing flight path profiles and the physical characteristics of the aircraft. Based on the critical aircraft operating at the Airport, the standard runway centerline to parallel taxiway centerline separation distance, using Table G-9 in FAA Advisory Circular 150/5300-13B, *Airport*

[22] TDGs classify taxiways by aircraft groups that define dimensional minimums needed to support groups of aircraft based on performance needs, indicated by numbers 1–7. All of the taxiways associated with the use of Runway 5-23 meet TDG 3 specifications with a width requirement of 50 feet. Two taxiways, Taxiway B between B4 and B5 and Taxiway B2 associated with the general aviation facilities and Marshall University Bill Noe Flight School, are limited to TDG 2 aircraft.

Design for C-III aircraft is 400 feet. The current separation distance of Taxiway A from Runway 5-23 is approximately 284 feet near the Runway 5 end and approximately 328 feet from between Taxiway D to the end of Runway 23. Therefore, the Airport has an existing modification to standards[23] (MOS) for the non-standard separation distance between the centerlines of Runway 5-23 and Taxiway A.

6. RUNWAY SAFETY AREA REQUIREMENTS

Based on the critical aircraft operating at the Airport, the runway has a RDC of C-III. Using Table G-9 provided in FAA Advisory Circular 150/5300-13B, *Airport Design*, the RSA for the runway should begin 600 feet before the runway landing threshold, extend 1,000 feet beyond the end of the runway, and be 500 feet wide centered on the runway centerline. The standard RSA dimensions compared to the existing RSA dimensions are shown on **Exhibit 1** and summarized in **Table 8**. The Airport Authority's Proposed Project incorporates the standard RSA dimensions for an RDC of C-III.

TABLE 8 EXISTING AND STANDARD RUNWAY SAFETY AREAS

DIMENSION	EXISTING		FAA DESIGN STANDARD (RDC OF C-III)
	RUNWAY 5[1]	RUNWAY 23	
Width (based on Runway Centerline)	500 ft	500 ft	500 ft
Length Beyond Runway End [2]	500 ft	352 ft EMAS	1,000 ft
Length Prior to Threshold [2]	352 ft EMAS	500 ft	600 ft

NOTES:

1 The EMAS bed is approximately 352 feet long and 150 feet wide. Located between the EMAS bed and the Runway 5 threshold is a 35-foot "run-in area," which increases the RSA length to 387 feet. However, per the FAA 150/1500-13B Advisory Circular, *Airport Design*, the presence of the EMAS does not diminish the standard RSA width. The RSA beyond the Runway 5 end is irregularly shaped due to the terrain and the drop off associated with the retaining wall. Thus, the RSA width varies between 455 feet (at the Runway 5 threshold) and 230 feet (at the end of the Runway 5 EMAS). The length of the RSA prior to the threshold is less than 400 feet.

2 The RSA length that is beyond the runway end is for aircraft arriving on the opposite end. Therefore, for aircraft landing on Runway 5, the RSA length beyond the runway end is the length beyond the Runway 23 end. Similarly, the RSA length prior to the threshold is for arriving aircraft. Therefore, for aircraft landing on Runway 5, the RSA length prior to the threshold is referring to the Runway 5 threshold.

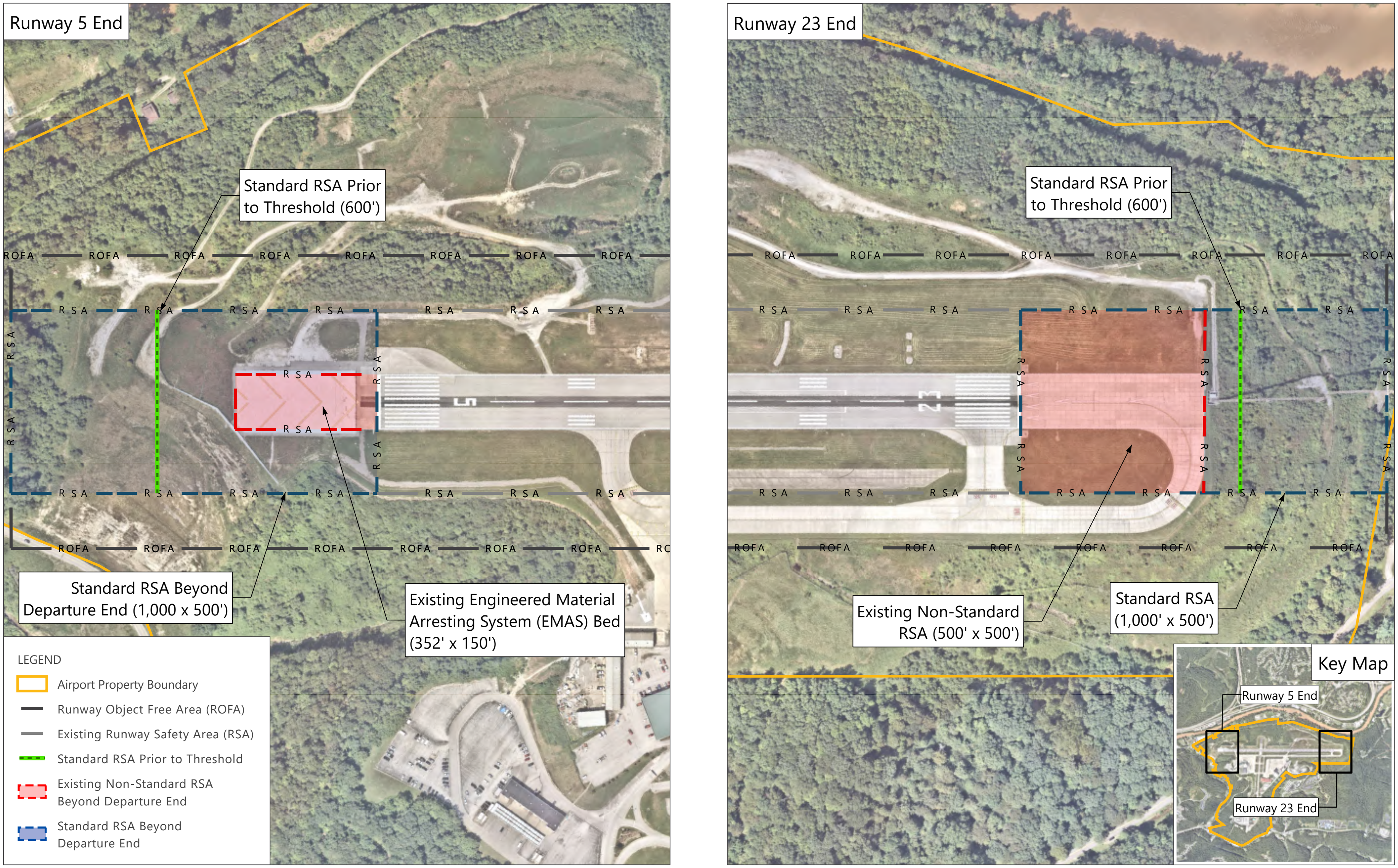
SOURCE: Central West Virginia Airport Authority, *Airport Layout Plan, Airport Data Sheet*, January 2020.

In addition to dimensional requirements, FAA airport design standards require that RSAs are:

- cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations;
- drained by grading or storm sewers to prevent water accumulation;
- capable, under dry conditions, of supporting snow removal equipment, Aircraft Rescue and Firefighting (ARFF) equipment, and the occasional passage of aircraft without causing damage to the aircraft; and,
- free of objects, except for objects that need to be located in the RSA because of their function.

Besides dimensional inadequacies, other RSA deficiencies associated with Runway 5-23 include the existence of drainage structures spanning from Taxiway D to Taxiway A that create transverse grades within this area greater than the allowable 3 percent, and the presence of lighting and navigational aids (NAVAIDS) that are not fixed by function at both ends of Runway 5-23.

[23] Any approved deviation from published FAA standards applicable to an airport design, construction, or equipment project that is necessary to accommodate an unusual local condition for a specific project while maintaining an acceptable level of safety and performance.



SOURCES: Nearmap, July 2021 (aerial photography – for visual reference only, may not be to scale); Central West Virginia Regional Airport Authority, 2020 (airport property boundary); Ricondo & Associates, Inc., February 2022 (safety areas).

NORTH

0 400 ft

EXHIBIT 1

EXISTING AND STANDARD RUNWAY SAFETY AREAS

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7. RUNWAY LENGTH ANALYSIS

7.1 BACKGROUND

7.1.1 EXISTING RUNWAY CONDITIONS

The Airport Authority operates one runway, Runway 5-23, with a physical length of 6,715 feet. As a result of the slope failure in 2015, the Airport Authority instituted declared distances to meet operational safety requirements. Declared distances are the distances an airport owner declares available for use in meeting a turbine powered aircraft's takeoff run, takeoff distance, accelerate-stop distance, and landing distance requirements. These terms are defined as:

- Takeoff Run Available (TORA) – the amount of runway available for the ground run of an aircraft taking off.
- Takeoff Distance Available (TODA) – the TORA plus the amount of any remaining runway (or clearway[24]) beyond the end of the TORA. The full length of TODA may be shorter than the runway length depicted on the Airport diagram because of obstacles in the departure area.
- Accelerate-Stop Distance Available (ASDA) – the amount of runway available for an aircraft to reach liftoff speed then decelerate without over-running the runway in the event takeoff is aborted. The ASDA typically ends 1,000 feet from any obstacle beyond the end of the runway.
- Landing Distance Available (LDA) – the amount of runway available for an aircraft to land and come to a complete stop on the runway. The LDA typically ends 1,000 feet from any obstacle beyond the end of the runway.

Table 9 identifies the existing runway length and declared distances at the Airport. As shown, the implemented declared distances for the ASDA and LDA reduces the usable runway lengths in both directions.

TABLE 9 EXISTING RUNWAY LENGTH IN FEET

	RUNWAY 5	RUNWAY 23
Takeoff Run Available	6,715	6,715
Takeoff Distance Available	6,715	6,715
Accelerate Stop Distance Available	6,215	6,715
Landing Distance Available	6,215	6,215

SOURCE: Federal Aviation Administration, *CRW Airport 5010,* December 2021.

7.1.2 AIRPORT AUTHORITY ANALYSIS

Reductions in the usable runway lengths, as identified in Section 7.1.1, have resulted in operational changes to airlines using the Airport. As part of the 2018 Interim RSA Study, the Airport Authority conducted outreach to the four commercial airlines operating at CRW. The input from these key stakeholders indicated that additional ASDA length for Runway 5-23 was needed in both directions to allow the airlines to serve their existing markets from CRW without weight restrictions. The 2018 Interim RSA Study determined that the ASDA requirement based on the 2017

[24] A clearway is a rectangular area beyond the runway not less than 500 feet wide and not longer than 1,000 feet, centrally located about the extended centerline of a runway and under the control of the airport authorities.

fleet mix for Runway 23 was 6,820 feet. However, with the proposed runway shift, an additional adjustment needs to be made to account for the further change in runway end point elevations. Guidance in FAA AC 150/5325-4B suggests an assumed increase in required runway length of 10 feet for every 1 foot of elevation change. As identified in the 2019 RSA Study, the takeoff requirement was increased to 7,000 feet to account for the runway gradient.[25] The runway length required to accommodate the existing and future aircraft fleet mix anticipated to operate at CRW up to 2030 will be analyzed as part of the Phase 1 project in the EIS.

As detailed in the 2020 Master Plan, the Airport Authority has also identified a long-term need of extending Runway 5-23 an additional 1,000 feet to the northeast to meet runway needs based on potential future aircraft operations, resulting in a total runway length of 8,000 feet. The Phase 2 project in the EIS will consider the runway length required to accommodate the potential future aircraft fleet mix anticipated to operate at CRW between 2030 and 2040.

7.2 METHODOLOGY

An analysis of the proposed runway lengths (both Phase 1 and Phase 2) was conducted for the updated aircraft fleet mix to confirm the required runway length for existing and future users at CRW using the methodologies outlined in FAA AC 150/5325-4B. The runway length analysis set forth in FAA AC 150/5325-4B relates to both arrivals and departures, although departures typically require more runway length. The runway length analysis is calculated based on the critical aircraft identified in Section 4.

According to FAA AC 150/5325-4B, the design objective for an airport's primary runway is to provide a runway length for all aircraft that will regularly use it without causing operational weight restrictions. FAA AC 150/5325-4B specifies that long-haul routes should set the operating takeoff weight equal to the maximum certified takeoff weight (MTOW) while short-haul routes should apply the actual operating takeoff weight. As identified in **Table 10**, all forecast destinations from CRW would be less than 1,000 nautical miles (nm), which are considered short-haul flights. However, the airplane manufacturers Airport Planning Manuals have limited data for this range, and it is difficult to determine changes in payload under 1,000 nm. As a result, the Standardized Computer Aircraft Planning (SCAP) software[26] was used to determine allowable[27] takeoff weight and estimated actual[28] takeoff weight required for each critical aircraft and its farthest forecast destination. The allowable takeoff weight was then compared to the estimated actual takeoff weight for each scenario to determine if the proposed runway length was sufficient.

[25] The new Runway 23 end is proposed to be additional 10 feet lower, adding 100 feet to the takeoff runway length requirement. This results in a runway length requirement of 7,000 feet (6,920 feet rounded up to the nearest 100).

[26] The SCAP software was developed by aircraft manufacturers as part of the FAA and European Union Aviation Safety Agency aircraft-engine type certification. It is part of the operational systems used by airline flight dispatch departments to calculate the legal maximum allowable takeoff weight prior to each flight. For airport planning purposes, the SCAP data can provide an accurate and reliable representation of the aircraft takeoff weight limitations in lieu of the availability of data in the airplane manufacturers Airport Planning Manuals.

[27] The allowable takeoff weight is independent of any particular destination or allocation of weight between empty weight, fuel, and payload. It is the lesser of the manufacturer's Maximum Structural Takeoff Weight and a calculated takeoff weight based on all aircraft performance-based criteria, such as runway field length, obstacle clearance, engine-out climb performance, and more than a dozen other criteria.

[28] The actual takeoff weight needed for identified destinations based on fuel requirements, desired payload, and other factors.

TABLE 10 DESTINATION DISTANCE

DESTINATION	DISTANCE (NM)
Charlotte (CLT)	221
Washington DC (DCA)	249
Chicago O'Hare (ORD)	416
Philadelphia (PHL)	356
Atlanta (ATL)	363
Orlando (MCO)	686
Myrtle Beach (MYR)	356
Houston (IAH)	975

SOURCES: Runway 5-23 EIS Forecast Update, Ricondo & Associates, Inc., January 2022; Great Circle Mapper, accessed January 2022.

7.3 ASSUMPTIONS AND INPUTS

The recommended runway length is a function of the most critical individual airplane's takeoff and landing operating weights, and is further dependent on wing flap settings, airport elevation and temperature, runway surface conditions (dry or wet), and effective runway gradient. Assumptions for the analysis include:

- **Density Altitude**. Aircraft engine performance decreases as elevation increases, therefore a higher airport elevation can require additional runway length for aircraft to become airborne. This analysis is based on the airport elevation of 947 feet above mean sea level.
- **Temperature.** The temperature used for take-off length determinations is the mean daily maximum temperature of the hottest month averaged over a period of thirty years, as required in FAA AC 150/5325-4B, also known as monthly climate normals. According to the monthly climate normals data from the National Climatic Data Center,[29] the mean daily maximum temperature for the hottest month (July) is 85.6 degrees Fahrenheit at CRW.

Additional assumptions used in the SCAP software analysis are summarized in **Table 11**.

Runway assumptions for each scenario are identified in **Table 12**. Existing conditions include the declared distances, as identified in Table 9. For both phases of the Proposed Project, it was assumed that TORA = TODA = ASDA.

Table 13 identifies the obstacles that were used in the analysis. The height and distance are relative to the lift-off end of the runway. The offset is the distance left or right of the extended runway centerline. Whether the offset is left or right of the extended centerline is not captured here since it is only used to determine if the obstacle falls within the FAA Obstacle Accountability Area (OAA).

[29] National Climatic Data Center, https://www.ncei.noaa.gov/pub/data/ccd-data/nrmmax.txt (accessed February 2, 2022).

TABLE 11 STANDARDIZED COMPUTER AIRCRAFT PLANNING SOFTWARE ASSUMPTIONS

ASSUMPTION	INPUT
Airport	
Airport Elevation	947 feet above mean sea level
Runway Data	See Table 9
Environmental	
Outside Air Temperature	85.6 Fahrenheit
Standard Atmospheric Pressure (QNH)	29.92 inches
Wind Velocity	0
Runway Condition	Dry for takeoff; wet for landing
Aircraft Configuration	
Air Conditioning Packs	Auto (off)
Engine and Wing Anti-Ice	Anti-ice off
Tires/Wheels/Brakes	Typical values used
Takeoff Speed	Optimum (improved climb)
Flap Setting	Optimum takeoff flaps
Takeoff Thrust	Full thrust
Other Parameters	▪ Dry runway, crowned, grooved, and porous friction coated (PFC) ▪ Standard line-up allowance for 90-degree entry onto runway ▪ Failure of the most critical engine to takeoff just prior to the V1 takeoff decision speed

SOURCE: Flight Engineering, LLC., Standardized Computer Aircraft Performance Software, March 2022.

TABLE 12 RUNWAY ASSUMPTIONS

PHASE	OVERALL RUNWAY LENGTH	RUNWAY END	LATITUDE	LONGITUDE	ELEVATION (FEET)
Existing	6,715	Runway 5	38°22'11.07"	81°36'5.32"	946.6
		Runway 23	38°22'56.2209"	81°35'3.5088"	894.1
Phase 1	7,000	Runway 5	38°22'17.90"	81°35'55.98"	946.9
		Runway 23	38°23'4.96"	81°34'51.54"	887.6
Phase 2	8,000	Runway 5	38°22'19.76"	81°35'53.42"	946.6
		Runway 23	38°23'13.56"	81°34'39.78"	881.1

SOURCE: Ricondo & Associates, Inc., March 2022.

TABLE 13 RUNWAY OBSTACLES

RUNWAY/PHASE	OBSTACLE		
	HEIGHT (FEET)	DISTANCE (FEET)	OFFSET (FEET)
Runway 5			
Existing	56	3,525	118
	73	3,554	247
	96	3,686	66
	197	3,744	215
	116	3,837	275
	123	3,901	130
	131	5,055	143
	137	5,180	292
	305	11,722	459
	486	21,910	1,147
Phase 1	316	9,922	459
	497	20,110	1,146
Phase 2	322	8,644	456
	503	18,832	1,141
Runway 23			
Existing	5	114	185
	17	4,490	232
	20	4,748	162
	83	4,805	253
	124	6,273	123
	308	22,058	1,141
	342	22,185	1,121
Phase 1	5	1,129	185
	129	5,175	0
	308	23,073	1,141
	342	23,200	1,121
Phase 2	5	1,407	184
	54	5,439	328
	127	5,453	0
	308	23,350	1,146
	342	23,477	1,126

SOURCE: AeroData, Inc., March 2022.

7.4 ANALYSIS AND OUTPUTS

The SCAP software analysis was performed by Flight Engineering, LLC to determine allowable takeoff weight and estimated actual takeoff weight required for each critical aircraft and its farthest forecast destination. As identified in **Table 14**, a total of six aircraft/destination scenarios were analyzed. The outputs from the software are also summarized in Table 14, including:

- The **allowable takeoff weight**, which is independent of any particular destination or allocation of weight between empty weight, fuel, and payload. It is the lesser of the manufacturer's maximum structural takeoff weight and a calculated takeoff weight based on all aircraft performance-based criteria such as runway field length, obstacle clearance, engine-out climb performance, temperature conditions, airport elevation, and more than a dozen other criteria.
- The **estimated actual takeoff weight** needed for identified destinations is based on fuel requirements, desired payload, and other factors. A breakdown of the estimated actual takeoff weights is summarized in Table 10, which includes:
    - **Fuel**. The fuel burn to a destination is a function of the Nautical Air Miles (wind adjusted distance accounting for typical routings), and the actual takeoff weight. Fuel burn varies with takeoff weight: A heavier takeoff weight requires more fuel, which is due in part to the fact that the climb profiles are different. A heavier aircraft will take longer to climb to higher, more fuel-efficient altitudes. The additional time spent at lower altitudes increases the overall trip fuel burn. In addition to fuel burn for each destination, the SCAP software also includes reserve fuel. The reserve fuel is calculated based on a fixed number of minutes. The FAA minimum legal domestic reserves are enough fuel for 45 minutes of cruise after passing the destination; however, specific values from recent internal airline route analyses were used, when known, or a default value of 60 minutes was used in the absence of specific airline information, which is more typical of airline operations than the legal minimum.
    - **Passenger and Baggage**. As part of determining the passenger load levels, the analysis consulted FAA AC 120/27F, *Aircraft Weight and Balance Control*.[30] The AC does not provide specific average passenger and baggage weights, but instead issues guidance for specific airlines in how to determine passenger and baggage weights for their operations. In the absence of actual estimated weights provided by the airlines, an all-inclusive weight of 228 pounds for each passenger, including bags, was assumed for this analysis.[31] The software runs also assume a full passenger load.
    - **Additional Cargo**. An allowance for additional cargo was calculated based on subtracting the passenger and baggage weight from the allowable payload[32].

The determined allowable takeoff weight was then compared to the estimated actual takeoff weight for each scenario to determine if the proposed runway length is sufficient.

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[30] US Department of Transportation Federal Aviation Administration, Advisory Circular 120/27F, *Aircraft Weigh and Balance Control,* May 6, 2019.

[31] Flight Engineering LLC, March 2022.

[32] Payload is the weight of occupants, cargo, and baggage. Each aircraft has a defined maximum payload capacity.

TABLE 14 STANDARDIZED COMPUTER AIRCRAFT PLANNING SOFTWARE RESULTS

AIRCRAFT	REPRESENTATIVE MODEL	# OF SEATS	FARTHEST DESTINATION AND DISTANCE (NM.)		RUNWAY END	MAXIMUM TAKEOFF WEIGHT	ALLOWABLE[1] TAKEOFF WEIGHT	ESTIMATED ACTUAL[2] TAKEOFF WEIGHT (LBS)					DIFFERENCE BETWEEN ACTUAL AND ALLOWABLE
								OPERATING EMPTY	FUEL	PASSENGERS AND BAGS	ADDITIONAL CARGO	TOTAL	
Phase 1 (7,000-foot runway)													
CRJ-700	CL-600-2D15	70	IAH	975	5	75,000	75,000	44,245	11,710	15,960	2,095	74,305	695
					23	75,000	75,000	44,245	11,710	15,960	2,095	74,305	695
CRJ-900	CL-600-2D24	76	ATL	363	5	84,500	78,820	48,160	7,526	17,328	4,512	77,526	1,294
					23	84,500	79,520	48,160	7,526	17,328	4,512	77,526	1,994
EMB-175	ERJ 170-200 STD	76	IAH	975	5	89,000	81,060	48,259	12,147	17,328	3,326	81,060	0
					23	89,000	82,740	48,259	12,584	17,328	4,569	82,740	0
Phase 2 (8,000-foot runway)													
A319	WV055 – CFM56	128	IAH	975	5	166,449	141,700	92,458	18,825	29,184	1,233	141,700	0
					23	166,449	146,300	92,458	19,107	29,184	5,551	146,300	0
A320	WV017 – CFM56	150	MCO	686	5	171,961	158,300	97,147	15,387	34,200	6,442	153,176	5,124
					23	171,961	162,400	97,147	15,387	34,200	6,442	153,176	9,224
A320neo	WV055 – Leap 1A	150	MCO	686	5	174,165	167,000	97,147	14,030	34,200	10,410	155,787	11,213
					23	174,165	172,600	97,147	14,030	34,200	10,410	155,787	16,813

NOTES:
ATL – Hartsfield-Jackson Atlanta International Airport
IAH – George Bush Intercontinental Airport (Houston)
MCO – Orlando International Airport
nm – nautical miles

1 The allowable takeoff weight (ATOW) is independent of any particular destination or allocation of weight between empty weight, fuel, and payload. It is the lesser of the manufacturer's Maximum Structural Takeoff Weight and all aircraft performance-based criteria such as runway field length, obstacle clearance, engine-out climb performance, temperature conditions, airport elevation, and more than a dozen other criteria. For all aircraft considered, the ATOW was limited by engine-out obstacle clearance requirements or the Maximum Structural Takeoff Weight. Some cases were simultaneously limited by field length and obstacle clearance criteria due to how ATOW optimization is done within the manufacturer's software. Even these cases should be considered obstacle limited since lower obstacles would improve ATOW more than a marginally longer runway.

2 The actual takeoff weight needed for the destinations based on fuel requirements, desired payload, and other factors is one of the outputs of the commercial flight plans that were run to determine allowable payload.

SOURCES: Aircraft Manufacturer's Airport Planning Manuals; Ricondo & Associates, Inc., January 2022; Flight Engineering LLC, March 2022.

7.5 RESULTS

For all aircraft considered, the allowable takeoff weight was limited by engine-out obstacle clearance requirements or the maximum structural takeoff weight. Some cases were simultaneously limited by field length and obstacle clearance criteria due to how the allowable takeoff weight optimization is calculated within the manufacturer's software.

As shown in Table 14, the runway length analysis indicates that under Phase 1, the estimated actual takeoff weight for the EMB-175 to IAH is equal to the allowable takeoff weight and would require the full 7,000-foot runway based on runway field length, obstacle clearance, engine-out climb performance, full passenger load, fuel requirements, cargo allowance, and other SCAP criteria. The estimated actual takeoff weights for the CRJ-700 and CRJ-900 are also very close to the allowable takeoff weights. Similarly, under Phase 2, the estimated actual takeoff weight of the A319 to IAH is equal to the allowable takeoff weight and would require an 8,000-foot runway based on runway field length, obstacle clearance, engine-out climb performance, full passenger load, fuel requirements, and other SCAP criteria.

It is important to note that the SCAP software is intended for planning purposes and that individual airlines have specific operating procedures, which may include more stringent policies and/or protocols, that are not accounted for in the analysis. These differences may require additional runway length than what is depicted in this planning analysis or could result in weight restrictions under certain conditions.

8. CONCLUSIONS

Ricondo has reviewed and updated and/or confirmed the previous planning assumptions and analyses. A comparison of the planning studies is summarized in **Table 15**. Although the forecast was updated, resulting in different identified critical aircraft, the results of the planning analyses confirm the proposed RSA dimensions and runway lengths.

TABLE 15 CONCLUSIONS SUMMARY

	AIRPORT AUTHORITY ANALYSIS / PROPOSED PROJECT	RICONDO VERIFICATION / RESULTS
Forecast	2017 Forecast was developed for both a base and high passenger demand forecast with a forecast period from 2017 to 2037.	The forecast was updated to account for impacts from COVID-19; the updated forecast period is 2021 to 2040.
Critical Aircraft		
Existing	ARC of C-III (including A319, B717, B737-700, and CRJ 900)	CRJ-700, CRJ-900, and EMB-175
Future	B737-700 and CS-100 CRJ-900 [1]	Airbus A320 family (A319, A320, and A321)
Runway Safety Area Requirements		
Runway Design Code	C-III	C-III
Width (based on Runway Centerline)	500 feet	500 feet
Length Beyond Runway End	1,000 feet	1,000 feet
Length Prior to Threshold	600 feet	600 feet
Runway Length Analysis		
Phase 1	7,000 feet	7,000 feet
Phase 2	8,000 feet	8,000 feet

NOTES:
ARC – Airport Reference Code
1 The 2020 Master Plan identified the CRJ-900 as having the longest runway length requirement in the forecast fleet.
SOURCES: Central West Virginia Regional Airport Authority, Interim Runway Safety Area Study, January 2018; Central West Virginia Regional Airport Authority, Runway Safety Area Study, August 2019; Landrum & Brown, prepared for Central West Virginia Regional Airport Authority, Airfield Maser Plan, Final, July 2020; Ricondo & Associates, Inc., January 2022; Flight Engineering LLC, March 2022.

APPENDIX B

Updated (EIS) Forecast

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1. INTRODUCTION

To aid the Federal Aviation Administration (FAA) in the review and verification of existing planning studies, to understand the potential future demand and aircraft fleet mix at the West Virginia International Yeager Airport (CRW or the Airport), and in consideration of the COVID-19 pandemic and its impact on the aviation industry overall and at the Airport, Ricondo & Associates, Inc. (Ricondo) performed the following tasks:

- A review of the aviation demand forecast completed by Landrum & Brown in 2017 (the 2017 Forecast) and included in the 2020 Airfield Master Plan.[1]
- A review of activity patterns at the Airport historically (2011-2019) and from the onset of the COVID-19 pandemic in early 2020.
- An update of the aviation demand forecast, including enplaned passengers and passenger, all-cargo, general aviation, air-taxi, and military operations.

2. REVIEW OF 2017 FORECAST COMPONENTS

Ricondo's review of the aviation demand forecast included in the 2017 Forecast consisted of an evaluation of:

- Historical activity patterns that served to inform the development of the 2017 Forecast.
- The methodologies and approaches used in the 2017 Forecast to derive projections of demand and activity.
- The relevance and completeness of data inputs in the 2017 Forecast.
- The assumptions that informed the 2017 Forecast, including:
    - projected socioeconomic indicators,
    - expected airline service,
    - aircraft fleet mix, and
    - consideration of alternative demand scenarios.

This section summarizes Ricondo's evaluation of the 2017 Forecast.

2.1 HISTORICAL ANALYSIS EVALUATION

The 2017 Forecast included an evaluation of historical passenger enplanements, air service, cargo capacity, and aircraft operations trends between 2008 and 2016, and identified factors which had already or may in the future impact traffic volumes. Ricondo analyzed the 2017 Forecast and believes that the analysis of past trends (through 2016) is complete and does not include errors or omissions. The factors identified in the 2017 Forecast as influencing demand at the Airport, including airline strategies, aircraft trends, low-cost carriers, socioeconomic trends, and regional growth are considered reasonable and reflective of the Airport's conditions at that time.

1 Landrum & Brown, prepared for Central West Virginia Regional Airport Authority, Airfield Master Plan, Final, July 2020.

2.2 METHODOLOGY EVALUATION

The technique of identifying statistical relationships between historical passengers and socioeconomic variables used in the 2017 Forecast is a common approach to forecasting demand for air travel and was an appropriate method for forecasting enplaned passengers at the Airport. The 2017 Forecast used multi-linear regression analysis in an attempt to identify statistical relationships between historical passengers and socioeconomic data (including population, employment, total personal income, and gross regional product [GRP]) of the Charleston-Huntington-Ashland Combined Statistical Area (CSA), the City of Charleston, the State of West Virginia, and the United States (US). Although no strong relationships were found between these variables and passenger activity at the Airport, the selected variables are typically associated with drivers of demand for air travel in the US; thus, use of these variables is a logical first step in the development of the activity forecast to attempt to identify predictive relationships between these drivers and aviation activity at CRW. Using the same historical socioeconomic data from the same source used in the 2017 Forecast (Woods & Poole Economics, Inc.) and evaluating more years (2017-2019 were added), Ricondo also was not able to find strong statistical relationships between historical passengers and the same socioeconomic variables considered in the 2017 Forecast. Thus, the 2017 Forecast was developed using a market demand-driven approach to determine future service, with assumptions developed for airline strategies, fleet mix, load factors, and gauge in order to derive the forecast of enplaned passengers. Ricondo agrees that using a market demand-driven approach is reasonable when socioeconomic forecasts cannot be used to estimate future enplaned passengers.

2.3 DATA INPUT EVALUATION

Ricondo found the data used to develop the 2017 Forecast was complete and relevant and that all pertinent aspects were considered in its development.

2.4 ASSUMPTIONS EVALUATION

Development of the 2017 Forecast through a market demand-driven approach required identifying which of the Airport's top 20 origin and destination (O&D) markets had no weekly direct service and made assumptions on new future destinations, fleet mix, load factors, and gauge. Changes to fleet mix, load factors, and gauge were also considered for existing destinations. Spirit Airlines (Spirit) to Orlando International Airport (MCO), American Airlines (American) to Dallas/Fort Worth International Airport (DFW), and Delta Air Lines (Delta) to Detroit Metropolitan Wayne County Airport (DTW) were all added as destinations by 2023. The high iteration of the 2017 Forecast also added United Airlines (United) service to Denver International Airport (DEN), Spirit to Fort Lauderdale-Hollywood International Airport (FLL) and McCarran International Airport (LAS), and American Airlines to Phoenix Sky Harbor Airport (PHX)—all markets that are either hub airports or destination markets with high O&D demand. Ricondo agrees that the assumptions on new destinations, fleet mix, load factors, and gauge were reasonable at the time the 2017 Forecast was developed. However, the market additions might have benefited from an explanation for why the markets were added, either historically at the Airport, or at an airport of similar size, showing the same methodology (weekly service passengers of O&D market demand assessment).

The MCO, DFW, and DTW destinations, which were added in the Base Forecast "due to their demand and previous success in these markets," were reasonable assumptions at the time, and it is possible, without the occurrence of the COVID-19 pandemic, that American and Delta would have established nonstop service from the Airport to DFW and DTW respectively by 2023. Spirit launched service to MCO prior to the start of the pandemic, in February 2020.

Projections for 2017 through 2019 from the 2017 Forecast were slightly higher than what actually occurred, and some service was both added and discontinued that the 2017 Forecast did not foresee. American service to O'Hare

International Airport (ORD) was initiated in 2018 before being discontinued in 2020 due to the COVID-19 pandemic. United service to Dulles International Airport (IAD) and George Bush Intercontinental Airport (IAH) were also discontinued prior to the pandemic, in January 2019 and May 2019, respectively. When United discontinued service to IAD and IAH from the Airport, it increased service to ORD. Delta was the only airline to have little change in service to its single destination of its Hartsfield-Jackson Atlanta International Airport (ATL) hub between 2016 and 2019.

The expected airline service and aircraft fleet mix assumptions made in the 2017 Forecast reflect a pre-COVID-19 pandemic landscape. At the time, the 2017 Forecast reflected expected changes in fleet mix in the future as 50-seat small regional jet aircraft were replaced with larger 70- and 80-seat aircraft. The 2017 Forecast assumed that American, United, and Delta would phase out all service to the Airport by 50-seat aircraft by 2027. Airlines have accelerated the retirement of 50-seat aircraft during the COVID-19 pandemic and the transition to larger aircraft for service to the Airport is expected to occur sooner than was assumed in the 2017 Forecast.

3. HISTORICAL ACTIVITY ANALYSIS

3.1 2011 TO 2021 PASSENGER AIRLINE ACTIVITY

Ricondo analyzed activity at the Airport from 2011 to 2021 to identify principal drivers of changes during this period. **Table 1** shows historical enplaned passengers and passenger airline landings at the Airport. Both enplaned passenger activity and passenger airline landings at the Airport during this period were characterized by a declining trend, with a turn toward growth in enplaned passengers in 2018 and 2019 before the COVID-19 pandemic (as discussed in Section 3.2).

TABLE 1 HISTORICAL ENPLANED PASSENGERS AND PASSENGER AIRLINE LANDINGS

YEAR	ENPLANED PASSENGERS	PASSENGER AIRLINE LANDINGS
2011	284,842	8,652
2012	270,199	7,834
2013	250,350	7,166
2014	239,852	6,618
2015	225,489	6,077
2016	213,514	5,669
2017	202,581	5,672
2018	215,731	5,820
2019	224,929	5,169
2020	89,244	2,915
2021	146,355	3,382
CAGR		
2011 – 2019	-2.9%	-6.2%
2011 – 2021	-6.4%	-9.0%

NOTE:
CAGR – Compound Annual Growth Rate
SOURCE: Central West Virginia Regional Airport Authority, May 2022.

As mentioned in the evaluation of the 2017 Forecast above, Ricondo was unable to identify socioeconomic variables that shared a statistical relationship with Airport activity historically. Population, gross domestic/regional product, and per capita personal income growth is generally lower in the Charleston-Huntington-Ashland CSA than in the US historically, but still positive. A statistical relationship between the Airport's negative activity growth and the Charleston-Huntington-Ashland CSA's and the nation's positive socioeconomic growth was not found. Therefore, Ricondo considered changes resulting from evolving airline strategies, nationally and at the Airport, having affected enplaned passengers and passenger airline operations levels since 2011. For example, American discontinued service from the Airport to DFW in 2015 after it merged with US Airways and could connect passengers through legacy US Airways hubs at Charlotte Douglas International Airport (CLT) and Philadelphia International Airport (PHL). Discontinuation of service to DTW, IAD, IAH, DFW, and LaGuardia Airport (LGA) during this period (2011 – 2019) was influenced by airline mergers as airlines redistributed capacity across a broader network of connecting hubs.

A trend toward use of larger aircraft and decreased service by smaller aircraft occurred at the Airport as anticipated by the 2017 Forecast and as evidenced by higher enplanements but lower aircraft operations in 2019 compared to 2018 (see Table 1). American discontinued using 35-seat turboprop aircraft on CRW routes in 2017 and introduced service on 65-seat CRJ-700 aircraft in 2018 and 76 seat CRJ-900 aircraft in 2019. Additionally, 37-seat turboprop aircraft were replaced with 50-seat regional jets in 2018 by United on service to IAD.

3.2 2020 TO PRESENT (POST-COVID-19 PANDEMIC ONSET) PASSENGER AIRLINE ACTIVITY

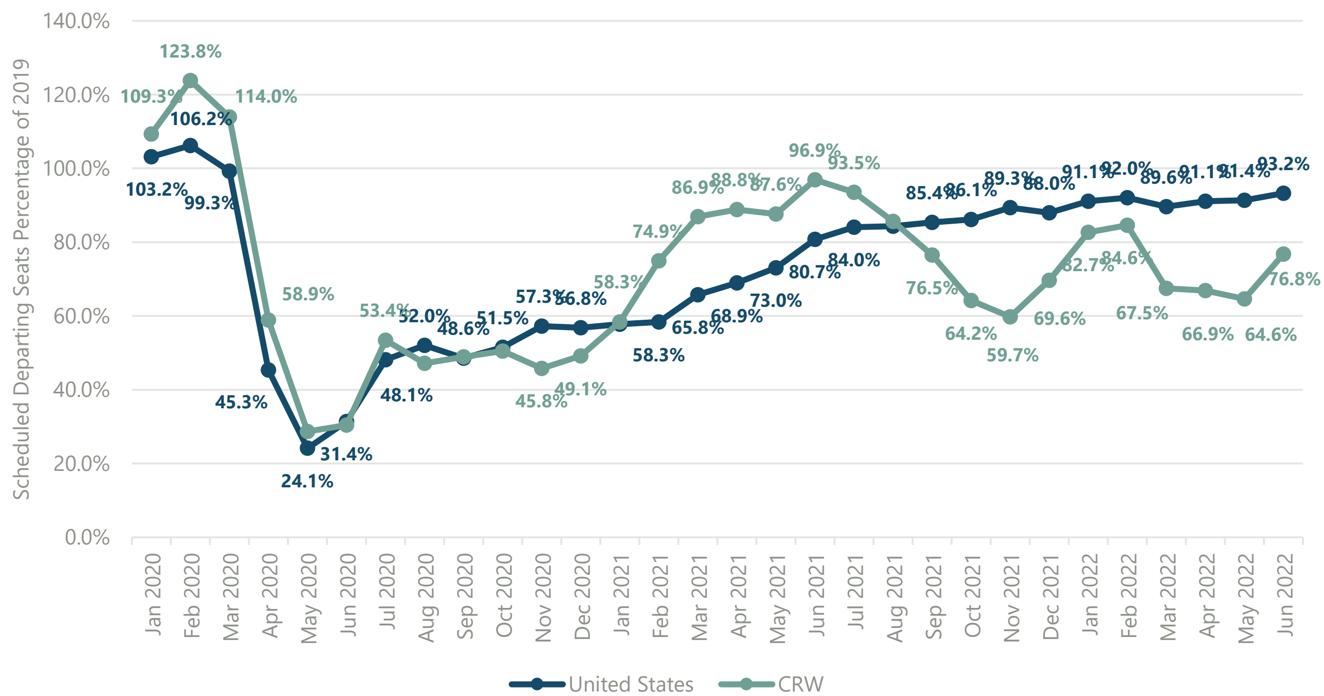
In the first two months of 2020, enplaned passengers at the Airport were 8.6 percent higher than the first two months of CY 2019. This was a result of American's upgauging from 50-seat to 65- and 76-seat regional jets on its approximately four times daily flights to CLT; increases in American and Delta frequencies to CLT and ATL, respectively; and an extra day of February activity due to 2020 being a leap year. However, the outbreak and spread of COVID-19 depressed demand for air travel at the Airport beginning in March 2020, having first impacted travel in East Asia in early 2020 before rapidly accelerating to other regions globally. Airlines responded to the collapse in demand by parking aircraft and drastically reducing capacity across their networks. By May 2020, which represented the low point in terms of passenger airline capacity reductions, scheduled departing seats represented 25.1 percent of May 2019 for all US airports and 22.1 percent of May 2019 capacity for CRW. A modest recovery in airline capacity occurred over the second half of 2020 and into the first quarter of 2021. Airlines accelerated their restoration of capacity in the second quarter of 2021, with June 2021 scheduled departing seats representing 80.7 percent of June 2019 scheduled departing seats for all US airports. At the Airport, June 2021 scheduled departing seats represented 96.9 percent of June 2019 scheduled departing seats, with American resuming service to PHL and Spirit resuming service to Myrtle Beach International Airport (MYR). Scheduled departing seats then stabilized in the United States at an average of 84.6 percent in the third quarter of 2021 but declined sharply at CRW as service was again suspended to PHL and MYR. November 2021 scheduled departing seats represented 89.3 percent of November 2019 scheduled departing seats for all US airports but only 59.7 percent of November 2019 scheduled departing seats for CRW. The reduction in scheduled departing seats at the Airport coincided with a peak in new COVID-19 cases in West Virginia in September 2021,[2] which could have contributed to the airlines cutting capacity at CRW. As of June 2022, scheduled departing seat capacity for all US airports represents 93.2 percent of June 2019. At the Airport, June 2022 scheduled departing seats represent 76.8 percent of June 2019, with service to PHL still

[2] New York Times, https://www.nytimes.com/interactive/2021/us/west-virginia-covid-cases.html (accessed November 30, 2021).

suspended and reduced MYR capacity compared to June 2021. A description of changes in seat capacity by airline is provided in Section 3.2.1.

Exhibit 1 presents departing seat capacity by month as a percentage of the same month in 2019 for January 2020 through June 2022 for the United States and the Airport.

EXHIBIT 1 MONTHLY SCHEDULED DEPARTING SEATS (AS A PERCENTAGE OF 2019)



SOURCE: Innovata, April 2022.

Passenger volumes have decreased at a faster rate than seat capacity systemwide since the start of the COVID-19 pandemic. Through the majority of April 2020, which represented the low point in terms of passenger activity, the Transportation Security Administration (TSA) reported daily airport screening throughput for all US airports was approximately 5 percent of the volume on the equivalent same day in 2019. For the Airport, April 2020 enplaned passengers represented 4.7 percent of April 2019 enplaned passengers. By July 2020, the Airport's percentage of prior year enplaned passengers had increased to 33.0 percent. In the fourth quarter of CY 2020, the modest recovery in passenger activity had plateaued at approximately 38.7 percent of CY 2019 passengers. The recovery began to accelerate in March 2021 when enplaned passengers represented 52.2 percent of March 2019 enplaned passengers, increasing to a high of 84.6 percent of CY 2019 enplaned passengers in July 2021. Enplaned passengers as a percentage of 2019 decreased in the late summer and fall of 2021 due to the suspension of service to PHL and MYR. As of March 2022, CRW enplaned passengers represented 75.1 percent of March 2019. **Table 2** presents the Airport's actual enplaned passengers and passenger airline landings for January 2020 through March 2022; it also includes the percentage the activity represented for the same month of 2019.

TABLE 2 RECENT ENPLANED PASSENGERS AND PASSENGER LANDINGS

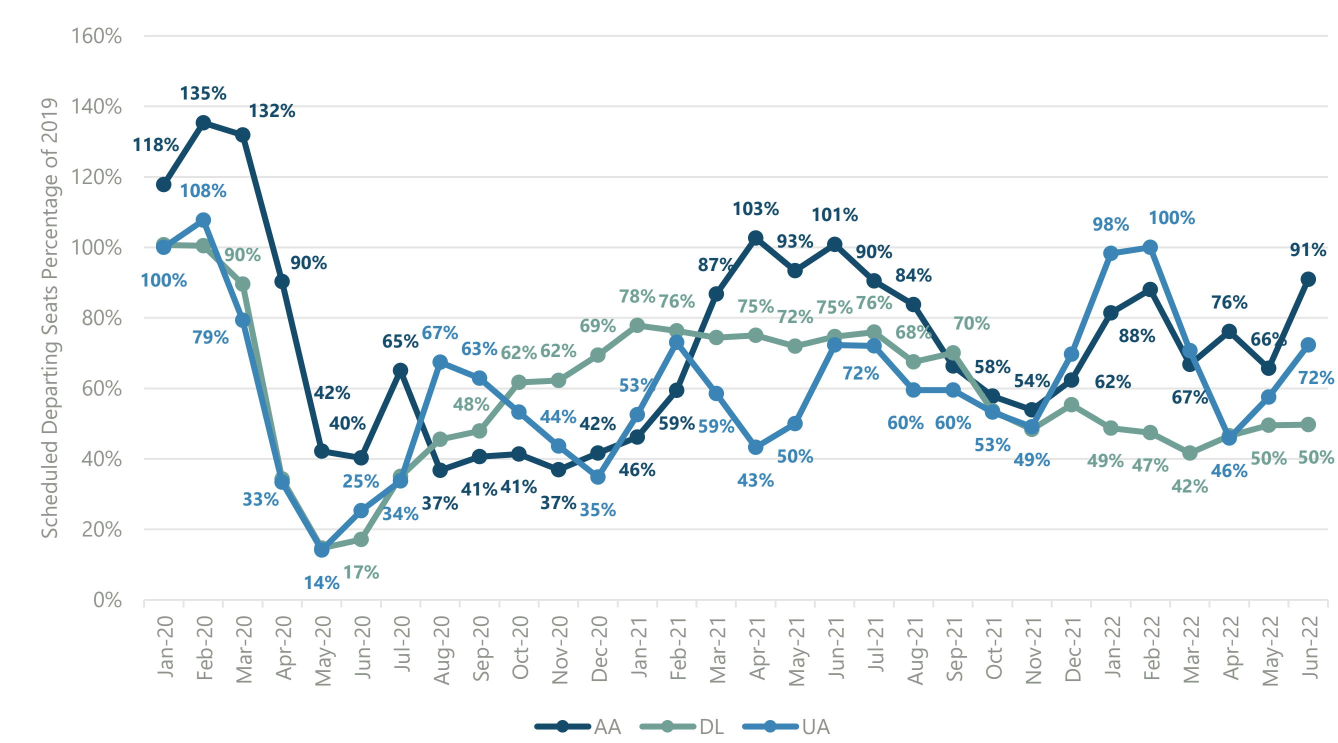
	ENPLANED PASSENGERS	ENPLANED PASSNGERS % OF 2019	LANDINGS	LANDINGS % OF 2019
Jan-20	15,863	106.6%	427	109.5%
Feb-20	15,554	110.8%	405	118.1%
Mar-20	9,018	49.7%	360	86.1%
Apr-20	861	4.7%	137	30.9%
May-20	2,213	10.3%	108	23.7%
Jun-20	3,802	18.4%	114	26.8%
Jul-20	6,667	33.0%	216	50.0%
Aug-20	6,397	31.3%	213	47.7%
Sep-20	6,557	34.6%	223	49.8%
Oct-20	7,871	38.5%	253	54.3%
Nov-20	7,313	38.7%	232	50.0%
Dec-20	7,128	38.9%	227	51.9%
Jan-21	5,573	37.4%	218	55.9%
Feb-21	5,698	40.6%	210	61.2%
Mar-21	9,472	52.2%	293	70.1%
Apr-21	11,093	60.4%	300	67.7%
May-21	15,233	70.7%	316	69.3%
Jun-21	16,406	79.5%	329	77.4%
Jul-21	17,077	84.6%	320	74.1%
Aug-21	13,189	64.4%	286	64.0%
Sep-21	13,038	68.8%	277	61.8%
Oct-21	12,879	63.0%	273	58.6%
Nov-21	12,851	67.9%	258	55.6%
Dec-21	13,846	75.5%	302	69.1%
Jan-22	9,911	66.6%	259	66.4%
Feb-22	10,972	78.2%	261	76.1%
Mar-22	13,616	75.1%	258	61.7%

SOURCE: Central West Virginia Regional Airport Authority, November 2021.

3.2.1 IMPACT OF COVID-19 PANDEMIC ON INDIVIDUAL PASSENGER AIRLINES

Ricondo performed an analysis of month over month changes in airline departing seat capacity and enplaned passengers by airline at the Airport to measure changes in demand across different segments of air travel and track the recovery to pre-pandemic levels of activity. **Exhibit 2** presents seat capacity by month as a percentage of the same month in 2019 for January 2020 through June 2022 for American, Delta, and United, the three airlines that have consistently served CRW during this period. Spirit is excluded from the exhibit as its service has been seasonal which skews the percentages. All three airlines drastically reduced capacity between March and June 2020. Different trends in the restoration of capacity through the summer of 2022 reflect different strategies of the airlines to adding back capacity to meet fluctuations in demand during this period.

EXHIBIT 2 SEAT CAPACITY BY AIRLINE (AS A PERCENTAGE OF 2019)



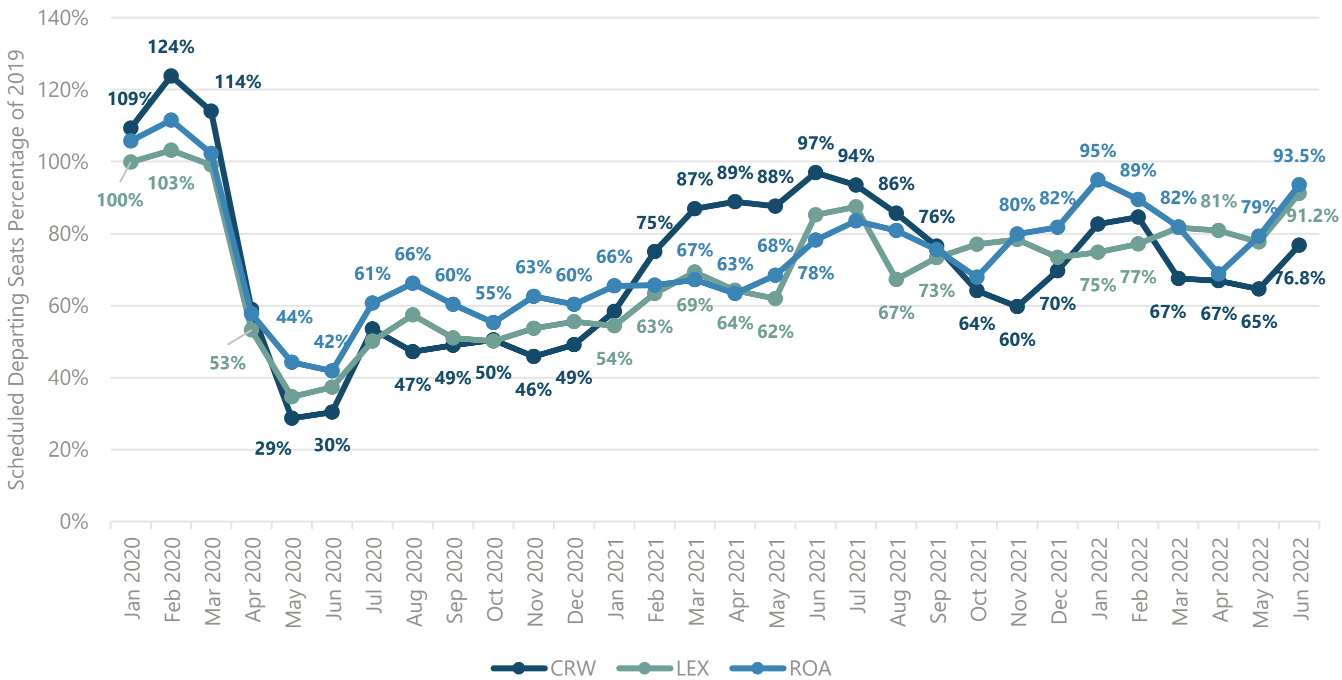
NOTES: Excludes Spirit Airlines.
AA – American Airlines
DL – Delta Airlines
UA – United Airlines
SOURCE: Innovata, May 2022.

3.2.2 IMPACT OF COVID-19 PANDEMIC ON AREA AIRPORTS

Departing seat capacity at peer commercial airports of roughly similar size in the same geographical region as the Airport varied as the COVID-19 pandemic progressed. **Exhibit 3** presents departing seat capacity by month as a percentage of the same month in 2019 for January 2020 through June 2022 for CRW, Blue Grass Airport (LEX), and Roanoke–Blacksburg Regional Airport (ROA). Through August 2021, the recovery in scheduled departing seats at the Airport was leading the recovery at its peer airports. The relative order for this measure among the three airports shifted in fall 2021, such that by November 2021, the Airport's scheduled departing seats as a percentage of November 2019 scheduled departing seats stood at 60.1 percent while the same measure for LEX and ROA was 78.4

percent and 79.9 percent, respectively. The decrease in scheduled departing seats at the Airport coincided with a September 2021 peak in COVID-19 cases in West Virginia, which could have led to airlines cutting capacity in the near term.[3] While COVID-19 case numbers for West Virginia, Kentucky, and Virginia all spiked in September 2021, there was a higher concentration of COVID-19 cases in the population of West Virginia than in the populations of Kentucky and Virginia. As of June 2022, the Airport's recovery to 2019 seat capacity levels trailed its peers at 76.8 percent, compared to 91.2 percent for LEX and 93.5 percent for ROA.

EXHIBIT 3 MONTHLY SCHEDULED DEPARTING SEATS AT PEER AIRPORTS (AS A PERCENTAGE OF 2019)



NOTES:
CRW – West Virginia International Yeager Airport
LEX – Blue Grass Airport
ROA – Roanoke–Blacksburg Regional Airport
SOURCE: Innovata (published airline schedules), May 2022.

3.3 HISTORICAL AIRPORT-WIDE OPERATIONS

Table 3 presents historical airport operations for passenger, cargo, general aviation (GA)/air taxi, and military for the eleven-year period 2011 to 2021 at CRW. As shown, there has been a downward trend in activity during this period. Operations have decreased at a faster rate than enplaned passengers due in part to the increase in passenger airline aircraft size.

[3] New York Times, https://www.nytimes.com/interactive/2021/us/west-virginia-covid-cases.html (accessed November 30, 2021).

TABLE 3 HISTORICAL AIRPORT OPERATIONS (2011-2021)

YEAR	PASSENGER	CARGO	GA/AIR TAXI	MILITARY	TOTAL
2011	17,304	1,062	31,645	6,480	56,491
2012	15,668	1,114	24,832	6,162	47,776
2013	14,332	1,120	26,434	6,775	48,661
2014	13,236	992	27,343	6,349	47,920
2015	12,154	742	27,990	6,540	47,426
2016	11,338	740	24,140	7,249	43,467
2017	11,344	742	18,189	5,702	35,977
2018	11,640	742	14,706	4,374	31,462
2019	10,338	752	16,126	4,496	31,712
2020	5,830	738	13,564	3,934	24,066
2021	6,764	730	21,090	4,224	32,808
CAGR					
2011 – 2019	-6.2%	-4.2%	-8.1%	-4.5%	-7.0%
2011 – 2021	-9.0%	-3.7%	-4.0%	-4.2%	-5.3%

NOTES:
GA – General Aviation
CAGR – Compound Annual Growth Rate
SOURCES: Central West Virginia Regional Airport Authority, May 2022; Ricondo & Associates, Inc., May 2022.

4. UPDATED FORECAST

Given the uncertainty of the duration and impacts of COVID-19 pandemic-related factors affecting the aviation industry, including various quarantine requirements, return-to-work policies, and passenger confidence, the timing of a return to pre-COVID-19 pandemic capacity and passenger levels is unknown. However, over the long term, US demand for air travel and airline capacity are expected to grow in line with the US Gross Domestic Product (GDP), a relationship that has been in place since before airline industry deregulation in 1978.[4] In this Updated Forecast, COVID-19 pandemic-related factors were modeled to continue influencing passenger activity through 2025, with traditional drivers of demand (socioeconomic factors) primarily influencing activity from 2026 through 2040.

4.1 SHORT-TERM RECOVERY FORECAST FOR PASSENGER AIRLINES

Airport passenger activity is resilient over the long-term, as historically demand for leisure and business travel has recovered from previous shocks. Airline capacity (measured in terms of available seats) and passenger volumes fell drastically after the terrorist attacks of September 11, 2001, and during the Great Recession beginning in 2008, both systemwide and at the Airport. At the Airport, passenger activity recovered in the following 3 to 4 years after each shock event. Airline passenger activity is expected to recover from COVID-19 impacts in broadly similar ways in the next several years as widespread distribution of vaccines, effective treatments, and other factors enable the end of

[4] US Department of Transportation Bureau of Transportation Statistics, May 2020 (airline capacity); Woods & Poole Economics, Inc., June 2020 (US GDP).

the pandemic. The 2021 Terminal Area Forecast (TAF), released by the FAA in March 2022, projects that recovery to 2019 passenger volumes will occur in 2023.

In the short-term, defined as 2019 to 2025, Ricondo developed a pandemic recovery forecast based on an evaluation of Airport activity for 2019 through March 2022. Forecast activity for April 2022 through June 2022 was based on published airline schedules, estimates of the percentage of scheduled flights that will be operated, and passenger load factors. Published airline schedules were not used after June 2022 because airlines are expected to file updated schedules closer to the departure dates. The forecast of departing seat capacity for July 2022 through the end of 2025 was based on an estimate of departures and average seats per departure by month and airline. Forecast departing seats were multiplied by estimated load factors to derive the forecast for enplaned passengers. Gradual increases in capacity and load factor represent the recovery in demand, which considers seasonal patterns in passenger activity as well as different segments of demand having different rates of recovery (e.g., a leisure passenger-oriented airline like Spirit recovering faster than airlines that rely more on business travelers like Delta, United, and American). The scheduled passenger operations forecast was informed by recent changes in fleet mix as airlines have accelerated the retirement of smaller regional jets during the COVID-19 pandemic. The forecast projects annual passenger activity returning to 2019 levels in 2023.

Ricondo assumed in the forecast that service to two destinations not served as of December 2021 will return during the forecast period: American's service to PHL and United's service to IAH. American (with its merger partner US Airways) operated service between CRW and PHL from 2014 through March 2020. Service was reinstated between June and November 2021. The route provides a critical link between CRW and American's primary connecting hub serving destinations in the northeast US and across the Atlantic and has historically generated strong passenger revenue yields. United (with its merger partner Continental) operated service between CRW and IAH from 2002 until 2019. The route provides a critical link between CRW and United's primary hub serving destinations in the southern US as well as Mexico, Central America, and South America.

Table 4 presents the projected enplaned passengers for the short-term recovery forecast. In the forecast, enplaned passengers increase from 224,929 in 2019 to 265,334 in 2025, which represents a CAGR of 2.8 percent. The forecast indicates recovery to 2019 enplanement levels occurring in 2023.

TABLE 4 SHORT-TERM RECOVERY FORECAST ENPLANED PASSENGERS

YEAR	ENPLANED PASSENGERS	PERCENT OF 2019
2019 (Actual)	224,929	100.0%
2020 (Actual)	89,244	39.7%
2021 (Actual)	146,355	65.1%
2022	177,854	79.1%
2023	233,668	103.9%
2024	258,516	114.9%
2025	265,334	118.0%
CAGR		
2019 – 2025	2.8%	

NOTE:
CAGR – Compound Annual Growth Rate
SOURCES: Central West Virginia Regional Airport Authority, November 2021; Ricondo & Associates, Inc., May 2022.

4.2 LONG-TERM PASSENGER AIRLINE FORECAST

An analysis of historical passenger activity and local and national socioeconomic data did not identify a strong predictive relationship between a variable or variables and enplaned passengers at the Airport. Because economic activity has historically been a primary driver of passenger demand in the US, it was determined that, absent predictive relationships existing between socioeconomic variables and passenger activity, local gross regional product (GRP) growth was an appropriate approach to model enplaned passengers in the long term. Local GRP projections for the Charleston-Huntington-Ashland CSA published in June 2021 by Woods & Poole Economics, Inc., an independent firm specializing in long-term county economic data and demographic data projections, were used for this modeling.

The updated enplaned passenger forecast is presented in **Table 5**, which includes the Updated Forecast for the full 20-year projection period. Table 5 also includes the Charleston-Huntington-Ashland CSA GRP data and the 2017 Forecast. Because local GRP was used to model enplaned passenger growth at the Airport, the CAGR from 2025 to 2040 for enplaned passengers is equal to the CAGR for the Charleston-Huntington-Ashland CSA GRP over the same period. Overall, enplaned passengers are forecast to increase at a CAGR of 1.2 percent between 2019, the year prior to the start of the COVID-19 pandemic, and 2040, from 224,929 in 2019 to 287,957 in 2040.

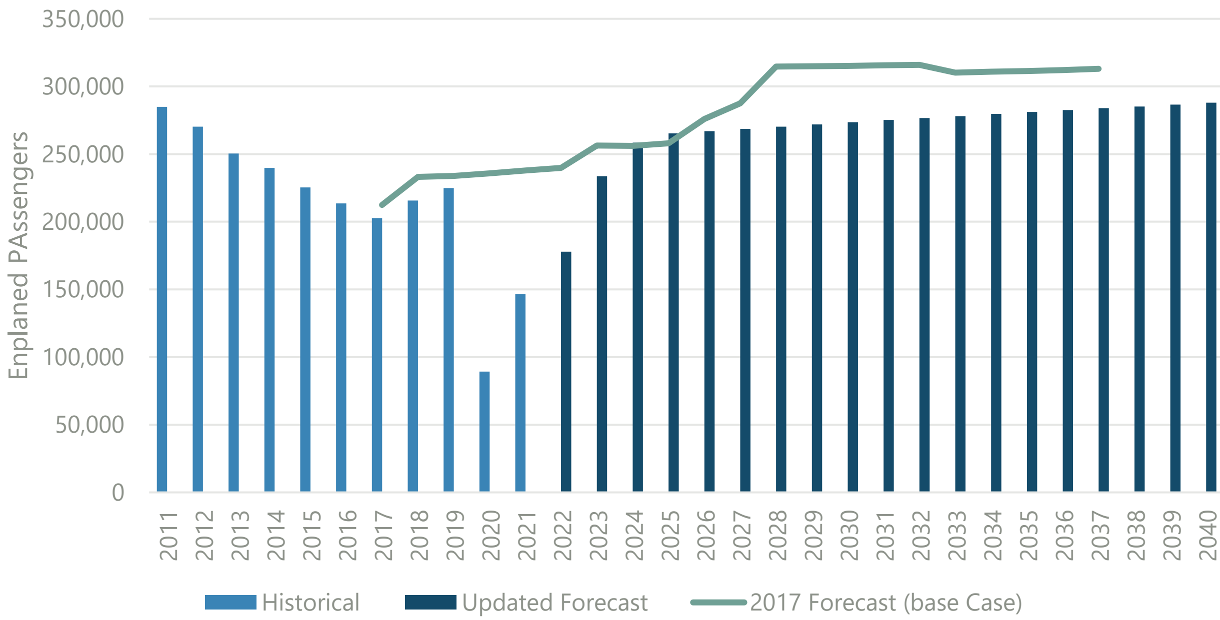
A graphical comparison of enplaned passenger projections from the 2017 Forecast and this Updated Forecast is provided in **Exhibit 4**.

TABLE 5 ENPLANED PASSENGERS UPDATED FORECAST

YEAR	2017 FORECAST ENPLANED PASSENGERS	UPDATED FORECAST ENPLANED PASSENGERS	CHARLESTON-HUNTINGTON-ASHLAND CSA GRP[1]
Historical			
2019*	233,852	224,929	$33,662
2020*	235,683	89,244	$31,994
2021*	237,796	146,355	$34,132
Forecast			
2022	239,733	177,854	$34,372
2023	256,452	233,668	$34,603
2024	256,000	258,516	$34,835
2025	258,018	265,334	$35,062
2026	275,883	267,036	$35,287
2027	287,618	268,710	$35,508
2028	314,796	270,354	$35,725
2029	314,958	271,972	$35,939
2030	315,189	273,563	$36,150
2031	315,615	275,134	$36,357
2032	315,978	276,655	$36,558
2033	310,275	278,155	$36,756
2034	310,954	279,627	$36,951
2035	311,384	281,064	$37,141
2036	312,014	282,503	$37,331
2037	312,949	283,905	$37,516
2038	n/a	285,281	$37,698
2039	n/a	286,625	$37,876
2040	n/a	287,957	$38,052
CAGR			
2019 – 2025	1.7%	2.8%	0.7%
2025 – 2040	n/a	0.5%	0.5%
2019 – 2040	n/a	1.2%	0.6%

NOTES:
CSA – Combined Statistical Area
GRP – Gross Regional Product
CAGR – Compound Annual Growth Rate
* For the years 2019, 2020, and 2021, 2017 Forecast Enplaned Passengers represent forecast, not historical data.
n/a – not applicable or not available
1 GRP in millions of 2012 dollars. 2020 GRP data is a Woods & Poole Economics, Inc. projection, not actual.
SOURCES: Central West Virginia Regional Airport Authority, November 2021; Landrum & Brown, prepared for Central West Virginia Regional Airport Authority, Airfield Master Plan, Final, July 2020; Woods & Poole Economics, Inc., *Complete Economic and Demographic Data Source (CEDDS)*, June 2021; Ricondo & Associates, Inc., May 2022.

EXHIBIT 4 HISTORICAL AND FORECAST ENPLANED PASSENGER COMPARISON – UPDATED FORECAST AND 2017 FORECAST



SOURCES: Central West Virginia Regional Airport Authority, November 2021; Landrum & Brown, prepared for Central West Virginia Regional Airport Authority, Airfield Master Plan, Final, July 2020; Ricondo & Associates, Inc., May 2022.

4.3 PASSENGER AIRLINE OPERATIONS FORECAST

The passenger airline operations forecast was based on the enplaned passenger forecast and estimated load factors and average seats per departure. As mentioned previously, the forecast is informed by the recent changes in fleet mix as airlines have accelerated the retirement of certain aircraft during the pandemic. **Table 6** presents the Updated Forecast for the Airport's passenger airline operations as well as the 2017 Forecast for comparison purposes.

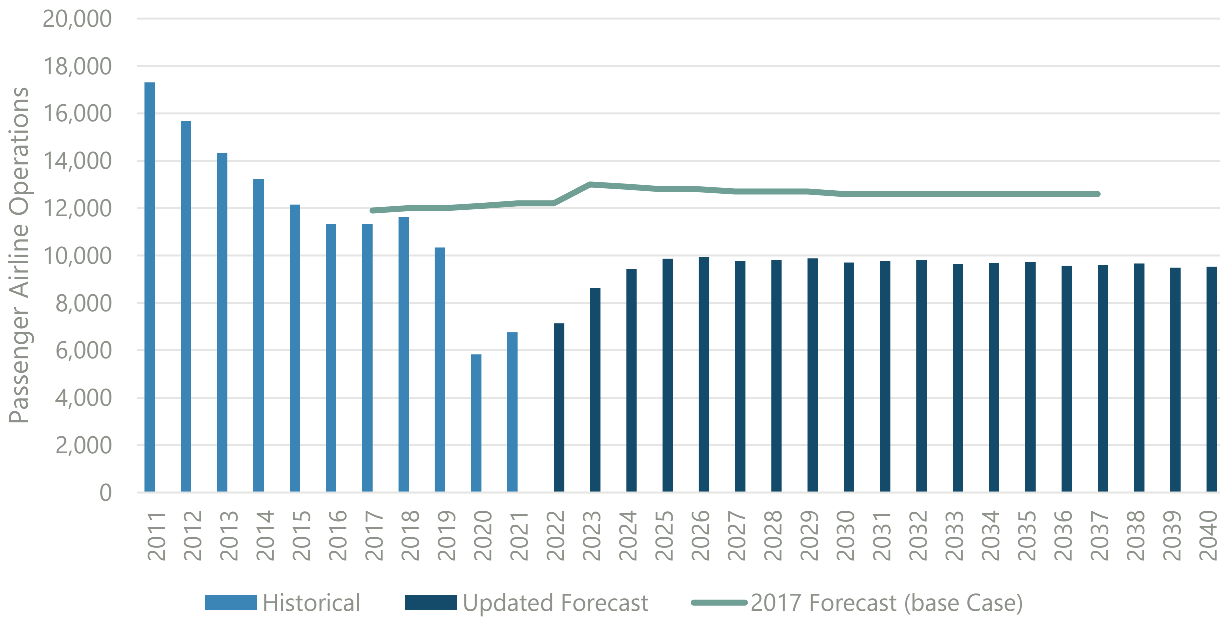
A graphical comparison of passenger airline operations projections from the 2017 Forecast and this Updated Forecast is provided in **Exhibit 5** (passenger airline operations). The Updated Forecast does not project a convergence to the passenger airline operations levels projected in the 2017 Forecast during the Projection Period. As anticipated in the 2017 Forecast, simultaneous increases in load factor and average seats per departure that occurred with the airlines upgauging their fleet resulted in decreased passenger airline operations in 2019, even while the passenger base increased. The passenger operations forecast in this Updated Forecast is also informed by recent changes in fleet mix as airlines have accelerated the retirement of certain lower capacity aircraft during the COVID-19 pandemic that goes beyond that anticipated in the 2017 Forecast.

TABLE 6 PASSENGER AIRLINE OPERATIONS UPDATED FORECAST

YEAR	2017 FORECAST	UPDATED FORECAST
Historical		
2019*	12,000	10,338
2020*	12,100	5,830
2021*	12,200	6,764
Forecast		
2022	12,200	7,147
2023	13,000	8,633
2024	12,900	9,422
2025	12,800	9,872
2026	12,800	9,935
2027	12,700	9,760
2028	12,700	9,820
2029	12,700	9,879
2030	12,600	9,704
2031	12,600	9,759
2032	12,600	9,813
2033	12,600	9,638
2034	12,600	9,689
2035	12,600	9,739
2036	12,600	9,565
2037	12,600	9,612
2038	n/a	9,659
2039	n/a	9,485
2040	n/a	9,529
CAGR		
2019 – 2025	1.1%	-0.8%
2025 – 2040	n/a	-0.2%
2019 – 2040	n/a	-0.4%

NOTE:
CAGR – Compound Annual Growth Rate
* For the years 2019, 2020, and 2021, 2017 Forecast operations represent forecast, not historical data.
n/a – not applicable or not available
SOURCES: Central West Virginia Regional Airport Authority, November 2021; Landrum & Brown, prepared for Central West Virginia Regional Airport Authority, Airfield Master Plan, Final, July 2020; Ricondo & Associates, Inc., May 2022.

EXHIBIT 5 HISTORICAL AND FORECAST PASSENGER AIRLINE OPERATIONS COMPARISON – UPDATED FORECAST AND 2017 FORECAST



SOURCES: Central West Virginia Regional Airport Authority, November 2021; Landrum & Brown, prepared for Central West Virginia Regional Airport Authority, Airfield Master Plan, Final, July 2020; Ricondo & Associates, Inc., May 2022.

4.4 NON-PASSENGER AIRLINES OPERATIONS FORECAST

Non-passenger airline operations forecast were independently developed for each type of operation:

- General Aviation (GA) and other air taxi operations were projected based on the growth rates for GA Total Operations identified in the FAA Aerospace Forecast 2021-2041.
- The forecast of all-cargo operations is based on the Boeing 2020 to 2039 World Air Cargo Forecast which projects North American cargo volumes will increase by a CAGR of 2.6 percent during this period, reflecting the continued rise in e-commerce.[5]
- The military operations forecast was developed in coordination with the Airport Authority and the West Virginia Air National Guard as part of agency coordination.

The Updated Forecast for all (passenger and non-passenger airlines) operations is presented in **Table 7**. Total operations are forecast to increase from 31,712 in 2019 to 40,026 in 2040, which represents a CAGR of 1.1 percent. A graphical comparison of the 2017 Forecast and this Updated Forecast for total operations is presented in **Exhibit 6**. The Updated Forecast does not project a convergence to the total operations levels projected in the 2017 Forecast during the Projection Period. This is due in part to the 2017 Forecast not foreseeing the significant decrease in operations in GA/Air Taxi beginning in 2017 through 2019 and decrease in passenger airline operations in 2019, all pre-COVID-19 pandemic.

[5] The Boeing Company, World Air Cargo Forecast 2020-2039, June 2020.

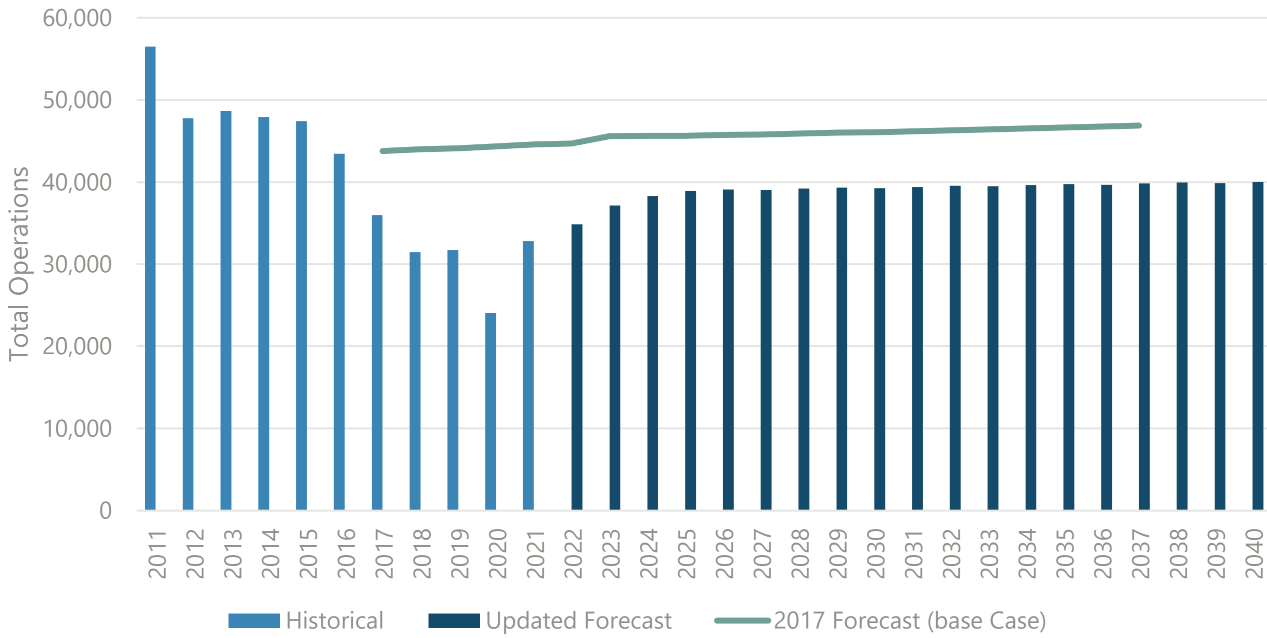
Table 8 presents the historical fleet mix for the Airport for 2020 and 2021, as well as the expected future passenger airlines fleet mix by airline by destination. **Table 9** presents the summary historical and expected future fleet mix for all categories of operations.

TABLE 7 TOTAL OPERATIONS UPDATED FORECAST

YEAR	PASSENGER	CARGO	GA/AIR TAXI	MILITARY	TOTAL
Historical					
2019	10,338	752	16,126	4,496	31,712
2020	5,830	738	13,564	3,934	24,066
2021	6,764	730	21,090	4,224	32,808
Forecast					
2022	7,147	820	22,089	4,800	34,856
2023	8,633	860	22,864	4,800	37,157
2024	9,422	900	23,174	4,800	38,296
2025	9,872	940	23,318	4,800	38,930
2026	9,935	980	23,388	4,800	39,104
2027	9,760	1,020	23,459	4,800	39,039
2028	9,820	1,040	23,530	4,800	39,190
2029	9,879	1,060	23,602	4,800	39,340
2030	9,704	1,080	23,674	4,800	39,257
2031	9,759	1,100	23,746	4,800	39,405
2032	9,813	1,120	23,819	4,800	39,552
2033	9,638	1,140	23,892	4,800	39,470
2034	9,689	1,160	23,966	4,800	39,615
2035	9,739	1,180	24,040	4,800	39,759
2036	9,565	1,200	24,115	4,800	39,679
2037	9,612	1,220	24,190	4,800	39,822
2038	9,659	1,240	24,265	4,800	39,964
2039	9,485	1,260	24,341	4,800	39,886
2040	9,529	1,280	24,418	4,800	40,026
CAGR					
2019 – 2025	-0.8%	3.8%	6.3%	1.1%	3.5%
2025 – 2040	-0.2%	2.1%	0.3%	0.0%	0.2%
2019 – 2040	-0.4%	2.6%	2.0%	0.3%	1.1%

NOTE:
CAGR – Compound Annual Growth Rate
SOURCES: Central West Virginia Regional Airport Authority, November 2021; Ricondo & Associates, Inc., May 2022.

EXHIBIT 6 HISTORICAL AND FORECAST TOTAL OPERATIONS COMPARISON – UPDATED FORECAST AND 2017 FORECAST



SOURCES: Central West Virginia Regional Airport Authority, November 2021; Landrum & Brown, prepared for Central West Virginia Regional Airport Authority, Airfield Master Plan, Final, July 2020; Ricondo & Associates, Inc., May 2022.

TABLE 8 PASSENGER AIRLINES FORECAST FLEET MIX

AIRLINE	DESTINATION	AIRCRAFT	OPERATIONS 2020	2021	2025	2030	2040
American	Charlotte (CLT)	CRJ-200	214	0	0	0	0
		CRJ-700	1,555	2,080	2,140	2,042	1,238
		CRJ-900	368	225	0	0	0
		EMB-175	0	0	715	850	1,350
		A319	0	0	0	0	147
	Washington DC (DCA)	CRJ-200	174	0	0	0	0
		CRJ-700	0	605	429	305	170
		EMB-175	0	0	197	322	442
	Chicago O'Hare (ORD)	CRJ-200	182	0	0	0	0
	Philadelphia (PHL)	CRJ-200	11	0	0	0	0
		CRJ-700	204	231	300	205	145
		CRJ-900	0	0	26	0	0
		EMB-175	0	0	183	307	351
Delta	Atlanta (ATL)	717-200	49	0	0	0	0
		CRJ-200	1,858	713	0	0	0
		CRJ-900	124	1,362	2,398	2,110	1,770
		EMB-175	0	0	821	950	1,102
		A220-300	0	0	0	0	158
Spirit	Orlando (MCO)	A319	58	12	16	0	0
		A320	28	250	206	155	137
		A320neo	0	12	95	140	152
		A321neo	0	0	0	16	15
	Myrtle Beach (MYR)	A319	19	0	4	0	0
		A320	0	71	54	42	35
		A320neo	0	0	14	28	31
		A321neo	0	0	0	0	3
United	Houston (IAH)	CRJ-700	0	0	150	102	50
		EMB-175	0	0	364	384	401
		A319	0	0	0	26	50
	Chicago O'Hare (ORD)	CRJ-200	986	1,203	0	0	0
		CRJ-700	0	0	1,220	1,090	890
		EMB-175	0	0	540	630	803
		A319	0	0	0	0	89
Total Passenger Airlines			**5,830**	**6,764**	**9,872**	**9,704**	**9,529**

NOTE: Aircraft in blue font are those not operating in the market in 2020.
SOURCES: Central West Virginia Regional Airport Authority, November 2021; US Department of Transportation, T-100 Database, November 2021; Ricondo & Associates, Inc. May 2022.

TABLE 9 TOTAL OPERATIONS FORECAST FLEET MIX

Aircraft Category	2020	2021	2025	2030	2040
Passenger Airlines	5,830	6,764	9,872	9,704	9,529
All-Cargo	738	730	940	1,080	1,280
General Aviation/Air Taxi					
Single Engine	2,378	3,697	4,088	4,150	4,281
Multi Engine	959	1,491	1,649	1,674	1,726
Jet	10,227	15,901	17,581	17,850	18,410
General Aviation / Air Taxi Subtotal	13,564	21,090	23,318	23,674	24,418
Military	3,934	4,224	4,800	4,800	4,800
Airport Total	**24,066**	**32,808**	**38,930**	**39,257**	**40,026**

SOURCES: Central West Virginia Regional Airport Authority, November 2021; US Department of Transportation, T-100 Database, November 2021; Federal Aviation Administration, OPSNET, November 2021; Ricondo & Associates, Inc., May 2022.

4.5 COMPARISON TO THE TERMINAL AREA FORECAST

Table 10 compares the Updated Forecast for enplaned passenger and total operations to the TAF for the Airport. For the 2020 to 2040 period, the Updated Forecast for enplaned passengers shows a CAGR of 6.0 percent compared to 4.2 percent for the TAF for the same period. While differences exist between the forecasts in the composition of enplaned passengers (the Updated Forecast includes nonrevenue passengers, while the TAF does not), the Updated Forecast remains within the variance tolerance levels specified by the FAA (within 10 percent over 5 years and within 15 percent over 10 years) from 2022 to 2040. The variance in 2021 may be due in part to the TAF being prepared on a federal fiscal year basis (October through September), while the Updated Forecast is prepared on a calendar year basis, a difference that is particularly relevant in the short term, during recovery from the COVID-19 pandemic.

For the 2020 to 2040 period, the Updated Forecast for total operations shows a CAGR of 2.6 percent compared to 2.2 percent for the TAF for the same period. The Updated Forecast for operations remains within the variance tolerance levels specified by the FAA (within 10 percent over 5 years and within 15 percent over 10 years).

Table 11 summarizes the baseline forecast of aviation activity (Updated Forecast) prepared in support of the CRW Runway 5-23 Project EIS; **Table 12** compares the Updated Forecast to the TAF. Data in Table 11 and Table 12 are presented similarly to the templates provided in the document Forecasting Aviation Activity by the Airport Authority.[6]

[6] GRA, Incorporated, *Forecasting Aviation Activity by Airport*, July 2001.

TABLE 10 COMPARISON TO TERMINAL AREA FORECAST

YEAR	HISTORICAL / FORECAST ENPLANED PASSENGERS	2021 TAF ENPLANED PASSENGERS	VARIANCE OF FORECAST VERSUS 2021 TAF	HISTORICAL / FORECAST TOTAL OPERATIONS	2021 TAF TOTAL OPERATIONS	VARIANCE OF FORECAST VERSUS 2021 TAF
Historical						
2011	284,842	279,085	2.1%	56,491	58,378	-3.2%
2012	270,199	280,716	-3.7%	47,776	48,248	-1.0%
2013	250,350	251,766	-0.6%	48,661	49,389	-1.5%
2014	239,852	241,630	-0.7%	47,920	48,571	-1.3%
2015	225,489	230,171	-2.0%	47,426	46,729	1.5%
2016	213,514	214,578	-0.5%	43,467	44,262	-1.8%
2017	202,581	204,760	-1.1%	35,977	38,806	-7.3%
2018	215,731	211,242	2.1%	31,462	31,117	1.1%
2019	224,929	224,264	0.3%	31,712	32,067	-1.1%
2020	89,244	124,833	-28.5%	24,066	25,101	-4.1%
2021	146,355	129,895	12.7%	32,808	32,172	2.0%
Forecast						
2022	177,854	185,394	-4.1%	34,856	33,333	4.6%
2023	233,668	242,408	-3.6%	37,157	35,797	3.8%
2024	258,516	264,422	-2.2%	38,296	37,932	1.0%
2025	265,334	268,496	-1.2%	38,930	38,162	2.0%
2026	267,036	269,907	-1.1%	39,104	38,255	2.2%
2027	268,710	271,388	-1.0%	39,039	38,317	1.9%
2028	270,354	272,857	-0.9%	39,190	38,357	2.2%
2029	271,972	274,196	-0.8%	39,340	38,392	2.5%
2030	273,563	275,473	-0.7%	39,257	38,423	2.2%
2031	275,134	276,720	-0.6%	39,405	38,454	2.5%
2032	276,655	277,981	-0.5%	39,552	38,485	2.8%
2033	278,155	279,144	-0.4%	39,470	38,513	2.5%
2034	279,627	280,287	-0.2%	39,615	38,537	2.8%
2035	281,064	281,401	-0.1%	39,759	38,557	3.1%
2036	282,503	282,554	0.0%	39,679	38,579	2.9%
2037	283,905	283,531	0.1%	39,822	38,594	3.2%
2038	285,281	284,509	0.3%	39,964	38,609	3.5%
2039	286,625	285,488	0.4%	39,886	38,624	3.3%
2040	287,957	286,527	0.5%	40,026	38,641	3.6%
CAGR						
2011 – 2020	-12.1%	-8.6%		-9.0%	-9.0%	
2020 – 2030	11.9%	8.2%		5.0%	4.3%	
2030 – 2040	0.5%	0.4%		0.2%	0.1%	
2020 – 2040	6.0%	4.2%		2.6%	2.2%	

NOTES:
TAF – Terminal Area Forecast
SOURCES: Central West Virginia Regional Airport Authority, November 2021; Federal Aviation Administration, *2021 Terminal Area Forecast*, March 2022; Ricondo & Associates, Inc., May 2022.

TABLE 11 FAA FORECAST SUMMARY (1 OF 2)

	FORECAST LEVELS AND GROWTH RATES					AVERAGE ANNUAL COMPOUND GROWTH RATES			
BASE YEAR: 2021	BASE YEAR LEVEL	BASE YEAR + 1 YEAR	BASE YEAR + 5 YEARS	BASE YEAR + 10 YEARS	BASE YEAR + 15 YEARS	BASE YEAR TO +1	BASE YEAR TO +5	BASE YEAR TO +10	BASE YEAR TO +15
Passenger Enplanements									
Air Carrier	109,096	131,266	232,321	239,367	245,778	20.3%	16.3%	8.2%	5.6%
Commuter[1]	37,259	46,587	34,715	35,767	36,725	25.0%	-1.4%	-0.4%	-0.1%
Total Enplanements	146,355	177,854	267,036	275,134	282,503	21.5%	12.8%	6.5%	4.5%
Operations									
Itinerant									
Air Carrier (incl. Air Cargo)	4,938	5,577	8,785	8,766	8,713	12.9%	12.2%	5.9%	3.9%
Commuter/Air Taxi	2,556	6,790	6,531	6,493	6,451	165.6%	20.6%	9.8%	6.4%
Total Commercial Operations	7,494	12,367	15,315	15,259	15,165	65.0%	15.4%	7.4%	4.8%
General Aviation	14,450	13,975	15,001	15,283	15,575	-3.3%	0.8%	0.6%	0.5%
Military	3,248	3,648	3,648	3,648	3,648	12.3%	2.3%	1.2%	0.8%
Local									
General Aviation	6,640	3,715	3,988	4,063	4,140	-44.1%	-9.7%	-4.8%	-3.1%
Military	976	1,152	1,152	1,152	1,152	18.0%	3.4%	1.7%	1.1%
Total Operations	32,808	34,856	39,104	39,405	39,679	6.2%	3.6%	1.8%	1.3%
Instrument Operations	26,447	28,098	31,522	31,765	31,986	6.2%	3.6%	1.8%	1.3%
Peak Hour Operations	26	25	23	23	24	-3.8%	-2.4%	-1.2%	-0.5%

TABLE 11 FAA FORECAST SUMMARY (2 OF 2)

	FORECAST LEVELS AND GROWTH RATES					AVERAGE ANNUAL COMPOUND GROWTH RATES			
BASE YEAR: 2021	BASE YEAR LEVEL	BASE YEAR + 1 YEAR	BASE YEAR + 5 YEARS	BASE YEAR + 10 YEARS	BASE YEAR + 15 YEARS	BASE YEAR TO +1	BASE YEAR TO +5	BASE YEAR TO +10	BASE YEAR TO +15
Cargo									
Cargo/mail (tons)[2]	10,690,004	11,331,388	13,655,775	15,689,614	17,142,356	6.0%	5.0%	3.9%	3.2%
Based Aircraft									
Single Engine (Nonjet)	31	31	32	32	32	0.0%	0.6%	0.3%	0.2%
Multi Engine (Nonjet)	10	10	10	10	10	0.0%	0.0%	0.0%	0.0%
Jet Engine	7	7	8	8	8	0.0%	2.7%	1.3%	0.9%
Helicopter	13	13	12	12	12	0.0%	-1.6%	-0.8%	-0.5%
Other	0	0	0	0	0	NA	NA	NA	NA
Total	61	61	62	62	62	0.0%	0.3%	0.2%	0.1%
OPERATIONAL FACTORS									
Average aircraft size (seats)									
Air Carrier	76.8	74.6	73.3	75.5	77.6				
Commuter	52.3	50.0	50.0	51.5	52.9				
Average Enplaning Load Factor									
Air Carrier	63%	74%	81%	82%	84%				
Commuter	66%	78%	67%	69%	70%				
General aviation operations per based aircraft	346	290	306	312	318				

NOTES:
Figures presented in calendar year.
1 Commuter as defined by FAA. Commuter operations include takeoff and landings by aircraft with 60 or fewer seats that transport regional passengers on scheduled commercial flights.
2 Cargo/mail in total U.S. tons (enplaned and deplaned).
SOURCES: Federal Aviation Administration (Template); Central West Virginia Regional Airport Authority, May 2022; Federal Aviation Administration, Air Traffic Activity Data System (ATADS); U.S. Department of Transportation, Form T-100 (Historical), December 2021; Ricondo & Associates, Inc. (Forecast), May 2022.

TABLE 12 FAA TAF COMPARISON

	YEAR	UPDATED FORECAST[1]	FAA TAF[1]	BASELINE VS. FAA TAF (% DIFFERENCE)
Passenger Enplanements				
Base year	2021	146,355	129,895	12.7%
Base year + 5 years	2026	267,036	269,907	-1.1%
Base year + 10 years	2031	275,134	276,720	-0.6%
Base year + 15 years	2036	282,503	282,554	0.0%
Commercial Operations				
Base year	2021	7,494	9,096	-17.6%
Base year + 5 years	2026	15,315	15,255	0.4%
Base year + 10 years	2031	15,259	15,454	-1.3%
Base year + 15 years	2036	15,165	15,579	-2.7%
Total Operations				
Base year	2021	32,808	32,172	2.0%
Base year + 5 years	2026	39,104	38,255	2.2%
Base year + 10 years	2031	39,405	38,454	2.5%
Base year + 15 years	2,036	39,679	38,579	2.9%

NOTE:
1 Updated Forecast presented in calendar year. Federal Aviation Administration TAF presented in federal fiscal year (October–September).
SOURCES: Federal Aviation Administration (Template); Central West Virginia Regional Airport Authority, May 2022; Federal Aviation Administration, Air Traffic Activity Data System (ATADS); U.S. Department of Transportation, Form T-100 (Historical), December 2021; Ricondo & Associates, Inc. (Forecast), May 2022.

APPENDIX C

Project Description Summary

PROJECT DESCRIPTION SUMMARY

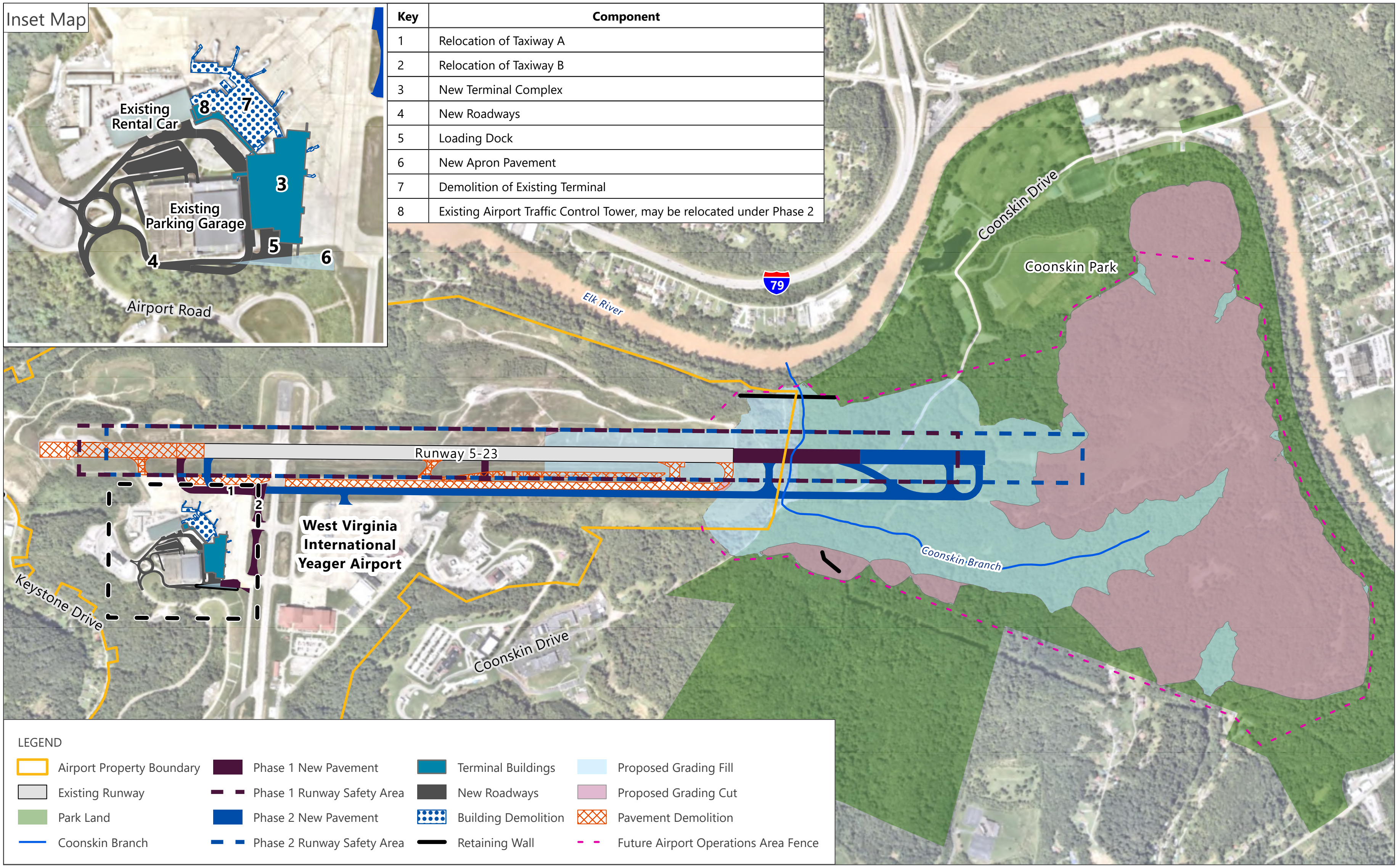
PROJECT COMPONENT	SUBCOMPONENTS	COMPONENT DETAILS
		Phase 1
Runway 5-23 Shift and Extension	Runway 5-23 Pavement	▪ shift to the northeast by 1,125 feet ▪ extend by 285 feet ▪ total runway length of 7,000 feet ▪ total new length of pavement of 1,410 feet maintaining a width of 150 feet for approximately 211,500 square feet of new runway pavement ▪ paved shoulders 25-feet-wide for approximately 350,000 square feet of pavement ▪ new pavement markings for the entire 7,000-foot runway length ▪ runway pavement and lighting components would conform with FAA standards
	Runway Protection	▪ grade and clear surfaces to provide for a standard runway safety area (RSA): 500 feet wide centered on the runway centerline, have 600-foot length prior to the landing threshold, and a length of 1,000 feet beyond the end of the runway ▪ clear all objects not fixed by function and fill below-grade portions at the Runway 23 end to establish a Runway Object Free Area
	Taxiway Improvements	▪ extend Taxiway A by 1,946 feet to the northeast and maintain the existing 75-foot taxiway width at a standard 400-foot separation distance from the Runway 5-23 centerline to the taxiway centerline ▪ three new 90-degree entrance/exit taxiways between Runway 5-23 and Taxiway A that would be 75 feet wide and constructed consistent with FAA standards, for a total of 42,000 square feet of taxiway pavement — one at the Runway 5 end — one at the Runway 23 end — one at the Runway 5-23 center point
	Relocation of Navigational Aids (NAVAIDS)	▪ existing Runway 23 end Approach Lighting System (ALS) to be relocated beyond the new Runway 23 end ▪ existing Runway 23 Visual Approach Slope Indicator (VASI) to be relocated ▪ Runway End Identified Lights (REILs) at the Runway 5 end to be relocated to the new corners of the Runway 5 landing threshold ▪ Precision Approach Path Indicators (PAPIs) would be removed and relocated along the west side of Runway 5-23 in the vicinity of the Taxiway C intersection and at the future Phase 1 Runway 23 end ▪ localizers relocated from the west side of Runway 5-23 to beyond the Runway 5 end and Runway 23 end ▪ two end fire glide slopes would be installed — one approximately 1,300 feet from the new Runway 5 threshold, offset approximately 175 feet from the runway centerline — one located approximately 1,300 feet from the new Runway 23 threshold, offset approximately 175 feet from the runway centerline
	Removal or Marking of Existing Airfield Pavement	▪ removal of existing airfield pavement and base materials—OR—the marking of pavement with chevron pavement markings to mark it as unusable in the vicinity of the runway ▪ pavement to be removed or marked includes: — engineered materials arresting system (EMAS) located at the Runway 5 end;

PROJECT COMPONENT	SUBCOMPONENTS	COMPONENT DETAILS
		— an existing 90-degree entrance/exit taxiway located at the Runway 5 threshold; — Taxiway A2; and — former taxiway pavement that exists parallel and between Runway 5-23 and Taxiway A, extending between Taxiways A2 and A1 ▪ a total of 406,000 square feet of pavement would be removed or marked as unusable
	Relocation of the AOA Fence	▪ approximately 18,800 linear feet of AOA fencing would be installed
	Vehicle Service Roads	▪ vehicle service roads located within the Runway 5-23 RSA would be relocated or realigned to meet RSA grading standards and to ensure that service vehicles operate outside of the RSA ▪ new airfield areas would require service roads to provide access to service and emergency vehicles. Linear footage of vehicle service roads is to be determined.
Terminal Redevelopment	Terminal Facility	▪ footprint of approximately 45,000 square feet and comprise three levels, for a total of approximately 115,000 square feet of floor space ▪ would provide 6 aircraft gates ▪ separate arrivals and departures levels ▪ compliant with the Americans with Disabilities Act (ADA) ▪ loading dock south of and connected to the replacement terminal, consisting of a truck dock and truck staging area and would be approximately 7,200 square feet ▪ demolition of the existing terminal, including the existing aircraft gates[1]
	Pedestrian Connectors	▪ elevated pedestrian connector approximately 350-foot-long and 17-foot-wide, connecting the replacement terminal to the rental car center/garage ▪ approximately 150-foot-long and 15-foot-wide pedestrian bridge to connect the existing parking garage to the replacement terminal
	Apron Pavement	▪ approximately 45,500 square feet of new apron pavement
	Roadway Improvements	▪ roundabout on the airport entrance road to support reoriented entrance and exits from existing parking areas and other roads currently converging at the existing intersection ▪ new roadways in the proximity of the replacement terminal that would split via ramps to provide curbside access to both the Arrivals Level and Gate Level of the replacement terminal ▪ demolition of approximately 104,000 square feet of existing roadway pavement ▪ construction of approximately 139,000 square feet of new pavement
Taxiway Improvements	Taxiway A Relocation	▪ relocation of an approximate 728-foot segment of Taxiway A between the existing end of Runway 5 and Taxiway C ▪ taxiway would be shifted to the east by approximately 108 feet ▪ approximately 5,000 square feet of new taxiway pavement ▪ approximately 2,000 square feet of new taxiway shoulder pavement ▪ demolition of approximately 102,000 square feet of existing pavement
	Taxiway B Relocation	▪ relocation of an approximately 930-foot segment of Taxiway B, extending from Taxiway A to Taxiway Connector B5 ▪ taxiway would be shifted to the north by approximately 99 feet ▪ approximately 81,000 square feet of new taxiway pavement ▪ approximately 14,500 square feet of new taxiway shoulder pavement ▪ new connector taxiway from Taxiway A to the existing military apron between Taxiways D and A2 — approximately 21,000 square feet of new taxiway pavement

PROJECT COMPONENT	SUBCOMPONENTS	COMPONENT DETAILS
		— approximately 16,500 square feet of new taxiway shoulder pavement
Connected Actions and Enabling Projects	Property Acquisition	▪ portions of Coonskin Park would need to be acquired at a to be determined acreage to facilitate construction ▪ identification of replacement properties for Coonskin Park in accordance with Section 6(f) of the Land and Water Conservation Fund Act ▪ Coonskin Park is currently owned by the Kanawha County Parks and Recreation Commission ▪ portions of Coonskin Park would be converted to airfield property ▪ anticipated closure of approximately 8,500 linear feet of roadways within the park ▪ permanent closure of approximately 4,700 linear feet of Coonskin Drive ▪ Coonskin Branch, an approximately 5,600-foot-long creek that flows from within Coonskin Park to the Elk River, would be rerouted to a 2,100-foot-long culvert ▪ displacement of approximately 20 picnic shelters and 10 hiking trails
	Earthwork	▪ up to approximately 25.6 million cubic yards of fill required to support construction ▪ proposed to be taken from borrow areas located in the adjacent Coonskin Park ▪ anticipated limit of disturbance for the cut/fill areas within Coonskin Park is approximately 397 acres ▪ retaining walls to be constructed to support placement of fill — 75-foot-tall by 1,200-foot-long retaining wall on the Runway 23 end, parallel to the Elk River — additional retaining wall may be required on the east side of the runway extension pending additional analysis on the grading and fill requirements — 100-foot-tall by 500-feet-wide retaining wall to support the fill in the terminal area.
		Phase 2
Runway 5-23 Shift and Extension	Runway 5-23 Pavement	▪ shift to the northeast by 290 feet ▪ extend by 1,000 feet ▪ total runway length of 8,000 feet ▪ total new length of pavement of 1,280 feet maintaining a width of 150 feet for approximately 192,000 square feet of new runway pavement ▪ paved shoulders 25-feet-wide for approximately 64,000 square feet of pavement ▪ new pavement markings for the entire 8,000-foot runway length ▪ runway pavement and lighting components would conform with FAA standards
	Runway Protection	▪ additional grading and clearing requirements for the RSA, ROFA, and RPZ
	Taxiway Improvements	▪ extend Taxiway A by 1,280 feet to the northeast and maintain the existing 75-foot taxiway width at a standard 400-foot separation distance from the Runway 5-23 centerline to the taxiway centerline ▪ five new 90-degree entrance/exit taxiways between Runway 5-23 and Taxiway A that would be 75 feet wide and constructed consistent with FAA standards, for a total of 350,000 square feet of taxiway pavement — four would be new 90-degree entrance/exit taxiways, including: one at the Runway 5 end, two at the Runway 23 end, and one connecting to the runway pavement constructed in Phase 1 — one high speed exit taxiway would be constructed near the Runway 23 end

PROJECT COMPONENT	SUBCOMPONENTS	COMPONENT DETAILS
	Relocation of NAVAIDS	▪ relocate the ALS beyond the shifted Runway 23 end ▪ relocate the Runway 5 REILs to the new corners of the Runway 5 landing threshold. ▪ relocate one PAPI to the west of Runway 5 and one PAPI to the west of Runway 23 ▪ relocate localizers beyond the Runway 5 and Runway 23 ends — one capture effect glide slope to be relocated west of Runway 5 — one capture effect glide slope to be relocated west of Runway 23 ▪ construct a new Category 1 ILS on the Runway 5 end
	Removal of Existing Airfield Pavement	▪ removal of two of the 90-degree entrance/exit taxiways located at both the Runway 5 threshold and the Runway 23 threshold ▪ approximately 42,000 square feet of pavement would be demolished and removed or marked with chevron pavement as unusable
Taxiway Improvements	Taxiway A Relocation	▪ relocation of an approximate 4,500-foot segment of Taxiway A between Taxiway C and the Runway 23 end ▪ taxiway would be shifted to the east by approximately 72 feet ▪ approximately 337,500 square feet of new taxiway pavement ▪ approximately 200,000 square feet of new taxiway shoulder pavement ▪ demolition of approximately 337,500 square feet of existing pavement
Terminal Improvements	Terminal Facility	▪ an additional gate (7th gate) to be added to the terminal facility from Phase 1
Connected Actions	Potential Relocation of the Air Traffic Control Tower (ATCT)	▪ relocation of the ATCT may be required to provide room for the addition of a 7th gate to the replacement terminal building ▪ an ATCT relocation study would need to be conducted prior to approval of a new site
	Earthwork	▪ approximately 4 million cubic yards of fill to support the shift of Taxiway A ▪ retaining wall parallel to and east of Taxiway A to support the placement of fill

NOTE:
1 The existing Air Traffic Control Tower (ATCT) is expected to remain as part of Phase 1 of the Proposed Project. However, an analysis of the structural integrity of the facility would be conducted prior to demolition. If necessary, the relocation of the ATCT would occur under Phase 2 of the Proposed Project. An ATCT relocation study would need to be conducted prior to approval of a new site.



Key	Component
1	Relocation of Taxiway A
2	Relocation of Taxiway B
3	New Terminal Complex
4	New Roadways
5	Loading Dock
6	New Apron Pavement
7	Demolition of Existing Terminal
8	Existing Airport Traffic Control Tower, may be relocated under Phase 2

LEGEND

- Airport Property Boundary
- Existing Runway
- Park Land
- Coonskin Branch
- Phase 1 New Pavement
- Phase 1 Runway Safety Area
- Phase 2 New Pavement
- Phase 2 Runway Safety Area
- Terminal Buildings
- New Roadways
- Building Demolition
- Retaining Wall
- Proposed Grading Fill
- Proposed Grading Cut
- Pavement Demolition
- Future Airport Operations Area Fence

SOURCES: Nearmap, February 2022 (aerial photography – for visual reference only, may not be to scale); Central West Virginia Regional Airport Authority, 2022 (existing and proposed project components); West Virginia GIS Technical Center, 2020 (parks).

NORTH

0 1,500 ft

EXHIBIT 1

PROPOSED PROJECT

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