APPENDIX A: GLOSSARY OF TERMS

Introduction

Combining the extremely technical language of airports and aviation with the bureaucratic language of government organizations can create a myriad of unusual words and term. The combination of technical language and "governmentese" often results in many short-hand phrases or acronyms. This appendix presents many of the terms and acronyms used throughout the master plan.

Glossary of Terms

ABOVE GROUND LEVEL (AGL): The elevation of a point or surface above the ground.
ACCELERATE-STOP DISTANCE AVAILABLE (ASDA): See declared distances.
ADVISORY CIRCULAR: Publications issued by the FAA providing recommendations relative to policy, guidance, and information on specific aviation subject. The recommendations in these publications are considered mandatory requirements for airports that have received federal grants.
AIR CARRIER: An operator that: (1) performs at least five round trips per week between two or more points and publishes flight schedules specifying the times, days of the week, and places between which such flights are performed; or (2) transports mail by air under a current contract with the U.S. Postal Service. Certified in accordance with Federal Aviation Regulation (FAR) Parts 121 and 127.
AIRCRAFT OPERATION: The landing, takeoff, or touch-and-go procedure by an aircraft on a runway at an airport.
AIRCRAFT OPERATIONS AREA (AOA): A restricted and secure area on airport property designed to protect all aspects of aircraft operations.
AIRCRAFT OWNERS AND PILOTS ASSOCIATION (AOPA): A private organization serving the interests and needs of general aviation pilots and aircraft owners.
AIRCRAFT APPROACH CATEGORY (AAC): A grouping of aircraft based on 1.3 times their stall speed in landing configuration at their maximum certificated landing weight. The AAC categories are as follows:

- Category A: Speed less than 91 knots.
- Category B: Speed 91 knots or more, but less than 121 knots.
- Category C: Speed 121 knots or more, but less than 141 knots.
- Category D: Speed 141 knots or more, but less than 166 knots.
- Category E: Speed greater than 166 knots.

AIRCRAFT RESCUE AND FIRE FIGHTING (ARFF): An airport service and facility that provides emergency vehicles, extinguishing agents, and personnel responsible for minimizing the impacts of an aircraft accident or incident.
AIRFIELD: The portion of an airport that contains facilities necessary for aircraft operations.
AIRLINE HUB: A category of commercial service airports or group of commercial service airports in a metropolitan or urban area based on the percentage of annual national enplanements at the airport or airports. The categories are large hub, medium hub, small hub, or non-hub. The categories form the basis for the apportionment of entitlement funds.
AIRPLANE CLASSIFICATION NUMBER (ACN): An international method that expresses the effect of an individual aircraft on different pavements with a unique number that varies according aircraft weight and configuration, pavement type, and subgrade strength.
AIRPLANE DESIGN GROUP (ADG): A grouping of aircraft based on wingspan. The groups are:

- Group I: Up to but not including 49 feet.
- Group II: 49 feet up to but not including 79 feet.
- Group III: 79 feet up to but not including 118 feet.
- Group IV: 118 feet up to but not including 171 feet.
- Group V: 171 feet up to but not including 214 feet.
- Group VI: 214 feet or greater.

AIRPORT AUTHORITY: A quasi-governmental organization responsible for setting the policies governing the management and operation of an airport or system of airports under its jurisdiction.
AIRPORT BEACON: A navigational aid located at an airport that displays a rotating light beam to identify the type of airport.
AIRPORT CAPITAL IMPROVEMENT PLAN (ACIP): The Federal Aviation Administration planning program that identifies, prioritizes, and distributes airport development funds required to meet the needs of the National Airspace System as specified by national goals and objectives.
AIRPORT ELEVATION: The highest point on the runway system at an airport expressed in feet above mean sea level (MSL).
AIRPORT IMPROVEMENT PROGRAM (AIP): A program created under the Airport and Airway Improvement Act of 1982 to provide funding for airport planning and development.
AIRPORT LAYOUT PLAN (ALP): The airport drawing showing boundaries and proposed additions to all areas owned or controlled by the sponsor for airport purposes, including the location and nature of existing and proposed airport facilities and structures, and the location on the airport of existing and proposed non-aviation areas and improvements.
AIRPORT MASTER PLAN: A long-range plan for airport development, including descriptions of the data and analyses on which the plan is based.
AIRPOR T OBSTRUCTION CHAR T: A scaled drawing depicting the Federal Aviation Regulation (FAR) Part 77 surfaces, with representation of objects that penetrate these surfaces, runway, taxiway, and ramp areas, navigational aids, buildings, roads, and other airport vicinity details.
AIRPORT REFERENCE CODE (ARC): A coding system used to relate airport design criteria to the operational (Aircraft Approach Category) and physical characteristics (Airplane Design Group) of the most demanding airplanes projected to operate at an airport.
AIRPORT REFERENCE POINT (ARP): The latitude and longitude of the approximate center of the airport.
AIRPORT REFERENCE TEMPERATURE: The mean maximum temperature of the hottest month.
AIRPORT SPONSOR: The entity legally responsible for the management and operation of an airport, including the fulfillment of the requirements of applicable laws and regulations.
AIRPORT SURFACE DETECTION EQUIPMENT (ASDE): A radar system providing air traffic controllers with a visual representation of aircraft and other vehicles ground movements on the airfield.
AIRPORT SURVEILLANCE RADAR (ASR): The primary radar located at an airport or in an air traffic control terminal area that depicts the location of aircraft in the air. The signal only provides the azimuth and range of aircraft from the location of the antenna.
AIRPORT TRAFFIC CONTROL TOWER (ATCT): A central operations facility in the terminal air traffic control system, consisting of a tower, including an associated instrument flight rule (IFR) room if radar equipped, using air to ground communications and/or radar, visual signaling and other methods to provide safe and expeditious movement of terminal air traffic.
AIRPORTS GEOGRAPHIC INFORMATION SYSTEM (AIRPORTS GIS or AGIS): Used by the FAA to collect airport and aeronautical data to support the FAA's next generation (NextGen) aviation system. AGIS

provides standards for surveying and data collection to assist the FAA in the development of instrument approaches and provides the basis for electronic ALPs (eALP).

AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC): A facility established to provide air traffic control service to aircraft operating on an IFR flight plan within controlled airspace and principally during the enroute phase of flight.

AIRSIDE: The portion of an airport containing the facilities necessary for the operation of aircraft. This normally includes, runways, taxiways, aprons, and hangar areas.

AIRSPACE: The volume of space above the surface of the ground provided for the safe operation of aircraft.

AIR TAXI: An air carrier certificated in accordance with FAR Part 121 and FAR Part 135 and authorized to provide on demand, public transportation of persons and property by aircraft. Generally operates small aircraft "for hire" for specific trips.

AIR TRAFFIC CONTROL (ATC): A service operated by an appropriate FAA designated organization for the purpose of providing for the safe, orderly, and expeditious flow of air traffic.

AIR TRANSPORT ASSOCIATION OF AMERICA (ATA): An organization that represents the interests of the airline industry on major aviation issues before federal, state, and local government bodies. The ATA promotes air transportation safety by coordinating industry and governmental safety programs and serves as a focal point for industry efforts to standardize practices and enhance the efficiency of the air transportation system.

ALERT AREA: See "special-use airspace."

ALTITUDE: The vertical distance measured in feet above mean sea level or above ground level.

APPROACH LIGHTING SYSTEM (ALS): An airport lighting facility that provides visual guidance to landing aircraft by radiating light beams by which the pilot aligns the aircraft with the extended centerline of the runway on his final approach and landing.

APPROACH MINIMUMS: The altitude below which an aircraft may not descend while on an IFR approach unless the pilot has the runway in sight.

APPROACH SURFACE: See "Part 77."

APRON: A specified portion of the airfield used for passenger, cargo, or freight loading and unloading, aircraft parking, and the refueling, maintenance, and servicing of aircraft.

AREA NAVIGATION (RNAV): The air navigation procedure that provides the capability to establish and maintain a flight path on an arbitrary course.

AUTOMATED TERMINAL INFORMATION SERVICE (ATIS): The continuous broadcast of recorded non-control information at towered airports. Information typically includes wind speed, direction, and runway in use.

AUTOMATED SURFACE OBSERVATION SYSTEM (ASOS): A reporting system that provides frequent airport ground surface weather observation data through digitized voice broadcasts and printed reports.

AUTOMATED WEATHER OBSERVATION STATION (AWOS): Equipment used to automatically record and relay weather conditions (i.e. cloud height, visibility, wind speed and direction, temperature, dew point, etc.)

AUTOMATIC DEPENDENT SURVEILLANCE – BROADCAST (ADS-B): A major component of the FAA's NextGen system, where aircraft equipped with GPS receivers can transmit their location and altitude to other nearby aircraft and to air traffic control.

AUTOMATIC DIRECTION FINDER (ADF): An aircraft radio navigation system that senses and indicates the direction to a non-directional radio beacon (NDB) ground transmitter.

AVIGATION EASEMENT: A contractual right or property interest in land over which the unobstructed right of flight in the airspace is established.
AZIMUTH: Horizontal direction expressed as the angular distance between true north and the direction of a fixed point (as the observer's heading).
BASE LEG: See "traffic pattern."
BASED AIRCRAFT: The total number of active general aviation aircraft that use or may be expected to use a specific airport as a home base.
BEARING: The horizontal direction to or from any point, usually measured clockwise from true north or magnetic north.
BLAST FENCE: A barrier used to divert or dissipate jet blast or propeller wash.
BLAST PAD: A prepared surface beyond the end of a runway for the purpose of eliminating ground surface erosion caused by the wind generated by aircraft engines at the initiation of a takeoff.
BUILDING RESTRICTION LINE (BRL): A theoretical line on an airport layout plan beyond which airport buildings must not be located in order to maintain safe aircraft operations.
CAPITAL IMPROVEMENT PLAN (CIP): A program for the design and construction of airport improvements needed to accommodate the operational and passenger activity at an airport.
CEILING: The cloud height above the ground surface, which is reported as either broken or overcast.
CIRCLING APPROACH: A pilot maneuver to align the aircraft with the runway for landing when flying a predetermined circling instrument approach procedure under IFR.
CLASS A, B, C, D, E, G AIRSPACE: See "Controlled Airspace."
CLEAR ZONE: See "Runway Protection Zone."
COMMERCIAL SERVICE AIRPORT: A public airport providing scheduled passenger service that enplanes at least 2,500 annual passengers.
COMMON TRAFFIC ADVISORY FREQUENCY (CTAF): A radio frequency designated for the purpose of transmitting airport advisory information and procedures while operating to or from an uncontrolled airport.
COMPASS LOCATOR (LOM): A low power, low/medium frequency radio-beacon installed in conjunction with the instrument landing system at the inner, middle, or outer marker sites.
CONICAL SURFACE: See "Part 77."
CONTROLLED AIRPORT: An airport that has an operating airport traffic control tower.
CONTROLLED AIRSPACE: Airspace of defined dimensions within which air traffic control services are provided to instrument flight rules (IFR) and visual flight rules (VFR) flights. Controlled airspace in the United States is designated as follows:

- **CLASS A**: Generally, the airspace from 18,000 feet mean sea level (MSL) up to but not including flight level FL600 (60,000 feet). All pilots must operate their aircraft under IFR.
- **CLASS B**: Generally, the airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The configuration of Class B airspace is unique to each airport, but typically consists of two or more layers of airspace and is designed to contain all published instrument approach procedures to the airport. An air traffic control clearance is required for all aircraft operating in the area.
- **CLASS C**: Generally, the airspace from the surface to 4,000 feet above the airport elevation (reported as MSL) surrounding those airports that have an operational control tower and radar approach control and are served by a qualifying number of IFR operations or passenger enplanements. Although individually tailored for each airport, Class C airspace typically consists

of a surface area with a five nautical mile (nm) radius and an outer area with a 10 nautical mile radius that extends from 1,200 feet to 4,000 feet above the airport elevation. Two-way radio communication is required for all aircraft.

- **CLASS D**: Generally, that airspace from the surface to 2,500 feet above the airport elevation (reported as MSL) surrounding airports that have an operational control tower. Class D airspace is individually tailored and configured to encompass published instrument approach procedures. Unless otherwise authorized, all pilots must establish two-way radio communication.
- **CLASS E**: Generally, controlled airspace that is not classified as Class A, B, C, or D. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. When designated as a surface area, the airspace will be configured to contain all instrument procedures. Class E airspace encompasses all Victor Airways. Only aircraft following instrument flight rules are required to establish two-way radio communication with air traffic control.
- **CLASS G**: Generally, that airspace not classified as Class A, B, C, D, or E. Class G airspace is uncontrolled for all aircraft. Class G airspace extends from the surface to the overlying Class E airspace.

CONTROLLED FIRING AREA: See "special-use airspace."
CROSSWIND: A wind that is not parallel to a runway centerline or to the intended flight path of an aircraft.
CROSSWIND COMPONENT: The component of wind that is at a right angle to the runway centerline or the intended flight path of an aircraft.
CROSSWIND LEG: See "traffic pattern."
DECIBEL: A unit of noise representing a level relative to a reference of a sound pressure of 20 micronewtons per square meter.
DECISION HEIGHT: The height above the runway surface at which a decision must be made to either continue the approach or execute a missed approach.
DECLARED DISTANCES: The distances declared available for an airplane's: takeoff runway; takeoff distance; accelerate-stop distance; and landing distance requirements as defined below:

- **TAKEOFF RUNWAY AVAILABLE (TORA)**: The runway length declared available and suitable for the ground run of an airplane taking off;
- **TAKEOFF DISTANCE AVAILABLE (TODA)**: The TORA plus the length of any remaining runway and/or clearway beyond the far end of the TORA;
- **ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)**: The runway plus stopway length declared available for the deceleration of an aircraft aborting a takeoff; and
- **LANDING DISTANCE AVAILABLE (LDA)**: The runway length declared available and suitable for landing.

DEPARTMENT OF TRANSPORTATION (DOT): The federal government organization including the Federal Aviation Administration, which was established to promote the coordination of federal transportation programs and to act as a focal point for research and development efforts in transportation.
DISCRETIONARY FUNDS: Federal grant funds that may be appropriated to an airport as designation by the Secretary of Transportation or Congress to meet a specified national priority such as enhancing capacity, safety, and security, or mitigating noise.

DISPLACED THRESHOLD: A threshold that is located at a point on the runway other than the physical beginning of the runway.
DISTANCE MEASURING EQUIPMENT (DME): Equipment (airborne and ground-based) used to measure in nautical miles, the slant range distance of an aircraft from the DME navigational aid.
DNL: (Day/Night Level) The 24-hour A-weighted average aircraft sound level between 10 PM and 7 AM as averaged over a span of one year. It is the FAA standard metric for deter mining the cumulative exposure of individuals to noise.
DOWNWIND LEG: see "traffic pattern."
EASEMENT: The agreed upon legal right of one party to use a portion of the real estate rights of another party as specified in the easement document.
ELEVATION: The vertical distance measured in feet above mean sea level.
ENROUTE: The portion of a flight between departure and arrival terminal areas.
ENPLANED PASSENGERS: The total number of revenue passengers boarding air craft, including originating, stop-over, and transfer passengers, in scheduled and non-scheduled services.
ENPLANEMENT: The loading of passengers, cargo, freight, or mail on an aircraft.
ENTITLEMENT: Federal funds for which a commercial service airport may be eligible based on its annual passenger enplanements.
ENVIRONMENTAL ASSESSMENT (EA): An environmental analysis performed in accordance with the National Environmental Policy Act (NEPA) to determine whether an action would significantly affect the environment and thus require a more detailed environmental impact statement.
ENVIRONMENTAL AUDIT: An assessment of a party's compliance with the applicable environmental requirements of an authority's environmental compliance policies, practices, and controls.
ENVIRONMENTAL IMPACT STATEMENT (EIS): A NEPA document required of federal agencies for major projects or legislative proposals affecting the environment. The EIS is a decision-making tool describing the positive and negative effects of a proposed action.
ESSENTIAL AIR SERVICE (EAS): A federal program that guarantees air carrier service to selected small communities by providing subsidies as needed to prevent these cities from losing such service.
FEDERAL AVIATION REGULATIONS (FAR): The rules established by the executive departments and agencies of the Federal Government for aviation. FAR's are the aviation subset of the Code of Federal Regulations.
FINAL APPROACH: See "traffic pattern."
FINDING OF NO SIGNIFICANT IMPACT (FONSI): A public document prepared by a Federal agency that presents the rationale why a proposed action will not have a significant effect on the environment and for which an environmental impact statement will not be prepared.
FIXED BASE OPERATOR (FBO): A provider of services to airport users. Such services include, but are not limited to: aircraft storage; fueling; flight training; repair; and maintenance.
FLIGHT LEVEL: An altitude designation within controlled airspace.
FLIGHT SERVICE STATION (FSS): An operations facility in the national flight advisory system that uses data interchange facilities for the collection and dissemination of Notices to Airmen, weather, and administrative data. An FSS provides pre-flight and in-flight advisory services to pilots through air and ground based communication facilities.
FRANGIBLE NAVAID: A navigational aid that retains its structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft.

GENERAL AVIATION: That portion of civil aviation that encompasses all facets of aviation except commercial or military aircraft.
GLIDESLOPE (GS): The electronic component of an ILS system that emits signals providing vertical guidance using airborne instruments during instrument approaches during approach and landing.
GLOBAL POSITIONING SYSTEM (GPS): A system of satellites that enables navigators equipped with GPS receivers to determine their latitude, longitude, and altitude.
GROUND ACCESS: The transportation system on and around the airport that provides access to and from the airport by ground transportation vehicles for passengers, employees, cargo freight, and airport services.
HELIPAD: A designated area for the takeoff, landing, and parking of helicopters.
HIGH INTENSITY RUNWAY LIGHTS (HIRL): The highest intensity or brightness of lights that delineate the lateral boundaries of a runway.
HIGH-SPEED EXIT TAXIWAY: A long radius taxiway designed to expedite aircraft movement off runways after landing (at speeds up to 60 knots), thus reducing runway occupancy time.
HORIZONTAL SURFACE: see "Part 77."
INSTRUMENT APPROACH: An approach to an airport with the intent to land by an aircraft in accordance with an IFR flight plan when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude.
INSTRUMENT APPROACH PROCEDURE (IAP): A series of predetermined maneuvers under instrument flight conditions for a landing, or to a point from which a landing may be made visually.
INSTRUMENT FLIGHT RULES (IFR): Procedures for the conduct of flight in weather conditions below Visual Flight Rules weather minimums. The term IFR is often also used to define weather conditions and the type of flight plan under which an air craft operates.
INSTRUMENT LANDING SYSTEM (ILS): A precision instrument approach system that provides horizontal and vertical guidance to a certain decision height (DH) above runway elevation and runway visual range (RVR). The ILS normally consists of the following electronic components and visual aids:

1. Localizer Antenna;
2. Glide Slope Antenna;
3. Markers at Inner, Middle, and/or Outer points;

4. Approach lights.

- **CATEGORY I ILS**: An ILS that provides guidance to 200 feet DH and 2400 feet RVR.
- **CATEGORY II ILS**: An ILS that provides guidance to 100 feet DH and 1200 feet RVR.
- **CATEGORY IIIA ILS**: An ILS that provides guidance to less than 100 foot DH and 700 feet RVR.
- **CATEGORY IIIB ILS**: An ILS that provides guidance to less than 50 feet DH and 150 feet RVR.
- **CATEGORY IIIC ILS**: An ILS that provides guidance to 0 feet DH and 0 feet RVR.

INSTRUMENT METEOROLOGICAL CONDITIONS (IMC): Specific visibility and ceiling conditions that are less than the minimums specified for visual meteorological conditions.
ITINERANT OPERATIONS: Arrivals and departures by aircraft to or from a location greater than 20 miles from the airport.
KNOTS: A unit of speed used in navigation that is equivalent to the number of nautical miles traveled in one hour.

LAND AND HOLD SHORT OPERATIONS (LAHSO): An air traffic control procedure intended to increase airport capacity without compromising safety that allows pilots to land and hold short of an intersecting runway, an intersecting taxiway, or some other designated point on a runway.
LANDSIDE: The portion of an airport that provides the facilities necessary for the processing of passengers, cargo, freight, and ground transportation vehicles.
LANDING DISTANCE AVAILABLE (LDA): See declared distances.
LARGE AIRPLANE: An airplane that has a maximum certified takeoff weight in excess of 12,500 pounds.
LOCAL AREA AUGMENTATION SYSTEM (LAAS): A differential GPS system that provides localized measurement correction signals to the basic GPS signals to improve navigational accuracy, integrity, continuity, and availability.
LOCAL OPERATIONS: Aircraft operations performed by aircraft based at the airport and operating in the local traffic pattern or within sight of the airport, including aircraft known to be departing for or arriving from flights in local practice areas within a prescribed distance from the airport, or that execute simulated instrument approaches at the airport.
LOCAL TRAFFIC: Aircraft operating in the traffic pattern or within sight of the tower, or aircraft known to be departing or arriving from the local practice areas, or aircraft executing practice instrument approach procedures. Typically, this includes touch-and-go training operations.
LOCALIZER (LOC): The component of an ILS that provides course guidance to the runway.
LOCALIZER TYPE DIRECTIONAL AID (LDA): A facility of comparable utility and accuracy to a localizer, but not part of a complete ILS and not aligned with the runway.
LOCALIZER PERFORMANCE WITH VERTICAL GUIDANCE (LPV): A Global Positioning System (GPS) runway instrument approach procedure providing horizontal and vertical guidance. Accuracy levels are 16 meters horizontally and 20 meters vertically.
LOW INTENSITY RUNWAY LIGHTS (LIRL): The lowest intensity or brightness of lights designated for use in delineating the sides of a runway.
MEDIUM INTENSITY RUNWAY LIGHTS MIRL: The middle intensity or brightness of lights designated for use in delineating the sides of a runway.
MILITARY OPERATIONS AREA (MOA): See special-use airspace.
MILITARY TRAINING ROUTE: An air route depicted on aeronautical charts for the conduct of military flight training at speeds above 250 knots.
MISSED APPROACH COURSE (MAC): The flight route to be followed if, after an instrument approach, a landing is not completed. Missed approaches normally occur:
1. When an aircraft has descended to the decision height but has not established visual confirmation of the runway; or
2. When directed by air traffic control to pull up or to go around.
MOVEMENT AREA: The runways, taxiways, and other areas of an airport used for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At airports with an airport traffic control tower, air traffic control clearance is required for entry onto the movement area.
NATIONAL AIRSPACE SYSTEM (NAS): The network of air traffic control facilities, air traffic control areas, and navigational facilities through the U.S.
NATIONAL PLAN OF INTEGRATED AIRPORT SYSTEMS (NPIAS): The national airport system plan developed by the Secretary of Transportation on a biannual basis for the development of public use airports to meet national air transportation needs.

NATIONAL TRANSPORTATION SAFETY BOARD (NTSB): A federal government organization established to investigate and determine the probable cause of transportation accidents, to recommend equipment and procedures to enhance transportation safety, and to review on appeal the suspension or revocation of any certificates or licenses issued by the Secretary of Transportation.
NAUTICAL MILE: A unit of distance used in navigation that is equivalent to the distance spanned by one minute of arc in latitude, that is, 1,852 meters or 6,076 feet. It is equal to approximately 1.15 statute mile.
NAVIGATIONAL AID (NAVAID): A term used to describe lights, signs, and associated supporting electronic equipment (e.g., PAPI, VASI, ILS, etc.) to aid in aircraft navigation.
NEXT GENERATION AIR TRANSPORTATION SYSTEM (NextGen): An umbrella term for the FAA's ongoing upgrade to the National Airspace System from a ground-based system of air traffic control to a satellite-based system of air traffic management.
NOISE CONTOUR: A continuous line on a map of the airport vicinity connecting all points of the same noise exposure level.
NON-DIRECTIONAL BEACON (NDB): A radio beacon transmitting electronic signals in a 360 degree pattern. Pilot of an aircraft equipped with direction finding equipment can determine their bearing to/from the radio beacon and home on, or track to, the station. When the radio beacon is installed in conjunction with the ILS marker, it is normally called a Compass Locator.
NON-PRECISION APPROACH PROCEDURE: A standard instrument approach procedure using horizontal but no vertical course guidance, such as VOR, TACAN, NDB, or LOC.
NOTICE TO AIRMEN (NOTAM): A time sensitive notice to pilots containing information concerning the establishment, condition, or change in any component of or hazard in the National Airspace System that is considered essential to flight operations personnel.
OBJECT FREE AREA (OFA): An area on the ground free of objects, except those required for air navigation or aircraft ground maneuvering purposes, centered on a runway, taxiway, or taxilane to enhance the safety of aircraft operations.
OBSTACLE FREE ZONE (OFZ): The airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that provides clearance for aircraft landing or taking off from the runway, and for missed approaches. The OFZ is required to be kept clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function.
OPERATION: A take-off or a landing.
OUTER MARKER (OM): An ILS navigation facility located four to seven miles from the runway threshold on the extended centerline, indicating the pilot is passing over the facility and can begin final approach.
PART 77: A federal regulation under Title 14 of the Code of Federal Regulations which identifies standards for the Safe, Efficient Use and Preservation of the Navigable Airspace. The regulation provides different imaginary airspace surfaces are defined for the purpose of identifying an obstruction to air navigation:

- **PRIMARY SURFACE:** An imaginary surface defined in FAR Part 77 that is specified as a rectangular surface longitudinally centered about a runway. The specific dimensions of this surface are a function of the type of approaches existing or planned for the runway.
- **APPROACH SURFACE:** An imaginary surface defined in FAR Part 77 that is longitudinally centered on an extended runway centerline and extends outward and upward from the primary surface at each runway end at a designated slope and distance based on the type of available or planned approach by aircraft to a runway.

- **TRANSITIONAL SURFACE:** An imaginary surface extending outward and upward at right angles to the runway centerline and the runway centerline extended at a slope of 7 to 1 from the sides of the primary surface and from the sides of the approach surfaces.
- **HORIZONTAL SURFACE:** An imaginary airspace surface with the horizontal plane 150 feet above the established airport elevation, the perimeter of which is constructed by swinging arcs from the center of each end of the primary surface of each runway of each airport and connecting the adjacent arcs by lines tangent to those arcs.
- **CONICAL SURFACE:** An imaginary surface defined in FAR Part 77 that extends from the edge of the horizontal surface outward and upward at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

PAVEMENT CONDITION INDEX (PCI): A numerical index between 0 and 100 which is used to indicate the general condition of a pavement. Surveying processes and calculation methods are standardized for airport pavements.

PAVEMENT CLASSIFICATION NUMBER (PCN): An international method of expressing the load-carrying capacity of a pavement as a single unique number, without specifying a particular aircraft or detailed information about the pavement structure.

PILOT CONTROLLED LIGHTING: Airport runway lighting systems controlled by pilots activating their microphone on a specified radio frequency.

PRECISION APPROACH: A standard instrument approach procedure that provides runway alignment and descent (glide slope) information. See "Instrument Landing System" for categories.

PRECISION APPROACH PATH INDICATOR (PAPI): A lighting system providing visual approach slope guidance to aircraft during a landing approach. It is similar to a VASI but provides a sharper transition between the colored indicator lights.

PRECISION APPROACH RADAR (PAR): A radar facility in the terminal air traffic control system used to detect and display with a high degree of accuracy the direction, range, and elevation of an aircraft on the final approach to a runway.

PRECISION OBJECT FREE AREA (POFA): An area centered on the extended runway centerline, beginning at the runway threshold and extending beyond the runway threshold that is 200 feet long by 800 feet wide. The POFA is a clearing standard that requires the POFA to be kept clear of above ground objects protruding above the runway safety area edge elevation (except for frangible N AVAIDS). The POFA applies to all new authorized instrument approach procedures with less than 3/4 mile visibility.

PRIMARY AIRPORT: A commercial service airport that enplanes at least 10,000 annual passengers.

PRIMARY SURFACE: See "Part 77."

PROHIBITED AREA: See special-use airspace.

PVC: Poor visibility and ceiling. Used in determining Annual Service Volume. PVC conditions exist when the cloud ceiling is less than 500 feet and visibility is less than one mile.

RADIAL: A radio signal generated by a Very High Frequency Omni-directional Range (VOR) station that is defined as an azimuth from the station.

REGRESSION ANALYSIS: A statistical technique used to identify and quantify the relationships between forecast factors.

REMOTE COMMUNICATIONS OUTLET (RCO): An unstaffed transmitter receiver/facility remotely controlled by air traffic personnel. RCOs serve flight service stations (FSSs)and are established to provide ground-to-ground communications between air traffic control specialists and pilots at satellite airports

for delivering enroute clearances, issuing departure authorizations, and acknowledging instrument flight rules cancellations or departure/landing times.

REMOTE TRANSMITTER/RECEIVER (RTR): See remote communications outlet. RTRs serve ATCTs.

RELIEVER AIRPORT: An airport serving general aviation aircraft that might otherwise use a congested air-carrier airport.

REQUIRED NAVIGATION PERFORMANCE (RNP): A type of performance-based navigation that enables aircraft with required on-board navigation performance monitoring and alerting equipment to fly a specific path between defined points, fundamentally similar to RNAV.

RESTRICTED AREA: See special-use airspace.

RNAV: Area navigation: airborne equipment that permits flights over determined tracks within prescribed accuracy tolerances without the need to over-fly ground-based navigation facilities. Used enroute and for approaches to an airport.

RUNWAY: A defined rectangular area on an airport prepared for aircraft landing and takeoff. Runways are normally numbered in relation to their magnetic direction, rounded off to the nearest 10 degrees. For example, a runway with a magnetic heading of 180 degrees would be designated Runway 18. The heading on the opposite end of the runway is 180 degrees from that runway end. For example, the opposite runway heading for Runway 18 would be Runway 36 (magnetic heading of 360 degrees). Aircraft can takeoff or land from either end of a runway, depending on wind direction.

RUNWAY ALIGNMENT INDICATOR LIGHT (RAIL): A series of high intensity, sequentially flashing lights installed on the extended runway centerline, usually in conjunction with an approach lighting system.

RUNWAY END IDENTIFIER LIGHTS (REIL): Two synchronized flashing lights, one on each side of the runway threshold, that provide rapid and positive identification of the approach end of a particular runway.

RUNWAY GRADIENT: The average slope, measured in percent, between the two ends of a runway.

RUNWAY PROTECTION ZONE (RPZ): An area off the runway end to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape with dimensions determined by the aircraft approach speed and runway approach type and minima.

RUNWAY SAFETY AREA (RSA): A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

RUNWAY VISIBILITY ZONE (RVZ): A specified area on the airport to be kept clear of permanent objects that provides an unobstructed line-of-site from any point five feet above the runway centerline to any point five feet above an intersecting runway centerline within the specified area.

RUNWAY VISUAL RANGE (RVR): An electronically-derived value in feet, representing the horizontal distance a pilot can see down the runway.

SPECIALIZED AVIATION SERVICE OPERATOR (SASO): Sometime known as single-service providers or special FBOs, a SASO is a commercial service provider on an airport typically providing a single specialized aeronautical service that does not meet the minimum standards of a full service fixed based operator (FBO).

SCOPE: The document that identifies and defines the tasks, emphasis, and level of effort associated with a project or study.

SEGMENTED CIRCLE: Visual indicators designed to provide traffic patter n Information at airports without operating control towers.

SHOULDER: An area adjacent to the edge of paved runways, taxiways, or aprons providing a transition between the pavement and the adjacent surface that supports aircraft running off the pavement; provides enhanced drainage; and blast protection.
SLANT-RANGE DISTANCE: The straight line distance between an aircraft and a point on the ground.
SMALL AIRPLANE: An airplane that has a maximum certified takeoff weight of up to 12,500 pounds.
SPECIAL-USE AIRSPACE: Airspace of defined dimensions identified by a surface area where activities must be confined because of their nature and/or where limitations may be imposed on aircraft operations that are not a part of those activities. Special-use airspace classifications include:

- **ALERT AREA**: Airspace that may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft.
- **CONTROLLED FIRING AREA**: Airspace where activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons or property on the ground.
- **MILITARY OPERATIONS AREA (MOA)**: Designated airspace with defined vertical and lateral dimensions established outside Class A airspace to separate/segregate certain military activities from instrument flight rule (IFR) traffic and to identify for visual flight rule (VFR) traffic where these activities are conducted.
- **PROHIBITED AREA**: Designated airspace within which aircraft flight is prohibited.
- **RESTRICTED AREA**: Airspace designated under Federal Aviation Regulation (FAR) 73, where the flight of aircraft, while not wholly prohibited, is subject to restrictions. Most restricted areas are designated joint use. When not in use by the using agency, IFR/VFR operations can be authorized by the controlling air traffic control facility.
- **WARNING AREA**: Airspace that may contain hazards to nonparticipating aircraft.

STANDARD INSTRUMENT DEPARTURE (SID): A preplanned IFR departure routing, preprinted for pilot use in graphic and textual form.
STANDARD TERMINAL ARRIVAL (STAR): A pre-planned IFR arrival routing, preprinted for pilot use in graphic and textual or textual form only.
STOP-AND-GO: Procedures wherein an aircraft will land, make a complete stop on the runway, and then takeoff. A stop-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.
STOPWAY: An area beyond the end of a takeoff runway designed to support aircraft during an aborted takeoff without causing structural damage to the aircraft. It is not to be used for takeoff, landing, or taxiing of aircraft.
STRAIGHT-IN LANDING/APPROACH: A landing aligned within 30 degrees of the final approach course following completion of an instrument approach.
TACTICAL AIR NAVIGATION (TACAN): An ultra-high frequency electronic air navigation aid providing suitably equipped aircraft with a continuous indication of bearing and distance to the TACAN station.
TAKEOFF RUNWAY AVAILABLE (TORA): See "declared distances."
TAKEOFF DISTANCE AVAILABLE (TODA): See "declared distances."
TAXILANE: The portion of the aircraft parking area used for access between taxiways and aircraft parking positions.
TAXIWAY: A defined path established for the taxiing of aircraft from one part of an airport to another.

TAXIWAY SAFETY AREA (TSA): A defined surface on each side of the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.
TERMINAL INSTRUMENT PROCEDURES: Published flight procedures for conducting instrument approaches to runways under instrument meteorological conditions
TERMINAL RADAR APPROACH CONTROL (TRACON): An element of the air traffic control system responsible for monitoring the enroute and terminal segment of air traffic in the airspace surrounding airports with moderate to high levels of air traffic.
TETRAHEDRON: A device used as a landing direction indicator. The small end of the tetrahedron points in the direction of landing.
THRESHOLD: The beginning of that portion of the runway available for landing. In some instances the landing threshold may be displaced.
TOUCH-AND-GO: An operation by an aircraft that lands and departs on a runway without stopping or exiting the runway. A touch-and-go is recorded as two operations: one operation for the landing and one operation for the takeoff.
TOUCHDOWN: The point at which a landing aircraft makes contact with the runway surface.
TOUCHDOWN ZONE (TDZ): The first 3,000 feet of the runway beginning at the threshold.
TOUCHDOWN ZONE ELEVATION (TDZE): The highest elevation in the touchdown zone.
TOUCHDOWN ZONE (TDZ) LIGHTING: Two rows of transverse light bars located symmetrically about the runway centerline normally at 100-foot intervals. The basic system extends 3,000 feet along the runway.
TRAFFIC PATTERN: The traffic flow prescribed for aircraft landing at or taking off from an airport. The components of a typical traffic pattern are the upwind leg, crosswind leg, downwind leg, base leg, and final approach, described as follows:

- **UPWIND LEG**: A flight path parallel to the landing runway in the direction of landing.
- **CROSSWIND LEG**: A flight path at right angles to the landing runway off its upwind end.
- **DOWNWIND LEG**: A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg.
- **BASE LEG**: The flight path at right angles to the landing runway off its approach end. The base leg normally extends from the down-wind leg to the intersection of the extended runway centerline.
- **FINAL APPROACH**: A flight path in the direction of landing along the extended runway centerline. The final approach normally extends from the base leg to the runway.

UNCONTROLLED AIRPORT: An airport without an airport traffic control tower where Visual Flight Rules traffic is performed.
UNCONTROLLED AIRSPACE: Airspace within which aircraft are not subject to air traffic control.
UNIVERSAL COMMUNICATION (UNICOM): A non-government airport communications facility that may provide airport information. Locations and frequencies of UNICOM's are shown on aeronautical charts and publications.
UPWIND LEG: See "traffic pattern."
VECTOR: A heading issued to an aircraft to provide radar navigational guidance.
VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE STATION (VOR): A ground-based electronic navigation aid transmitting very high frequency radio signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the national airspace system. The VOR periodically identifies itself by Morse Code and may have an additional voice identification feature.

VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE STATION/ TACTICAL AIR NAVIGATION (VORTAC): A navigation aid providing co-located VOR azimuth, TACAN azimuth, and TACAN distance-measuring equipment (DME).

VICTOR AIRWAY: A control area or portion thereof established in the form of a corridor, whose centerline is defined by radio navigation aids.

VISUAL APPROACH: An aircraft approach conducted in VFR conditions.

VISUAL APPROACH SLOPE INDICATOR (VASI): An airport approach aid providing visual approach slope guidance to aircraft during a landing approach. The VASI emits a directional pattern of high intensity red and white focused light beams that indicate to the pilot they are on path when seeing red/white, above path if white/white, and below path if red/red. Some airports serving large aircraft have three-bar VASI's that provide two visual glide paths to the same runway.

VISUAL FLIGHT RULES (VFR): Rules that govern the procedures for conducting flight under visual conditions. The term VFR is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, pilots and controllers use VFR to indicate the type of flight plan.

VISUAL METEOROLOGICAL CONDITIONS: Meteorological conditions expressed in terms of specific visibility and ceiling conditions equal to or greater than the threshold values for instrument meteorological conditions.

VOR: See "Very High Frequency Omnidirectional Range Station."

VORTAC: See "Very High Frequency Omnidirectional Range Station/Tactical Air Navigation."

WARNING AREA: See "special-use airspace."

WIDE AREA AUGMENTATION SYSTEM (WAAS): An enhancement of the Global Positioning System that includes integrity broadcasts, differential corrections, and additional ranging signals for the purpose of providing the accuracy, integrity, availability, and continuity required to support all phases of flight.

Acronyms and Abbreviations

AC:	advisory circular
ACN:	aircraft classification number
ADF:	automatic direction finder
ADG:	airplane design group
ADS-B:	automatic dependent surveillance - broadcast
AFSS:	automated flight service station
AGL:	above ground level
AGIS:	Airports Geographic Information System
AIP:	Airport Improvement Program
AIR-21:	Wendell H. Ford Aviation Investment and Reform Act for the 21st Century
ALS:	approach lighting system
ALSF-1:	standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT I configuration)
ALSF-2:	standard 2,400-foot high intensity approach lighting system with sequenced flashers (CAT II configuration)
APV:	instrument approach procedure with vertical guidance
ARC:	airport reference code
ARFF:	aircraft rescue and firefighting
ARP:	airport reference point
ARTCC:	air route traffic control center
ASDA:	accelerate-stop distance available
ASR:	airport surveillance radar
ASOS:	automated surface observation station
ATCT:	airport traffic control tower
ATIS:	automated terminal information service
AVGAS:	aviation gasoline - typically 100 low lead (100LL)
AWOS:	automated weather observation station
BRL:	building restriction line
CFR:	Code of Federal Regulations
CIP:	capital improvement program
DME:	distance measuring equipment
DNL:	day-night noise level
DWL:	runway weight bearing capacity for aircraft with dual-wheel type landing gear
DTWL:	runway weight bearing capacity of aircraft with dual-tandem type landing gear
FAA:	Federal Aviation Administration
FAR:	Federal Aviation Regulation
FBO:	fixed base operator
FY:	fiscal year
GPS:	global positioning system
GS:	glide slope
HIRL:	high intensity runway edge lighting
IFR:	instrument flight rules (FAR Part 91)

ILS: instrument landing system
IM: inner marker
LAAS: local area augmentation system
LAHSO: land and hold short operations
LDA: localizer type directional aid
LDA: landing distance available
LIRL: low intensity runway edge lighting
LMM: compass locator at middle marker
LOC: ILS localizer
LOM: compass locator at ILS outer marker
LPV: localizer performance with vertical guidance
MALS: medium intensity approach lighting system
MALSR: medium intensity approach lighting system with runway alignment indicator lights
MIRL: medium intensity runway edge lighting
MITL: medium intensity taxiway edge lighting
MLS: microwave landing system
MM: middle marker
MOA: military operations area
MSL: mean sea level
NAVAID: navigational aid
NDB: nondirectional radio beacon
NextGen: next generation air transportation system
NM: nautical mile (6,076 .1 feet)
NPES: National Pollutant Discharge Elimination System
NPIAS: National Plan of Integrated Airport Systems
NPRM: notice of proposed rulemaking
ODALS: omnidirectional approach lighting system
OFA: object free area
OFZ: obstacle free zone
OM: outer marker
PAC: planning advisory committee
PAPI: precision approach path indicator
PCN: pavement classification number
PFC: porous friction course
PFC: passenger facility charge
PCL: pilot-controlled lighting
PIW: public information workshop
PLASI: pulsating visual approach slope indicator
POFA: precision object free area
PVASI: pulsating/steady visual approach slope indicator
PVC: Poor visibility and ceiling.
RCO: remote communications outlet
REIL: runway end identifier lighting
RNAV: area navigation

RNP: required navigation performance
RPZ: runway protection zone
RSA: runway safety area
RTR: remote transmitter/receiver
RVR: runway visibility range
RVZ: runway visibility zone
SALS: short approach lighting system
SASO: specialized aviation service operator
SASP: state aviation system plan
SEL: sound exposure level
SID: standard instrument departure
SM: statute mile (5,280 feet)
SRE: snow removal equipment
SSALF: simplified short approach lighting system with sequenced flashers
SSALR: simplified short approach lighting system with runway alignment indicator lights
STAR: standard terminal arrival route
SWL: runway weight bearing capacity for aircraft with single-wheel type landing gear
STWL: runway weight bearing capacity for aircraft with single-wheel tandem type landing gear
TACAN: tactical air navigational aid
TDZ: touchdown zone
TDZE: touchdown zone elevation
TAF: Federal Aviation Administration (FAA) Terminal Area Forecast
TODA: takeoff distance available
TORA: takeoff runway available
TRACON: terminal radar approach control
VASI: visual approach slope indicator
VFR: visual flight rules (FAR Part 91)
VHF: very high frequency
VOR: very high frequency omni-directional range
VORTAC: VOR and TACAN collocated
WAAS: wide area augmentation system

APPENDIX B: COMMERCIAL AIRPORTS 101

Introduction

This appendix provides background information for various issues that are pertinent to airports. The issues covered in this appendix include the following:

- Airport Governance and Management
- Airport Classification
- Airport Funding
- Airport Background
- Terminal Facilities
- Airport Design Standards

Airport Management/Governing Structure

Airports function as public entities and are managed or governed in a variety of forms. Before outlining the current governing and management structure for (airport name), this section will provide an overview of the variety of options that airports use to govern and manage their affairs.

Governing Structures

There are four predominant types of airport governing structures used to provide public oversight for airports:

City/County Department – the City/County governing board serves as the airport's governing board for all matters such as contracting, capital improvements, finance' and similar matters. The City/County may use its taxing authority to help support the airport or there may be provisions in state statutes that allow additional limited taxing authority to support the airport.

City/County Department with Advisory Board – the City/County governing board serves as the airport's governing board for all matters but looks to the Airport Advisory board for recommendations on actions. The City/County may use its taxing authority to help support the airport or there may be provisions in state statutes that allow additional some limited taxing authority to support the airport.

Airport Board – there are provisions in state statutes that allow for a first or second class city to create an Airport Board with limited and specific governing authority. The type of authority that exists with the board varies but in general this structure allows the airport to operate semi-autonomously from the City while final responsibility for the airport still rests with the City which owns the airport. The City may use its taxing authority to help support the airport or there may be provisions in state statutes that allow some limited taxing authority to support the airport.

Airport Authority – there are provisions in state statues that allow for the creation of an independent airport authority. These may be created by a City/County or created through a separate process. Once created, these entities have complete authority to govern the activities at the airport. Depending on state statutes, these governing bodies may also have independent, but limited, taxing authority to aid in funding the airport.

Management Structures

There are three general types of management structures for an airport. These different management structures are necessary to ensure that the policies established by the governing body can be carried out on a day by day basis in the operation and delivery of services at the airport. These are as follows:

Appointed Airport Manager – an appointed airport manager is one whose sole responsibility is the operation of the airport. The airport manager is selected by the governing body, the city/county manager or through the city/county's established human resources structure through a qualifications-based selection process. The airport manager then serves at the will of the city/county.

City/County Department Head also assigned as Airport Manager – this person is assigned as airport manager in title but often has larger responsibility such as public works director, city engineer, or transportation director. Like the appointed manager, this person is selected by the governing body, the city/county manager, or through the city/county's human resources system through a qualifications based selection process.

FBO Appointed as Airport Manager – this person is assigned as airport manager mostly in order to provide a physical presence at the airport and assure the day to day operation of the airport. This person also serves as the FBO at the airport and therefore has a concerted interest in the operation of their FBO business. When an FBO is appointed as airport manager, the governing body often retains more responsibility as to formulating capital improvement plans, financial planning, leasing, and similar matters.

Aviation Services

The final element of the airport's management and governing structure has to do with the provision of Fixed Base Operator (FBO) type aircraft servicing. At many small airports, it is not financially feasible for an FBO to operate. At some larger airports, the airport has chosen to provide FBO-type aircraft servicing in order to retain the profits from such an activity to fund the airport. In accordance with FAA policy, airports have the 'Proprietary Exclusive Right' to provide any and all types of aeronautical services if they wish. Information regarding the 'Proprietary Exclusive Right' may be found in AC 150/5190-6 "Exclusive Rights at Federally-Obligated Airports" and FAA Order 5190-6b Airport Compliance Manual (Chapter 8). The decision to operate one way or another is an economic and policy choice made by the governing body.

Private FBO – this arrangement has a private company operating under an agreement with the governing body to use space at the airport. The FBO provides services for aircraft and pilots which may include fueling, maintenance, hangaring, aircraft handling, instruction etc.

Airport providing Aircraft Servicing (similar to an FBO) – this structure carries out all the traditional responsibilities of an airport to maintain the airfield and additionally provides FBO-type aircraft services. This direct customer service role adds another dimension to the variety of duties that an airport manager will encounter on a daily basis.

Rapid City Regional Airport

The City of Rapid City, through an appointed Airport Board is the governing body which owns and is responsible for the operations and capital development of the airport and is considered the 'Airport Sponsor'. The airport is managed by city staff assigned to the airport.

Westjet is the only FBO at RAP and there are several Specialized Aviation Service Operators (SASOs) also providing services at the airport.

Airport Classification

Airports are given different classifications or designations, depending on the source. This section discusses the various sources or systems used nationally, regionally, or locally to classify an airport. The primary systems used to classify an airport include:

a. FAA National Plan of Integrated Airport Systems (NPIAS)
b. Regional or State Aviation System Plans (SASP)
c. FAA General Aviation Airport Report (ASSET)

National Plan of Integrated Airport Systems

The Airport and Airway Improvement Act of 1982 directed the Secretary of Transportation to prepare, publish, and biannually revise a national system plan – the National Plan of Integrated Airport Systems (NPIAS) – for the development of public-use airports in the United States. This requirement can be found in Public Law 49 United States Code § 47103. The NPIAS is a system that emphasizes system planning and development to meet current and future aviation needs. It includes the development considered necessary to provide a safe, efficient, and integrated airport system to meet the needs of civil aviation, national defense, and the United States Postal Service. It takes into account the relationship of each airport to the rest of the transportation system in a particular area, the forecast of technological developments in aeronautics, and the development forecast in other modes of transportation.

To be eligible for funding under the Airport Improvement Program (AIP), an airport must be included in the NPIAS. The FAA determines whether an airport can be included in the NPIAS and the requirements for inclusion in the NPIAS are defined by law and FAA policy. As general criteria, the airport must be a publicly-owned, public-use airport serving civil aviation (privately-owned, public use airports may be included under certain circumstances) with an eligible sponsor, must have at least 10 based aircraft, and must be located at least 20 miles from another NPIAS airport.

Although it is not a factor in determining an airport's classification in the NPIAS, it is important to note that, after an airport is included in the NPIAS and accepts a federal grant for AIP funds, the airport sponsor is contractually obligated to meet the terms and conditions of the AIP grant. These terms and conditions, typically called grant assurances, are established by federal law and define the requirements a sponsor must comply with in the safe and efficient operation and maintenance of the airport.

NPIAS Airport Classification

The public law that created the NPIAS plan defines airports by categories of airport activities. Those categories are defined as follows:

Commercial Service

Commercial service airports are defined as publicly owned airports that have at least 2500 passenger boardings each calendar year and receive scheduled passenger service. Commercial service airports are further categorized based on the number of annual passenger boardings.

Primary commercial service: a commercial service airport with more than 10,000 passenger boardings each year.

Nonprimary commercial service: a commercial service airport with at least 2,500 but no more than 10,000 passenger boardings each year. These airports are commonly referred to as **Commercial Service** airports.

Because of the wide range in levels of passenger boardings throughout the United States, primary commercial service airports are further categorized by the percentage of total passenger boardings in the United States.

Large Hub: a primary commercial service airport with 1 percent or more of the annual national passenger boardings. Commonly referred to as **Large Hub** airports, annual passenger boardings typically range above 8 million.

Medium Hub: a primary commercial service airport with at least 0.25 percent but not more than 1 percent of the annual national passenger boardings. Commonly referred to as **Medium Hub** airports, passenger boardings typically range from 2 million to 8 million.

Small Hub: a primary commercial service airport with at least 0.05% but not more than 0.25 percent of the annual national passenger boardings. Commonly referred to as **Small Hub** airports, passenger boardings typically range from 350,000 to 2 million.

Nonhub: a primary commercial service airport with more than 10,000 but less than 0.05 percent of the annual national passenger boardings. Commonly referred to as **Nonhub Primary** airports, passenger boardings typically range from 10,000 to 350,000.

General Aviation

Most airports that are not considered commercial service airports fall into this category. Although some general aviation airports do have scheduled passenger service, they have fewer than 2500 annual boardings and therefore are not classified as commercial service airports. See the section **General Aviation Airport: A National Asset** for more detail on general aviation airports.

Reliever

Reliever airports are general aviation airports designated by the FAA to relieve congestion at a commercial service airport and to provide more general aviation access to the overall community.

Rapid City Regional Airport Classification

The Rapid City Regional Airport is classified as a Nonhub Primary Commercial Service Airport.

State Aviation System Plan

An integrated State airport system plan is the representation of facilities required to meet immediate and future needs as well as achieve overall goals of the State. It recommends the general role, location, and characteristics of new airports or the nature of expansion for existing ones. In order for an airport to be considered for inclusion in the NPIAS, it must first be included in the State's Aviation System Plan (SASP). Each SASP may use different terms or definitions for the role of an airport within the state, and those roles are defined below.

South Dakota State Aviation System Plan

Airports in South Dakota are organized in a variety of roles based on the users they serve and support. South Dakota airports are classified in one of five categories, each with a unique set of characteristics and Airport Reference Code (ARC). See the following section **Airport Design Standards** for more information on ARC codes. The airport classification categories are:

Commercial Service: These airports support some level of scheduled commercial airline service addition to a full range of general aviation aircraft. This includes both domestic and international destinations. Airports in this category typically have a minimum runway length of 6,500 feet with precision approaches, weather reporting equipment, major repair service, and Jet A/100 LL available 24 hours. ARC = C-II or greater

Large General Aviation: These airports support all general aviation aircraft and accommodate corporate aviation activity, including business jets, helicopters, and other general aviation activity. These airports' primary users are business-related and service a large geographic region or they experience high levels of general aviation activity. Airports in this category typically have a minimum runway length of 5,000 feet with non-precision approaches, weather reporting equipment, minor repair service, and Jet A/100 LL fuel available. ARC = C-I

Medium General Aviation: These airports support most twin and single-engine aircraft and may accommodate occasional business jets. These airports support a regional transportation need. Airports in this category typically have a runway length of at least 4,200 feet with non-precision or GPS approaches, weather reporting equipment, on-call repair service, 100 LL fuel available. ARC = B-II

Small General Aviation: The airports support primarily single-engine general aviation aircraft but are capable of accommodating smaller twin-engine general aviation aircraft. These airports support local air transportation needs and special-use aviation activities. Airports in this category typically have a minimum runway length of 3,000 feet with visual approaches. ARC = B-I

Basic General Aviation: These airports support primarily single-engine general aviation aircraft, special-use aviation activities, and access to remote areas or provide emergency service access. Airports in this category are generally not included in the NPIAS, have visual approaches, and may have turf runways. ARC = A-I

Rapid City Regional Airport is classified as a Commercial Service airport in the current South Dakota State Aviation System Plan.

General Aviation Airports: A National Asset

This report, commonly known as the ASSET 1 Study, documented an 18-month study of the nearly 3000 general aviation (GA) airports, heliports, and seaplane bases identified in the FAA's National Plan of Integrated Airport Systems (NPIAS). The in-depth analysis highlighted the pivotal role GA airports play in our society, economy, and the aviation system. The study also aligned the GA airports into four categories – national, regional, local, and basic – based on their existing activity levels. The categories are a tool to help the FAA and state aeronautical agencies make more consistent planning decisions for the nation's GA airports. They reflect the current aviation activity at GA airports, such as the number and type of based aircraft, the number of passenger boardings, and the number of flights.

During the initial study, the FAA found that almost 500 GA airports did not clearly fit into the four defined categories. As a result, the FAA initiated a second phase of the study in 2013 to define a category for those airports, as well as reassign airports to different categories, based on updated information. That study, known as the ASSET 2 study, assigned 212 previously unclassified airports to one of the four categories.

ASSET Study Airport Categories

The current version of the ASSET study includes four categories. These categories are National, Regional, Local, and Basic. As the second phase of the study was completed, the number of airports considered unclassified was reduced from 497 to 281.

National Airports

These 84 GA airports are located in metropolitan areas near major business centers and support flying throughout the nation and the world. Currently located within 31 states, they account for 13 percent of total flying at the studied airports and 35 percent of all filed flight plans at the airports in the four categories. These 84 airports support operations by the most sophisticated aircraft in the GA fleet. Many flights are by jet aircraft, including corporate and fractional ownership operations and air taxi services. These airports also provide pilots with an alternative to busy primary commercial service airports. There are no heliports or seaplane bases in this category. The criteria used to define the National category include:

- 5,000 + instrument operations, 11+ based jets, 20+ international flights, or 500+ interstate departures: or
- 10,000+ enplanements and at least 1+ charter enplanement by a large certificated air carrier: or
- 500+ million pounds of landed cargo weight.

Regional Airports

The 468 airports in the Regional Airport category are located in metropolitan areas and serve relatively large populations. These airports support interstate and some long distance (cross country) flying with more sophisticated aircraft. 49 states, with the exception of Hawaii, currently have Regional airports. These airports account for 37 percent of total flying at the studied GA airports and 42 percent of filed flight plans. There is a substantial amount of charter (air taxi), jet flying, and rotorcraft at regional airports. There are no heliports or seaplane bases in this category. The criteria used to define the Regional category include:

- Metropolitan Statistical Area (Metro or Micro) and 10+ domestic flights over 500 miles, 1,000+ instrument operations, 1+ based jet, or 100+ based aircraft; or
- The airport is located in a metropolitan or micropolitan statistical area, and the airport meets the definition of commercial service.

Local Airports

The 1,263 airports in the Local category are the backbone of the general aviation system, with at least one Local airport in every state. They are typically located near larger population centers but are not necessarily in metropolitan or micropolitan areas. Local airports account for 42 percent of the general aviation airports eligible for Federal funding. They also account for approximately 38 percent of the total flying at the studied GA airports and 17 percent of filed flight plans. Most of the flying is by piston aircraft in support of business and personal needs. In addition, these airports also typically accommodate flight training, emergency services, and charter passenger service, and the flying tends to be within a state or immediate region. There are no

heliports, but there are four seaplane bases in this category. The criteria used to define the Local category include:

- 10+ instrument operations and 15+ based aircraft; or
- 2,500+ passenger enplanements.

Basic airports

The 852 airports in the Basic category are often able to fulfill their role with a single runway, helipads, seaplane area, and limited infrastructure. 43 states have Basic airports and these airports fulfill the role of a community airport providing a means for private GA flying and linking the community to the national airport system. Basic airports account for approximately 7 percent of the total flying at GA airports and 2 percent of filed flight plans. Most of the flying is self-piloted for business and personal reasons using propeller-driven aircraft. A fair amount of air charter (taxi) services is provided at these airports. There are also 3 heliports and 20 seaplane bases in this category. The criteria used to define the Basic category include:

- 10+ based aircraft; or
- 4+based helicopters; or
- The airport is located 30+ miles from the nearest NPIAS airport; or
- The airport is identified and used by the US Forest Service, US Marshals, US Customs and Border Protection (designated, international, or landing rights), or US Postal Service (air stops), or has Essential Air Service; or
- The airport is a new or replacement facility activated after January 1, 2001; and
- Publicly owned or privately owned and designated as a reliever with a minimum of 90 based aircraft.

General Aviation airports not classified

There are 281 airports that did not fit into one of the four categories. Most of these airport have been in the NPIAS for decades and may have seen an erosion of based aircraft and activity (because of population or economic shifts or recession) or may have no based aircraft. 54 of these airports are privately owned and were originally included in the national system as relievers for commercial service airports, but no longer met the entry criteria. Others may be seasonal airports, military airfields recently converted to general aviation use, or airports used to access important state airports with related national interests. These airports account for approximately 6 percent of total flying at the studied GA airports and 2 percent of filed flight plans. However, none are commercial service airports and none received scheduled air service through the Essential Air Service program.

Rapid City Regional Airport ASSET Classification

Since Rapid City Regional Airport is a Primary Commercial Service airport, it is not classified within the ASSET report.

Airport Funding

This section provides background information on available Federal, State, and local funding, and lists the various projects that have been undertaken at the Rapid City Regional Airport (RAP).

Federal Funding

Most funding for airport development comes from federal government programs. The predominant federal funding program is the Airport Improvement Program (AIP), managed by the Federal Aviation Administration.

Federal Funding Legislation

The Federal Aviation Administration (FAA) issues grants for airport planning and development in the United States under Public Law 49 United States Code (USC) § 47104(a). Two separate legislative actions - an authorization and an appropriation are needed in order to issue grants and operate the Airport Improvement Program (AIP) grant program.

- **Authorization.** The FAA authorization legislation has numerous titles but is often referred to as the FAA Reauthorization and is passed by Congress for varying lengths of time. The authorization sets yearly limits on AIP funding levels and gives the FAA contract authority to issue grants. The AIP is currently operating under an extension (H.R. 636) of the FAA Modernization and Reform Act of 2012 (Public Law 112-95). The Act extends the agency's authority and provides funding at current levels through September 2017.
- **Appropriation.** Congress establishes an annual appropriation that allows the FAA to incur obligations and make payments for specific purposes. Although the FAA reauthorization typically establishes an annual authorized funding level for the AIP program, Congress may also use the appropriation law to adjust the authorized AIP funding level for the current year.

Airport and Airway Trust Fund (Source of AIP)

AIP funds are drawn from the Airport and Airway Trust Fund, referred to as the Trust Fund. The Trust Fund receives revenues solely from a variety of sources in the aviation industry, including the domestic ticket tax, a domestic passenger flight segment fee, a departure tax for flights to Hawaii and Alaska, a passenger ticket tax at rural airports, international departure and arrival taxes, frequent flyer taxes, domestic freight and mail taxes, a commercial aviation fuel tax, and a general aviation fuel tax.

AIP Funding Categories

The AIP legislation determines the amount of funding available in each period. Once that amount is established, a complex set of formulas defined by the FAA authorization law, determines how much funding is available within each airport category. In general, AIP funding is distributed in the following categories:

Entitlements

Entitlement funds are AIP funds available to individual airports and fall into various categories based on the number of enplaned passengers.

Cargo Entitlements

Airports receiving cargo shipments may be eligible for cargo entitlements. Cargo entitlements are based on the distribution of 3.5 percent of the total available AIP funds, divided on a pro-rata basis according to an airport's share of total US landed cargo weight.

Primary Entitlements

These funds are available to airports with scheduled passenger service and enplaning more than 10,000 passengers per year. Passenger entitlements are calculated based on the following formula:

- $7.80 for each of the first 50,000 passenger enplanements
- $5.20 for each of the next 50,000 passenger enplanements
- $2.60 for each of the next 400,000 passenger enplanements
- $0.65 for each of the next 500,000 passenger enplanements
- $0.50 for each passenger enplanement greater than 1 million

The annual minimum is $650,000 and the annual maximum is $22 million per airport. By a special provision in the authorization, when $3,200,000,000 or more AIP is appropriated in the fiscal year, each level doubles (i.e., instead of $7.80 for each of the first 50,000, the rate becomes $15.60, etc.), the annual minimum becomes $1 million, and the maximum becomes $26 million per airport.

Nonprimary Entitlements

The special provision in the authorization (as noted above) stipulates that airports not receiving passenger entitlements will receive nonprimary entitlements when AIP appropriations are $3,200,000,000 or more in the fiscal year. These entitlements are the lesser of $150,000 or 20 percent of an airport's 5-year development costs listed in the biennial National Plan of Integrated Airport Systems (NPIAS) report to Congress.

State Apportionment

These funds are available for eligible airport development projects within a state. Normally, 18.5 percent of total available AIP grant funds are apportioned for airports based on an area/population formula. These funds are generally limited to commercial service, nonprimary, and general aviation airports.

Discretionary

The appropriated funds remaining after the other types of funds have been allocated are referred to as "discretionary" funds. A portion of the discretionary funds are directed toward specific, or "set-aside," programs, such as noise-related projects or the Military Airport Program. Of the discretionary funds remaining after set-asides, 75 percent are to be used for enhancing capacity, safety, security, and noise compatibility planning and programs. The remaining 25 percent, known as pure discretionary funds, may be used for any eligible project at any airport, as determined by the FAA.

As a general rule pure discretionary funds typically account for less than four percent of the available AIP funds. However, during the fiscal year some airport sponsors may decide not to proceed with an AIP project or may have funds remaining after the completion of a project. Those funds are returned to FAA and converted to discretionary funds, creating additional discretionary funds to be used for eligible projects.

Other Non-Traditional Federal Funding Sources

There are other non-aeronautical funding sources that may be available for airport development. These can include funding from agencies such as the Transportation Security Administration (TSA), National Guard, or Customs and Border Patrol (CBP) which may provide funding for airport improvements.

Federal Share of Project Funding

AIP funds typically do not cover the entire cost of an airport development project. Although there are some exceptions, the current legislation limits the federal share of allowable AIP costs to 90 percent for most non-hub primary or smaller airports. The remaining 10 percent is considered the local share and is the sponsor's responsibility.

Types of Potential AIP Funding Available for Rapid City

By law, only public-use airports in the NPIAS are eligible for AIP funding. These airports are classified into various categories based on their usage and level of passenger enplanements, and those categories determine the type of airport funding eligibility. **Rapid City Regional Airport meets the definition for primary airport and receives primary entitlement funding for eligible projects.**

Most AIP-eligible projects would also be eligible for discretionary funding. However, as stated earlier, the assignment of discretionary funds is determined by the FAA, and extensive coordination with the FAA is required to determine the potential availability of discretionary funding for specific projects.

The Federal AIP Grant Process

Once AIP funding has been identified, the airport sponsor must go through an established process to receive the federal funds and apply them towards an airport development project. The current version of FAA Order 5100.38 contains a detailed explanation of all requirements and processes. In addition, coordination with the Airports District Office (ADO) is strongly encouraged to ensure there is no confusion.

Basic Grant Steps

While there are numerous steps in the FAA AIP grant process, all AIP grants proceed through the same basic steps.

Pre-Grant Actions

Pre-grant actions must be taken before an AIP-eligible project is ready to be considered for inclusion in a grant. The most critical action is the need for early and extensive coordination between the sponsor and the FAA. The majority of the sponsor's interface with the FAA is at the local level with the appropriate ADO.

Sponsors must develop a Capital Improvement Plan (CIP), typically based on the airport's 20-year development plan. This CIP is submitted to the ADO, where it is reviewed to identify the projects that meet all of the applicable requirements. The ADO enters those projects into an automated AIP system, which is then used to create a five-year NPIAS report, outlining projects eligible for AIP funding. The FAA creates an Airports Capital Improvement Plan (ACIP) to identify the projects that may be funded with AIP over the next three years. Inclusion of a project in the ACIP represents the initial FAA concurrence with the project. However, inclusion of a project in the NPIAS or the ACIP is not a guarantee of funding, nor does the FAA consider the value of the project a final determination.

The ADO will typically notify the sponsor of the favorable potential for receiving federal funding in the upcoming fiscal years. However, it is not a commitment nor a guarantee of funds; rather, it is simply a notice that funding for the project appears favorable and the sponsor should consider initiating those actions that require long lead times in order to avoid delays in the grant process. In addition, the sponsor must develop a realistic project schedule, setting realistic sponsor deadlines for key steps in the grant process and coordinate this schedule with the ADO.

Grant Programming

A grant is "programmed" when the ADO creates a proposed grant in the automated AIP system. These proposed grants are typically based on estimated costs. The grant is then reviewed within the FAA Office of Airports. If the grant is approved, it then enters into the congressional notification process.

The FAA posts the grant on the official FAA Office of Airports website after the congressional notification process is complete. This is considered formal notification that the ADO has authority to issue the grant. The sponsor is typically notified in writing through a Tentative Allocation letter.

Grant Application, Offer and Acceptance

The following steps must be completed after the sponsor has been notified that they will receive a grant:

- Submittal of Grant Application Package
- Grant Application Review
- Fund Reservation
- Grant Offer
- Grant Acceptance

Grant Acceptance

If the sponsor agrees with the grant offer an authorized representative of the sponsor must sign the grant agreement. The sponsor's attorney must also sign the grant agreement, confirming the sponsor is legally able to enter into the contract with the US government. No funds can be drawn from the grant allocation until the ADO receives an original signed agreement and enters it into the FAA's system.

Grant Payments

The sponsor may begin requesting payments from the FAA once the grant agreement has been fully executed and returned to the ADO. It is important to note a number of requirements in the payment process.

- All grant payment requests must be processed through the currently approved DOT grant payment system.
- Payment requests must be submitted at least annually, unless the ADO requests more frequent submissions. The sponsor may submit payment requests more frequently as costs are incurred.
- Payment requests must be based on costs already paid by the sponsor. Advance payments must be approved by the ADO.
- The last 10 percent of the federal share of the grant must be withheld until the ADO receives the final grant closeout report.

- The sponsor must retain all the documentation supporting the grant payment for the required time period and must make this information available on request.

Grant Amendments

A grant agreement can be amended under certain circumstances. Only the ADO can change a grant agreement and amendments are the process used to implement such changes. In general, a grant agreement can be amended with certain limitations for the following reasons:

- To increase or decrease the grant amount. Grants for planning projects cannot be increased. In addition, amendments to increase the grant amount are limited to a maximum of 15 percent.
- To clarify the project description.
- To add, delete or modify a project.

The Sponsor must coordinate with the ADO to determine requirements for grant amendments.

Grant Closeouts

The final step in the process after the project has been completed is to complete all the administrative actions to close out the grant. This step is particularly important to the sponsor, since the FAA is required to withhold the last 10 percent of the federal share of the grant amount until the closeout report has been submitted to the ADO. The basic steps of the process are:

- Physically complete all projects in the grant.
- Complete all grant administrative and financial requirements
- Complete the closeout process

A project is physically complete when all work funded by the grant has been satisfactorily completed in accordance with all specifications or requirements. Before the ADO can process the closeout, they must receive the appropriate documentation demonstrating that the grant project requirements have met, the sponsor has met all of the grant requirements and all project costs are properly documented.

After the ADO has received all required documentation and verified that all requirements have been met, they will prepare a FAA Final Project Report. The ADO will then send written notification to the sponsor of the final payment amount. After the final payment has been made, the ADO will coordinate with other FAA offices to close the grant. When all these actions have been completed, the ADO will notify the sponsor in writing that the grant is physically and financially complete and the grant is officially closed.

Post-Grant Actions

Once the FAA has officially closed the grant, the sponsor:

- Is required by law to retain all grant-related documentation for three years. If there is litigation, the sponsor must retain the documentation until the issue is resolved or three years, whichever is later;
- Must meet grant assurances and special conditions. Most grant assurances and special conditions remain in effect for 20 years after the grant was signed. Some assurances or special conditions are in effect for the life of the equipment or facility, while other obligations remain in effect for in perpetuity.

- Must comply with the Office of Management and Budget (OMB) single audit requirements If a sponsor expends more than $500,000 in federal funds (all federal funds, not just AIP) in a fiscal year. Unless the sponsor is an independent airport authority, this requirement applies to the airport's governing organization, i.e., city, county, state, etc.
- Must receive FAA approval to dispose of equipment or land acquired with AIP funds.

NOTE: The above narrative on the AIP grant process is a summary of current program guidance and does not include all the available details and program requirements. A more detailed description of all of the elements of the AIP grant process can be found in the current version of *FAA Order 5100.38, Airport Improvement Program Handbook*. In addition, sponsors are strongly encouraged to consult their local ADO for the latest policy and guidance.

State Funding

State governments typically have a variety of airport development funding programs available. These funding programs typically use funds from a variety of sources, such as aviation fuel taxes or aircraft registration fees, and are often used to fund a portion of an airport sponsor's local share of federally-funded airport development projects.

South Dakota State Aviation Funding

The South Dakota Department of Transportation's Office of Aeronautics, under the direction of the South Dakota Aeronautics Commission manages State funding for airport development. This funding, held in the South Dakota Aeronautics Fund, comes primarily from aviation fuel taxes and aircraft registration fees.

Airports may apply for funds to cover up to 50 percent of the local share for federal AIP-funded projects. Airports are also allocated a portion of the aviation fuel taxes collected from fuel sales on their airport and may request those funds for airport development projects.

Local Funding

While funding for airport development is typically derived from federal or state sources, portions of most capital projects and the majority of airport operating expenses must be funded through local sources. Ideally, the airport generates sufficient revenue to meet those costs. However, for many smaller airports, airport expenses and funding requirements typically exceed available airport revenue and the airport must rely on other funding sources. This section reviews local revenue and identifies possible revenue or funding sources for airport capital development projects, growth, and operation and maintenance expenses.

Project Funding

An airport does not typically satisfy its capital development needs with internal funding sources alone. Federal, state, and private funding, together with airport funds and bond proceeds, are usually combined to produce the total funds required for capital projects. Federal sources, including Airport Improvement Program (AIP) funds, are subject to modification by Congress or other entities having authority over a funding source.

The specific project eligibility criteria may vary depending on the funding source. In identifying potential sources of funds, it is necessary to examine each project element to determine its eligibility for funding. It's also important to consider the availability of funds for each funding source. AIP funding, as the primary source

of federal funding, is described in the previous **Federal Funding** section, and potential state funding is described in the previous **State Funding** section. The following paragraphs briefly describe other funding sources available to the airport.

Passenger Facility Charge

The Aviation Safety and Capacity Expansion Act of 1990 authorized the Secretary of Transportation to grant public agencies the authority to impose a Passenger Facility Charge (PFC) to fund eligible airport projects. PFC revenue may be used on a "pay-as-you-go" basis or leveraged to pay debt service on bonds or other debt used to pay for PFC-eligible projects. Although the FAA is required to approve the collection and use of PFCs, the program permits local collection of PFC revenue through the airlines operating at an airport and provides more flexibility to airport sponsors than AIP funds. The current cap on PFC is $4.50 per revenue passenger.

Customer Facility Charge

A customer facility charge (CFC) is a fee paid by airport customers for the use of some non-aeronautical service at the airport. These charges are commonly collected from on-airport rental car agencies. The funds are collected by the rental car agency from their customers and then paid to the airport for use in paying the debt service on, for example, a consolidated rental car facility. The airport constructs the facilities on behalf of the agency, allowing them to finance major projects, but keeping the debt off their balance sheets. Airport CFCs are typically charged to each customer for each rental day, ranging from $1.50 per day up to $8 per day. Fees imposed are identified for specific projects.

General Obligation (GO) Bonds

GO bonds are backed by the creditworthiness and taxing power of the municipality operating the airport. They usually bear low interest rates because of their high degree of security. However, state laws may limit a municipality's overall debt, and competition from other community financing requirements may preclude their use for an airport project. Some states have an exemption from the debt limitation rule for general obligation bonds because they are used for a revenue producing enterprise.

Revenue Bonds

Revenue bonds pledge the revenues of an airport sponsor to the repayment of debt service. These are the most common source of funding at larger commercial service airports. Revenue bonds are popular because they do not burden the taxpayer or affect the bonding capacity of the municipality. However, their use is limited to airports with a sufficient operating surplus to cover the debt service. Projected Net Revenues must exceed debt service requirements by at least 1.25 times and up to 2.0 times, depending on the strength of the bond issuer and the underlying assumptions with respect to the market risk for the bonds. Interest rates are dependent on the coverage ratio, but in any case will be higher than for general obligation bonds. Other factors that may affect the interest rates on revenue bonds are the strength of the local passenger market and the financial condition of the airlines serving the market.

Special Facility Revenue Bonds

These bonds are normally issued by the airport sponsor for the construction of a facility for a third party and backed by the revenues generated from that facility. This method of funding can be used for such facilities as maintenance hangars, airline reservation centers, terminal buildings and air cargo terminals.

Industrial Development Bonds

These types of bonds can be issued by states, local government, or an airport authority to fund the construction of an airport industrial park or other facilities that may attract business and increase non-aeronautical leasing revenues at the airport.

Third Party Development

Third party financing may be appropriate in a case where an airport sponsor uses a third-party developer or a tenant to finance a construction project. Only projects with a strong positive cash flow can support this type of financing. Generally, the third party would lease the structure for a period of years to the tenant paying the airport ground rents. According to the terms of the agreement, the airport sponsor receives ownership of the asset upon expiration of the lease.

Local Funds

The remaining portion of project costs must be funded from local sources. The local share of project costs can come from cash flow at the airport or with unrestricted cash balances available to the airport sponsor.

Airport Design Guidelines

Guidance on minimum FAA airport design standards is found in FAA AC 150/5300-13A, *Airport Design (Change 1)*. Airport design standards provide basic guidelines for a safe, efficient, and economic airport system. Careful selection of basic aircraft characteristics for which the airport will be designed is important. Airport designs based only on existing aircraft can severely limit the ability to expand the airport to meet future requirements for larger, more demanding aircraft. Airport designs that are based on large aircraft unlikely to operate at the airport are not economical.

Critical Design Aircraft

Planning a new airport or improvements to an existing airport requires the selection of one or more "critical aircraft." FAA design standards for an airport are determined by a coding system that relates the physical and operational characteristics of an aircraft to the design and safety separation distances of the airfield facility. The design aircraft is the most demanding aircraft operating or forecast to operate at the airport on a regular basis, which is typically considered 500 annual takeoff and landing operations. The design aircraft may be a single aircraft, or a grouping of aircraft.

The first consideration should be the safe operation of aircraft that regularly use the airport. According to FAA AC 150/5300-13A, any operation of an aircraft that exceeds design criteria of the airport may result in either an unsafe operation or a lesser safety margin unless air traffic control (ATC) Standard Operating Procedures (SOPs) are in place for those operations. However, the AC also states that it is not the usual practice to base the airport design on an aircraft that uses the airport infrequently, and it is appropriate and necessary to develop ATC SOPs to accommodate faster and/or larger aircraft that use the airport occasionally.[1]

[1] FAA Advisory Circular 150/5300-13A, *Airport Design*

The FAA typically only provides funding for design standards required by the existing and approved forecasted critical aircraft that are expected to exceed 500 annual operations.

Airport & Runway Classifications

The FAA has established aircraft classification systems that group aircraft types based on their performance and geometric characteristics. These classification systems (see **Figure B-1**) are used to determine the appropriate airport design standards for specific runway, taxiway, apron, or other facilities, as described in FAA AC 150/5300-13A.

- **Aircraft Approach Category (AAC):** a grouping of aircraft based on approach reference speed, typically 1.3 times the stall speed. Approach speed affects the dimensions and size of runway safety and object free areas.
- **Airplane Design Group (ADG)**: a classification of aircraft based on wingspan and tail height. When the aircraft wingspan and tail height fall in different groups, the higher group is used. Wingspan affects the dimensions of taxiway and apron object free areas, as well as apron and parking configurations.
- **Approach Visibility Minimums:** relates to the visibility minimums expressed by Runway Visual Range (RVR) values in feet. This is the minimum distance pilots must be able to see the runway to execute an approach to land. Visibility categories include visual (V), non-precision (NPA), approach procedure with vertical guidance (APV) and precision (PA). Lower visibility minimums require more complex airfield infrastructure and enhanced protection areas.
- **Taxiway Design Group (TDG):** a classification of airplanes based on outer to outer Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance. TDG affects taxiway/taxilane pavement width and fillet design at intersections. See **Figure B-2** for the TDG chart.

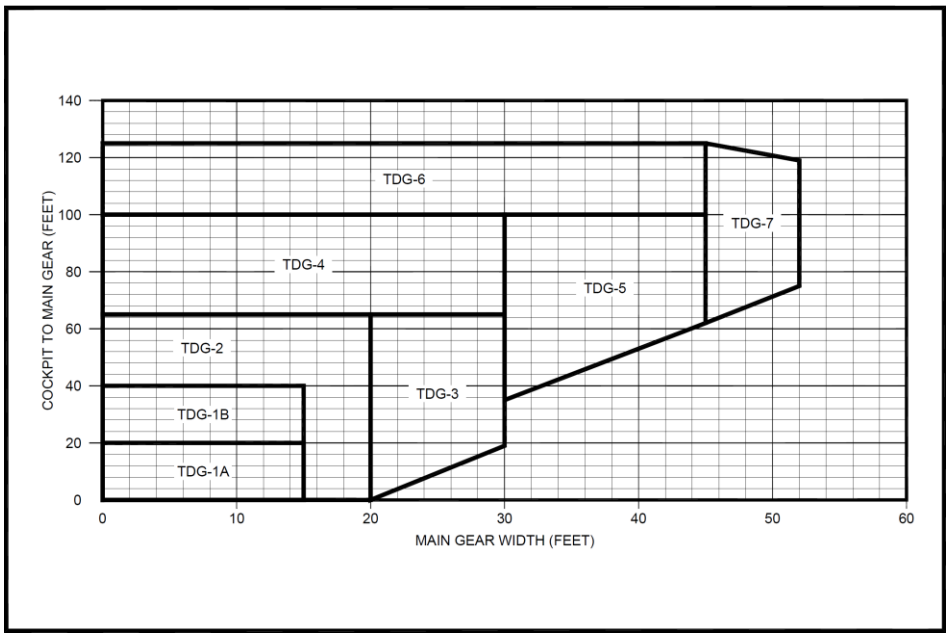
Figure B-1 – Airfield Classification Systems

Aircraft Approach Category (AAC)		
AAC	**Approach Speed**	
A	Approach speed less than 91 knots	
B	Approach speed 91 knots or more but less than 121 knots	
C	Approach speed 121 knots or more but less than 141 knots	
D	Approach speed 141 knots or more but less than 166 knots	
E	Approach speed 166 knots or more	
Airplane Design Group (ADG)		
ADG	**Tail Height (ft.)**	**Wingspan (ft.)**
I	< 20’	< 49’
II	20’ - < 30’	49’ - < 79’
III	30’ - < 45’	79’ - < 118’
IV	45’ - < 60’	118’ - < 171’
V	60’ - < 66’	171’ - < 214’
IV	66’ - < 80’	214’ - < 262’
Approach Visibility Minimums		
RVR (ft.)*	**Instrument Flight Visibility Category (statue mile)**	
N/A (VIS)	Visual (V)	
5000	Not lower than 1 mile (NPA)	

4000	Lower than 1 mile but not lower than ¾ mile (APV)
2400	Lower than ¾ mile but not lower than ½ mile (CAT-I PA)
1600	Lower than ½ mile but not lower than ¼ mile (CAT-II PA)
1200	Lower than ¼ mile (CAT-III PA)

*Source: FAA AC 150/5300-13A – Change 1, Airport Design; *Runway Visibility Range (RVR) values are not exact equivalents*
APV = Approach with Vertical Guidance, PA = Precision Approach

Figure B-2 – Taxiway Design Group



Source: FAA AC 150/5300-13A – Change 1, Airport Design

Airport Design Principles

Other airport design principles are important to consider for a safe and efficient airport design:

- **Runway/Taxiway Configuration:** The configuration of runways and taxiways affects the airport's capacity/delay, risk of incursions with other aircraft on the runway and overall operational safety. Location of and type of taxiways connecting with runways correlates to runway occupancy time. The design of taxiway infrastructure should promote safety by minimizing confusing or complex geometry to reduce risk of an aircraft inadvertently entering the runway environment.
- **Approach and Departure Airspace & Land Use**: Runways each have imaginary surfaces that extend upward and outward from the runway end to protect normal flight operations. Runways also have land use standards beyond the runway end to protect the flying public as well as persons and property on the ground from potential operational hazards. Runways must meet grading and clearance standards considering natural and man-made obstacles that may obstruct these airspace surfaces. Surrounding land use should be compatible with airport operations. Airports should develop comprehensive land use controls to prevent new hazards outside the airport property line. Obstructions can limit the utility of a runway.
- **Meteorological Conditions**: An airport's runways should be designed so that aircraft land and takeoff into the prevailing wind. As wind conditions change, the addition of an additional runway may be needed to

mitigate the effects of significant crosswind conditions that occur more than five percent of the year. Airports that experience lower cloud ceiling and/or visibility should also consider implementing an instrument procedures and related navigational aids to runways to maximize airport utility.

- **Controller Line of Sight**: The local Airport Traffic Control Tower (ATCT) relies on a clear line of sight from the controller cab to the airport's movement areas which includes the runways, taxiways, aprons, and arrival/departure corridors. Structures on an airport need to consider this design standard, and in some cases, require the completion of a shadow study to demonstrate no adverse impact. This standard only applies to airports with a local ATCT.
- **Navigation Aids & Critical Areas:** Visual navigational aids (NAVAIDs) to a runway or the airfield require necessary clear areas for these NAVAIDs to be effective for pilots. Instrument NAVAIDs on an airport require sufficient clear areas for the NAVAID to properly function without interference to provide guidance to pilots. These NAVAID protection areas restrict development.
- **Airfield Line of Sight:** Runways need to meet grading standards so that objects and aircraft can be seen along the entire runway. A clear line of sight is also required for intersecting runways within the Runway Visibility Zone to allow pilots to maintain visual contact with other objects and/or aircraft that may pose a hazard.
- **Interface with Landside:** The airfield configuration should be designed to provide for the safe and efficient operation of aircraft as they transition from the airfield to landside facilities such as hangars and terminals.
- **Environmental Factors:** Airport development must consider potential impacts in and around the airport environs through the National Environmental Policy Act (NEPA). Additionally, development should also reduce the risk of potential wildlife hazards such as deer and birds that may cause hazards to flight operations.

Design Codes

Runway designs are based on specific FAA runway design standards. These standards, found in FAA AC 150/5300-13A, provide basic guidelines for a safe and efficient airport system, and are based on the most demanding or "design" aircraft expected to use the runway. Runway lengths are related to the design aircraft but are determined in accordance with procedures detailed in the current version of FAA AC 150/5325-4, *Runway Length Requirements for Airport Design*. All other critical dimensions related to the design aircraft are found in FAA AC 150/5300-13A, including dimensions for runway widths, safety areas and separations from other infrastructure.

There are several ways in which the codes from **Figure B-1** are used. These include codes that recognize existing conditions, codes that identify planned capabilities, codes that are for specific runways and codes for the airport. These codes are as follows.

Airport Reference Code (ARC)

The Airport Reference Code (ARC) is an airport designation that represents the AAC and ADG of the aircraft that the entire airfield is intended to accommodate on a regular basis. The ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely on the airport.

Runway Design Code (RDC)

RDC is a code signifying the design standards to which the overall runway is to be planned and built, typically based on the AAC, ADG and approach visibility minimums for a runway. RDC provides the information needed to determine the design standards that apply.

Approach Reference Code (APRC)

The APRC is composed of the AAC, the ADG, and the visibility minimums. See **Figure B-3**. APRC signifies the current operational capabilities of a runway and associated parallel taxiway for landing operations. The visibility minimums are linked to critical standards that determine which aircraft can operate on taxiways adjacent to a runway under meteorological conditions with no special operational procedures necessary.

Figure B-3 – Approach Reference Code

Visibility Minimums	Runway to Taxiway Separation (ft)									
	≥150	≥200	≥225	≥240	≥250	≥300	≥350	≥400	≥500	≥550
Visual	B/I(S)/VIS	B/I(S)/VIS	B/I/VIS	B/II/VIS	B/II/VIS	B/III/VIS D/II/VIS	B/III/VIS	D/IV/VIS D/V/VIS	D/VI/VIS	D/VI/VIS
Not lower than 1 mile	B/I(S)/5000	B/I(S)/5000	B/I/5000	B/II/5000	B/II/5000	B/III/5000 D/II/5000	B/III/5000	D/IV/5000 D/V/5000	D/VI/5000	D/VI/5000
Not lower than 3/4 mile	B/I(S)/4000	B/I(S)/4000	B/I/4000	B/II/4000	B/II/4000	B/III/4000 D/II/4000	B/III/4000	D/IV/4000 D/V/4000	D/VI/4000	D/VI/4000
Lower than 3/4 mile but not lower than 1/2 mile		B/I(S)/2400	B/I/4000 B/I(S)/2400	B/II/4000	B/I/2400	B/III/4000 [1] D/II/4000 B/II/2400	B/III/2400	D/IV/2400 D/V/2400	D/VI/2400	D/VI/2400
Lower than 1/2 mile								D/V/2400 D/IV/1600	D/VI/2400 D/V/1600	D/VI/1600

Notes: (S) denotes small aircraft
Entries for Approach Category D also apply to Approach Category E. However, there are no Approach Category E aircraft currently in the civil fleet.

Source: FAA AC 150/5300-13A, Airport Design

Departure Reference Code (DPRC)

DPRC signifies the runway's operational capabilities for takeoff operations. See **Figure B-4**. The DPRC code is the like the APRC code, but is comprised of two components, AAC and ADG. It represents those aircraft that can takeoff from a runway while any aircraft are present on adjacent taxiways, under meteorological condition with no special procedures necessary.

Figure B-4 – Departure Reference Code

Runway to Taxiway Separation (ft)					
≥ 150	≥ 225	≥ 240	≥ 300	≥ 400	≥ 500
B/I(S)	B/I	B/II	B/III D/II	D/IV D/V [1]	D/VI [2]

Notes: (S) denotes small aircraft
Entries for Approach Category D also apply to Approach Category E. However, there are no Approach Category E aircraft currently in the civil fleet.

Source: FAA AC 150/5300-13A, Airport Design

Small Category

One additional unique coding is the use of the term 'small'. Small aircraft are those that have a maximum certificated takeoff weight of 12,500 pounds or less. Aircraft in categories A and B may be further designated as 'small' which has different standards than larger aircraft. The 'small' term is used with the ARC or RDC but not with APRC or DPRC. The term small is not used for C, D, or E aircraft. As an example, the term will be used as 'B-II (Small)' with a small aircraft as compared to 'B-II' only when referring to larger aircraft.

Code Context

It is critical to understand the context in which the specific code is being used. For example, depending where the code is being used, a C-II-2400 code would have the following meanings:

- **Critical Design Aircraft:** A C-II aircraft is what the runway was either built for what the runway is being designed for. Referencing **Figure B-1**, a C-II aircraft is an aircraft with an approach speed between 121 and 140 knots, and a wingspan between 49 and 78 feet or a tail height between 20 and 29 feet.
- **Runway Design Code (RDC):** The planned runway will be designed to meet the FAA runway design standards for a C-II aircraft with a visibility minimum as low as ½ mile.
- **Approach Reference Code (APRC)**: The runway currently meets the FAA runway design standards for a C-II aircraft with a visibility minimum as low as ½ mile and with a C-II aircraft on the adjacent parallel taxiway.
- **Departure Reference Code (DPRC):** The runway currently meets the FAA runway design standards for a C-II aircraft departing the runway with a C-II aircraft on the adjacent parallel taxiway.
- **Airport Reference Code (ARC):** The ARC can be used to discuss the operational capability of an existing airport, i.e., if the highest RDC of existing runways at an airport is C-II, the airport would have an ARC of C-II. The ARC can also be used to discuss the planned capability of an airport, i.e., an airport will be designated as an ARC C-II airport when the highest RDC of the planned runways is C-II.

Runway Design Standards

Basic runway design standards vary based on the RDC and RRC as established by the design aircraft. Some of the safety standards include:

- **Runway Width:** The physical width of the runway pavement.
- **Runway Safety Area (RSA):** A defined graded surface surrounding the runway 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 must be free of objects, except those required to be in the RSA to serve their function. The RSA should also be capable to supporting airport equipment and the occasional passage of aircraft.
- **Runway Object Free Area (ROFA):** An area centered on the ground on a runway provided to enhance the safety of aircraft operations by remaining clear of objects, except for objects that need to be in the OFA for air navigation or aircraft ground maneuvering purposes.
- **Runway Obstacle Free Zone (ROFZ):** The OFZ is the three-dimensional volume of airspace along the runway and extended runway centerline that is required to be clear of taxiing or parked aircraft as well

as other obstacles that do not need to be within the OFZ to function. The purpose of the OFZ is for protection of aircraft landing or taking off from the runway and for missed approaches.

- **Runway Protection Zone (RPZ):** The RPZ is a trapezoidal area located 200 feet beyond the runway end and centered on the extended runway centerline. The RPZ is primarily a land use control that is meant to enhance the protection of people and property near the airport through airport control. Such control includes clearing of RPZ areas of incompatible objects and activities. If a special application of declared distances is used, separate approach and departure RPZs are required.
- **Runway Line of Sight**: Along individual runways, a point 5 feet above the runway must be mutually visible with any other point 5 feet above the runway centerline. For intersecting runways, Runway Visibility Zone (RVZ) standards require a clear visible 5-foot high line-of-sight to enhance safety amongst airport users when runways intersect.

Other basic runway design standards include:

- Runway surface gradient
- Runway shoulder width to prevent soil erosion or debris ingestion for jet engines,
- Blast pad to prevent soil erosion from jet blast
- Required separation distances to markings, objects, and other infrastructure for safety
- Parallel runway separation distances

There are also critical areas associated with navigational aids as well as airspace clearance requirements for runways.

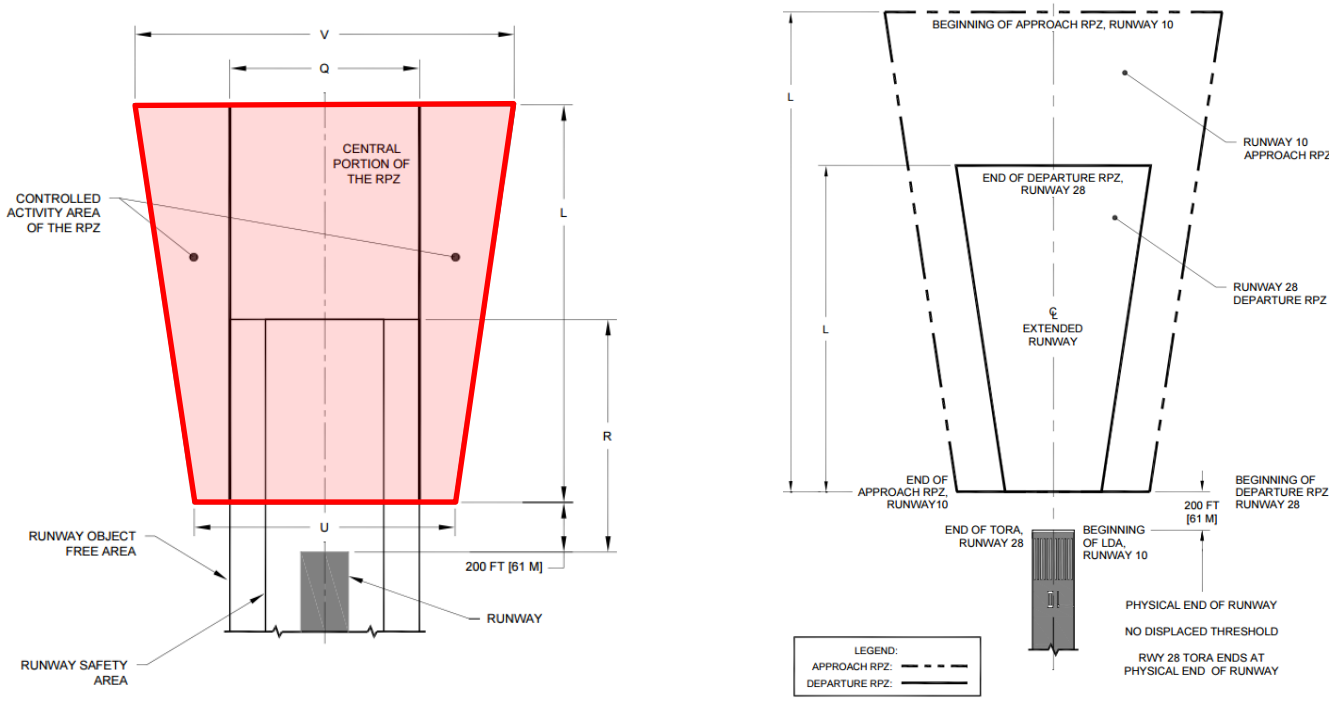
Runway Protection Zones

The Runway Protection Zone (RPZ) is a trapezoidal land use area at ground level prior to the landing threshold or beyond the departure runway end. The RPZ's function is to enhance the protection of people and property on the ground. The RPZ size varies based on the runway's RDC. The RPZ is further broken down into two types and two areas:

- **Approach RPZ:** Approach RPZ starts 200 feet from the runway threshold.
- **Departure RPZ:** Departure RPZ extends 200 feet from the runway end or claimed Takeoff Runway Available (TORA).
- **Central Portion:** Land within the RPZ centered on runway centerline with a width matching the width of the ROFA.
- **Controlled Activity Area:** Land with the RPZ on the sides of the central portion.

FAA permissible land uses without further evaluation include farming that meets airport design standards, irrigation channels that do not attract wildlife, controlled airport service roads, underground facilities and unstaffed NAVAIDs that are required to be within the RPZ. Airport owners should, at a minimum, maintain the RPZ clear of all facilities supporting incompatible activities. It is desirable to clear all above-ground objects from the RPZ. **Figure B-5** graphically depicts the characteristics of an RPZ.

Figure B-5 – FAA Runway Protection Zone



Source: FAA AC 150/5300-13A, Change 1 (Airport Design)

Protection of the RPZ is achieved through airport control over RPZs including fee title ownership or clear zone easement. The increased emphasis has resulted in additional requirements to monitor and analyze RPZs for conformance to established policies and standards.

In September 2012, FAA issued an interim policy on activities within an RPZ providing airports with guidance on land use compatibility standards. The standards from the interim guidance are summarized below:

- **New or Modified Land Uses:** FAA coordination is required for new or modified land uses within the RPZ because of an airfield project, change in RPZ dimensions or local development proposal.
- **Land Uses Requiring FAA Coordination:** Building and structures, recreational land uses, transportation facilities (i.e. roads, parking, rail), fuel storage, hazardous material storage, wastewater treatment, above-ground utility infrastructure
- **Alternatives Analysis:** A full range of alternatives must be evaluated prior to FAA coordination that avoid introducing the land use into the RPZ, minimize the impact of the land use in the RPZ and mitigate risk to people and property on the ground.
- **Existing Land Uses in the RPZ:** No change in policy, airports should work with FAA to remove or mitigate the risk of any existing incompatible land uses in the RPZ. Incompatible land uses in the RPZ from previous FAA guidance include but are not limited to residences, places of public assembly (i.e. uses with high concentration of persons), fuel storage facilities and wildlife attractants.

FAA has acknowledged the ongoing update to the land use compatibility advisory circular where an RPZ land use consideration section will be added.

FAA Runway Approach/Departure Surfaces

FAA identifies sloping approach surfaces that must be cleared at an absolute minimum for safety for landing and departing aircraft. These surfaces are identified in Table 3-2 of FAA AC 150/5300-13A which is shown in **Figure B-6**. All objects must clear the surface for the applicable runway operational design standard to meet minimum aviation safety standards for a given runway landing threshold location. Approach airspace penetrations typically require the removal of the object, operational restrictions, or the runway landing threshold to be shifted or displaced down the runway.

The departure surface applies to runways where instrument departures are allowable. It begins at the end of the takeoff distance available and extends upward and outward at a 40:1 slope. No new penetrations are allowed unless an FAA study has been completed and a determination of no hazard has been issued. Penetrations to the departure surface may require the obstacle to be published, or require mitigation including increasing the minimum aircraft climb rate or runway length operational restrictions.

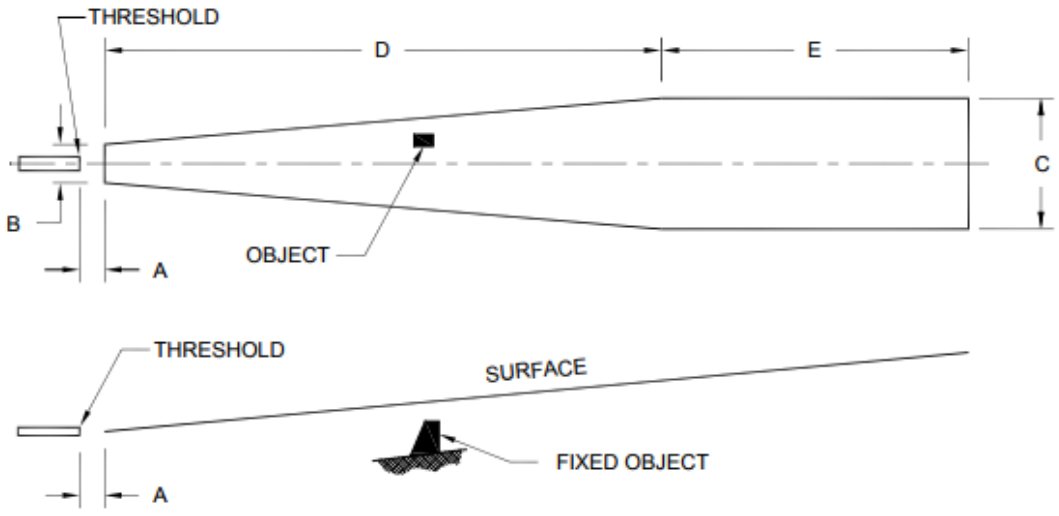
Mitigation options generally include obstruction removal, lighting/marking, declared distances and/or adjustment of the visual guidance slope indicator angle. Other long-term options include reconfiguring the runway or modifying design standards. New development should be clear of airspace surfaces.

Figure B-6 – FAA Approach/Departure Standards Table

Table 3-2. Approach and Departure Standards Table [1, 2]

	Runway Type	DIMENSIONAL STANDARDS* Feet (Meters) A	B	C	D	E	Slope
1	Approach end of runways expected to serve small airplanes with approach speeds less than 50 knots. (Visual runways only, day/night).	0 (0)	120 (37)	300 (91)	500 (152)	2,500 (762)	15:1
2	Approach end of runways expected to serve small airplanes with approach speeds of 50 knots or more. (Visual runways only, day/night).	0 (0)	250 (76)	700 (213)	2,250 (686)	2,750 (838)	20:1
3	Approach end of runway expected to serve large airplanes. (Visual runways only, day/night).	0 (0)	400 (122)	1,000 (305)	1,500 (457)	8,500 (2591)	20:1
4	Approach end of runways expected to accommodate instrument approaches having visibility greater than or equal to 3/4 statute mile. [3]	200 (61)	400 (122)	3,400 (1036)	10,000 [4] (3048)	0 (0)	20:1
5	Approach end of runways expected to accommodate instrument approaches having visibility minimums less than 3/4 statute mile.	200 (61)	800 (244)	3,400 (1036)	10,000 [4] (3048)	0 (0)	34:1
6 [5]	Approach end of runways expected to accommodate instrument approaches with vertical guidance.	0 (0)	Runway width + 200 (61)	1520 (463)	10,000 [4] (3048)	0 (0)	30:1
7	Departure runway ends used for any instrument operations.	0 [6] (0)	See Figure 3-4.				40:1

* The letters are keyed to those shown in Figure 3-2 of AC 150/5300-13A.



Source: FAA AC 150/5300-13A, Change 1 (Airport Design) & FAA Engineering Brief #99, Changes to Tables 3-2 and 3-4 of Advisory Circular 150/5300-13A

Taxiway Design Standards

Taxiways provide for the safe and efficient movement of aircraft between the runway and other operational areas of the airport. The taxiway system should provide critical links to airside infrastructure, increase capacity and reduce the risk of an incursion with traffic on the runway.

System Design

FAA has placed a renewed emphasis on taxiway design in their updated airport design standards. Fundamental elements help develop and efficient system to meet demands, reduce pilot confusion and enhance safety. Considerations include:

- Design taxiways to meet FAA design standards for existing and future users considering expandability of airport facilities.
- Design taxiway intersections so the cockpit is over the centerline with a sufficient taxiway edge safety margin.
- Simplify taxiway intersections to reduce pilot confusion using the three-node concept, where a pilot has no more than three choices at an intersection.
- Eliminate "hot spots" identified by the FAA Runway Safety Action Team where enhanced pilot awareness is encouraged.
- Minimize the number of runway crossings and avoid direct access from the apron to the runway.
- Eliminate aligned taxiways whose centerline coincides with a runway centerline.
- Other considerations include avoiding wide expanses of pavement and avoiding "high energy intersections" near the middle third of a runway.

Design Standards

Taxiways are subject to FAA design requirements such as pavement width, edge safety margins, shoulder width, and safety and object free area dimensions. The design standards vary based on individual aircraft geometric and landing gear characteristics. The Taxiway Design Group (TDG) and Airplane Design Group (ADG) identified for the design aircraft using a taxiway. The FAA standards in relation to taxiways (as defined in FAA AC 150/5300-13A) are described below. See **Figure B-7** for Taxiway Design Standards.

- **Taxiway Width**: The physical width of the taxiway pavement.
- **Taxiway Edge Safety Margin**: The minimum acceptable distance between the outside of the airplane wheels and the pavement edge.
- **Taxiway Shoulder Width**: Taxiway shoulders provide stabilized or paved surfaces to reduce the possibility of blast erosion and engine ingestion problems associated with jet engines which overhang the edge of the taxiway pavement.
- **Taxiway/Taxilane Safety Area (TSA)**: The TSA is located on the taxiway centerline and shall be cleared and graded, properly drained, and capable, under dry conditions, of supporting snow removal equipment, ARFF equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.
- **Taxiway Edge Safety Margin (TESM):** The minimum acceptable distance between the outside of the airplane wheels and the pavement edge.

- **Taxiway/Taxilane Object Free Area (TOFA):** The TOFA is centered on the taxiway centerline and prohibits service vehicle roads, parked airplanes, and above ground objects, except for objects that need to be in the TOFA for air navigation or aircraft ground maneuvering purposes.
- **Taxiway Separation Standards:** Separation standards between the taxiways and other airport facilities are established to ensure operational safety of the airport and are as follows:
    - Taxiway centerline to parallel taxiway/taxilane centerline
    - Taxiway centerline to fixed or moveable object

Other design standards include taxiway shoulder width to prevent jet blast soil erosion or debris ingestion for jet engines and required separation distances to other taxiways/taxilanes.

Figure B-7 – Taxiway Design Standards Table 4-1 and 4-2

Table 4-1. Design standards based on Airplane Design Group (ADG)

ITEM	DIM (See Figure 3-26)	ADG					
		I	II	III	IV	V	VI
TAXIWAY PROTECTION							
TSA	E	49 ft (15 m)	79 ft (24 m)	118 ft (36 m)	171 ft (52 m)	214 ft (65 m)	262 ft (80 m)
Taxiway OFA		89 ft (27 m)	131 ft (40 m)	186 ft (57 m)	259 ft (79 m)	320 ft (98 m)	386 ft (118 m)
Taxilane OFA		79 ft (24 m)	115 ft (35 m)	162 ft (49 m)	225 ft (69 m)	276 ft (84 m)	334 ft (102 m)
TAXIWAY SEPARATION							
Taxiway Centerline to Parallel Taxiway/Taxilane Centerline [1]	J	70 ft (21 m)	105 ft (32 m)	152 ft (46.5 m)	215 ft (65.5 m)	267 ft (81 m)	324 ft (99 m)
Taxiway Centerline to Fixed or Movable Object	K	44.5 ft (13.5 m)	65.5 ft (20 m)	93 ft (28.5 m)	129.5 ft (39.5 m)	160 ft (48.5 m)	193 ft (59 m)
Taxilane Centerline to Parallel Taxilane Centerline [1]		64 ft (19.5 m)	97 ft (29.5 m)	140 ft (42.5 m)	198 ft (60 m)	245 ft (74.5 m)	298 ft (91 m)
Taxilane Centerline to Fixed or Movable Object		39.5 ft (12 m)	57.5 ft (17.5 m)	81 ft (24.5 m)	112.5 ft (34 m)	138 ft (42 m)	167 ft (51 m)
WINGTIP CLEARANCE							
Taxiway Wingtip Clearance		20 ft (6 m)	26 ft (8 m)	34 ft (10.5 m)	44 ft (13.5 m)	53 ft (16 m)	62 ft (19 m)
Taxilane Wingtip Clearance		15 ft (4.5 m)	18 ft (5.5 m)	27 ft (6.5 m)	27 ft (8 m)	31 ft (9.5 m)	36 ft (11 m)

Note: 1. These values are based on wingtip clearances. If direction reversal between parallel taxiways is needed, use this dimension or the dimension specified in Table 4-14 or Table 4-15, whichever is largest.

Table 4-2. Design standards based on Taxiway Design Group (TDG)

ITEM	DIM (See Figure 4-6)	TDG							
		1A	1B	2	3	4	5	6	7
Taxiway Width	W	25 ft (7.5 m)	25 ft (7.5 m)	35 ft (10.5 m)	50 ft (15 m)	50 ft (15 m)	75 ft (23 m)	75 ft (23 m)	82 ft (25 m)
Taxiway Edge Safety Margin	TESM	5 ft (1.5 m)	5 ft (1.5 m)	7.5 ft (2 m)	10 ft (3 m)	10 ft (3 m)	15 ft (4.6m)	15 ft (4.6m)	15 ft (4.6m)
Taxiway Shoulder Width		10 ft (3 m)	10 ft (3 m)	15 ft (3 m)	20 ft (6 m)	20 ft (6 m)	30 ft (9 m)	30 ft (9 m)	40 ft (12 m)
Taxiway/Taxilane Centerline to Parallel Taxiway/Taxilane Centerline w/ 180 Degree Turn	J	See Table 4-14							
TAXIWAY FILLET DIMENSIONS		Table 4-3	Table 4-4	Table 4-5	Table 4-6	Table 4-7	Table 4-8	Table 4-9	Table 4-10

Source: FAA AC 150/5300-13A, Change 1 (Airport Design)

Airspace Protection

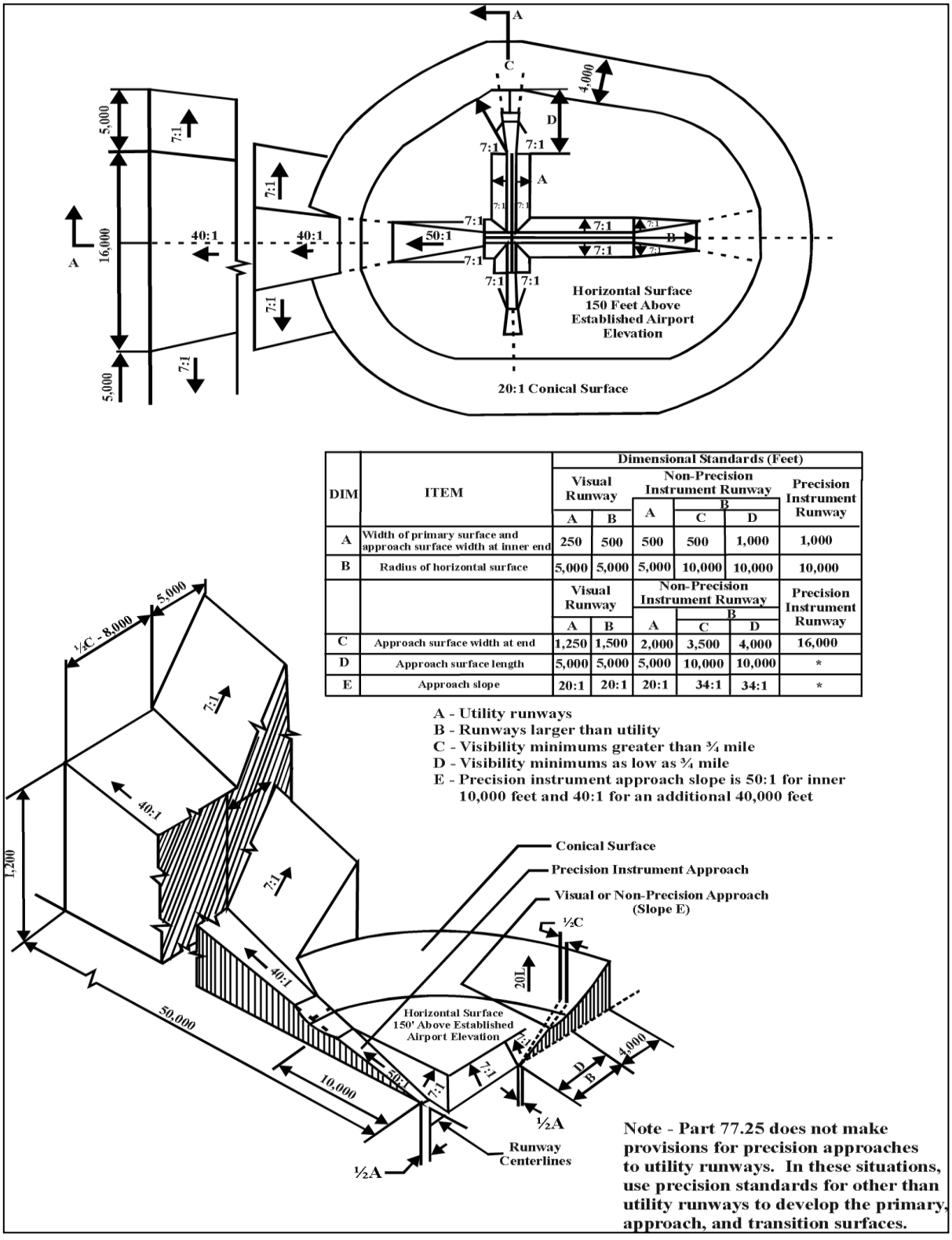
Airspace is an important resource around airports that is essential for safe flight operations. There are established standards to identify airspace obstructions around airports. FAA grant assurances (obligations) require the airport sponsor to take appropriate action to assure that airspace is adequately cleared to protect instrument and visual flight operations by removing, lowering, relocating, marking or lighting, or otherwise mitigating existing airport hazards and preventing the establishment or creating of future airport hazards. Examples of obstructions include trees, buildings, poles, towers, terrain, mobile objects, and aircraft tails. Sufficiently clear airspace near the approach and departure runway ends are vitally important for safe airport operations. An FAA aeronautical study should be completed to determine the operational impacts and necessary mitigation of obstructions (i.e. lowering, lighting, marking, publish operational restrictions).

Part 77 Civil Airport Imaginary Surfaces

Title 14 CFR (Code of Federal Regulations) Part 77 *Safe, Efficient Use, and Preservation of the Navigable Airspace* is used to determine whether man-made or natural objects penetrate these "imaginary" three-dimensional airspace surfaces and become obstructions. Federal Aviation Regulation (FAR) Part 77 surfaces are the protective surfaces most often used to provide height restriction zoning protection around an airport. Sufficiently clear airspace is necessary for the safe and efficient use of aircraft arriving and departing an airport. The most demanding approach to a runway defines the Part 77 airspace standards for that runway. These airspace surfaces include the primary, approach, transitional, horizontal, and conical surfaces each with different standards. The slope of an airspace surface is defined as the horizontal distance traveled for each one vertical foot (i.e. 50:1). Part 77 standards are shown in **Figure B-8**.

Of note are the primary surfaces which should be kept clear of non-essential objects above the runway centerline elevation. The approach surface extends upward and outward from the runway. A slope is defined as the horizontal distance traveled for each one vertical foot.

Figure B-8 – FAR Part 77



DIM	ITEM	Dimensional Standards (Feet)					
		Visual Runway		Non-Precision Instrument Runway			Precision Instrument Runway
		A	B	A	B C	B D	
A	Width of primary surface and approach surface width at inner end	250	500	500	500	1,000	1,000
B	Radius of horizontal surface	5,000	5,000	5,000	10,000	10,000	10,000
		Visual Runway		Non-Precision Instrument Runway			Precision Instrument Runway
		A	B	A	B C	B D	
C	Approach surface width at end	1,250	1,500	2,000	3,500	4,000	16,000
D	Approach surface length	5,000	5,000	5,000	10,000	10,000	*
E	Approach slope	20:1	20:1	20:1	34:1	34:1	*

A - Utility runways
B - Runways larger than utility
C - Visibility minimums greater than ¾ mile
D - Visibility minimums as low as ¾ mile
E - Precision instrument approach slope is 50:1 for inner 10,000 feet and 40:1 for an additional 40,000 feet

Note - Part 77.25 does not make provisions for precision approaches to utility runways. In these situations, use precision standards for other than utility runways to develop the primary, approach, and transition surfaces.

Source: FAA

Appendix C: Meetings & Public Involvement

Introduction

The Rapid City Regional Airport (RAP) understands the importance of public involvement in the Master Plan Update process. During the scoping meeting, the Airport and KLJ designed a transparent process that allows opportunities for stakeholders to be actively engaged. The Airport also believes that members of the public should have an opportunity to comment on decisions about actions that could affect their lives. This involvement took place in the form of public open houses, website information sessions, and stakeholder outreach efforts. The Airport appreciates that public participation improves the decision-making process by recognizing and communicating the needs and interests of all participants. As a result of the public participation process, we feel that the airport master plan offers a valuable path for developing the Rapid City Regional Airport.

COVID-19

At the start of the planning process, a worldwide pandemic hit in the form of a coronavirus (COVID-19) . As a result of this, the planned kickoff meetings were postponed due to travel bans and practicing social distancing to help prevent the spread of the virus. Initial meetings were supposed to take place the week of March 15th, 2020. Because of the uncertainty of when in-person meetings could be conducted, KLJ decided to conduct virtual conference calls mid May 2020 to start the master plan process.

Stakeholders

As part of the planning process the following groups/people were contacted for their insight into the Custer County Airport:

1. Airport/Sponsor Staff
    a. Patrick Dame – Airport Manager
    b. Chris Deitz – Airport Director of Operations
    c. Toni Broom – Airport Finance Director
    d. Shawn Gab – Airport Board member
    e. Rod Pettigrew – Airport Board member
2. Local Government
    a. Becky Drury – Rapid City Council & Airport Liaison
    b. Kip Harrington – Rapid City Planner
    c. Jon Becker – SDDOT
    d. Brittany Molitor – Pennington County
3. Airport Users
    a. Les Mittleider – L&D Aero Services
    b. Lisa Modrick – Westjet Aviation
    c. Linda Rydstrom – Westjet Aviation
    d. David Johnson – Pilot
    e. Martin Yost – SDARNG

4. FAA
    a. Sandy DePottey – FAA St. Paul
    b. David Anderson – FAA Bismarck

For this master planning effort, it was determined that the use of focus groups, a strategic partner committee and an advisory committee would provide the best results. The following is a breakout of the groups

1. Advisory Committee – RAP board and staff, local government officials, FAA, SDOT, SDARNG and GA representatives
2. Airline Focus Group – Local representatives for airline operations
3. Terminal Concessions Focus Group – Business that operate in the main terminal
4. TSA Focus Group – RAP TSA agents
5. Governmental Operators & Airspace Focus Group – ATC, USFS, SDARNG and Ellsworth Airforce Base
6. Airport Operations & Maintenance Focus Group – RAP operations and maintenance staff
7. Cargo Focus Group – Local representatives for cargo operations
8. Planning & Engineering Focus Group – City and county planning development
9. FBO & SASO Focus Group – RAP general aviation (GA) business operators
10. GA Focus Group – RAP users, tenants and lease holders
11. Airport Executive Staff Focus Group – RAP staff
12. Economic Development Focus Group – Rapid City resources, hospitality and local business

Key Issues/Public Involvement Goals

This planning effort completed typical aspects of airport master plans from reviewing existing conditions to forecasts to alternative development but also focused on key issues which we learned from our scoping meeting. These issues were as follows:

1. Evaluation of critical issues such as cultural features, roadway alignments and property acquisition that may affect the environmental clearance of future airport development.
2. Identify a critical design aircraft fleet based on local, corporate, and commercial flight operations as necessary and obtain FAA approval.
3. Get a clear understanding of the airport's role and the types of aircraft and aviation activities it is expected to serve including; general aviation aircraft operations, scheduled/unscheduled passenger, cargo, military and United States Forest Service (USFS).
4. Identify airport facility requirements based on FAA, state and local requirements along with industry best-practices using approved forecasts and critical design aircraft. Facility requirements to emphasis include:
    a. Sustainable airport operations such as runway needs including runway alignment, additional runway, length/extension and pavement strength.
    b. General aviation facilities.
    c. Passenger terminal building including number of gates/hold room space, baggage claim space and terminal apron parking spaces.
    d. Rental car ready/return parking lot.
    e. Air cargo space requirements.
    f. Potential non-aeronautical land uses compatible with airport operations.

g. Landside facilities, specifically general locations for possible non-traditional revenue producing facilities.

5. Identify a development and action plan for the reconstruction of Runway 14-32 including a phased reconstruction with possible extension or shifting of Runway 14-32.
6. Analyze alternatives through a technical, operational, financial and environmental investigation while considering political and public acceptance and recommend feasible preferred alternatives.
7. Runway Protection Zone (RPZ) compatibility concerns and likely needs for an RPZ action plan.
8. Prioritizing airport needs based on available resources and establish a realistic project implementation schedule/phasing plan while identifying triggering events for implementation.
9. Meeting an achievable financial plan to support the implementation schedule.

From the scope meeting it was determined that documentation of existing conditions, forecasting future aviation activity levels, identifying future facility requirements, formulating and evaluating alternatives, preparing implementation plans and engaging the public and other government agencies were main goals for the future of RAP. The table below identifies the outreach efforts used for the master plan process. These efforts included a meetings, workshops, open houses and other outreach efforts (website, newsletter).

Table C-1 – Public Outreach Activities

Date	Meeting/Public Process	Page in Appendix
-	Project Website	C-4
May 2020	Focus Groups Kickoff Meetings	C-5
May 2020	Advisory Committee Kickoff Meeting	C-74
Oct 2020	Strategic Partner Committee	C-85
Jan 2021	Board Meeting – Development Concepts	C-89
Feb 2021	Rental Car Operators	C-98
Apr 2021	Board Meeting – Runway/Terminal Concepts	C-106
Jul 2021	GA Committee Update	C-121
Oct 2021	Public Open House	C-128
Oct 2021	GA Committee Update	C-159

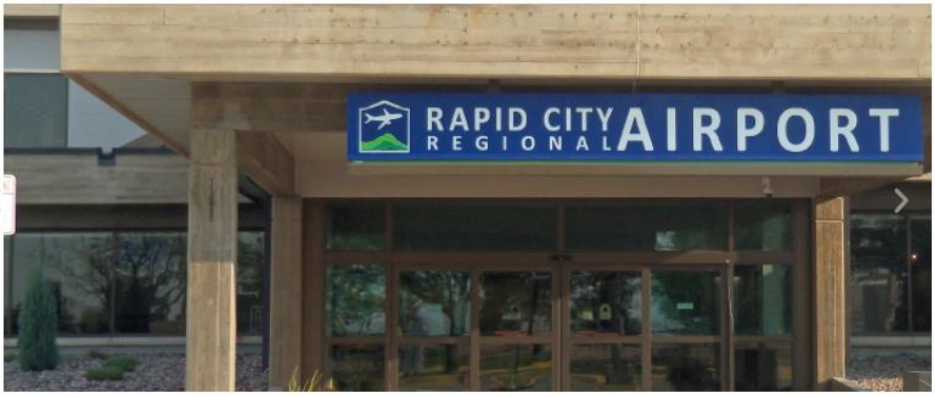
Source: KLJ

Project Website

Rapid City Regional Airport

Airport Master Plan

Menu



The Rapid City Regional Airport (RAP) is updating its Airport Master Plan from 2015. Twenty-year aviation activity forecasts from the 2015 master plan have already been surpassed; a primary objective of this targeted master plan update is addressing long-term needs while making the best use of developable space and financial resources.

5/12/2020


Rapid City Regional Airport
Master Plan Update
Airline Focus Group Kickoff Meeting
May 12, 2020
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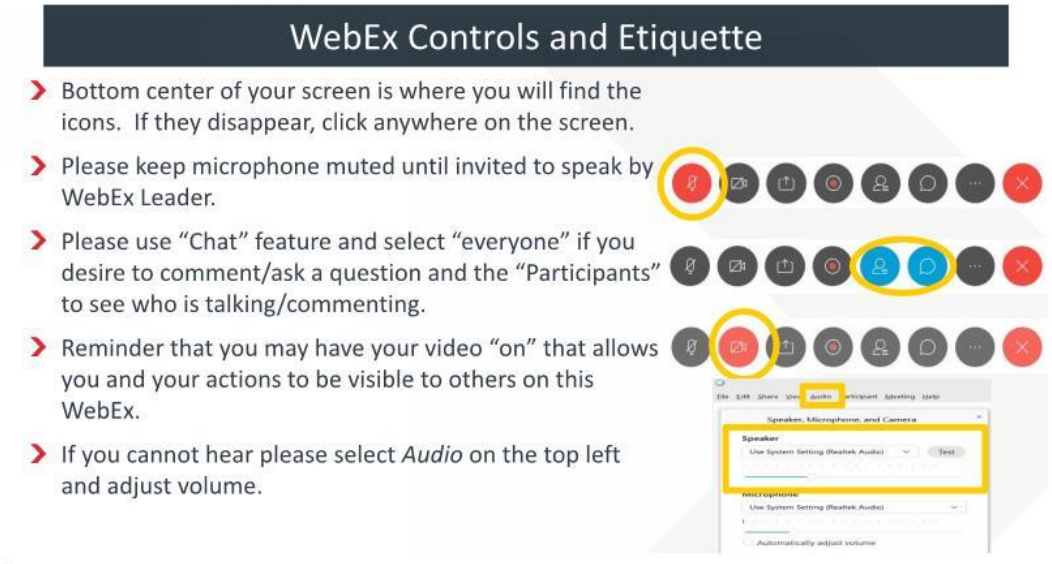
WebEx Controls and Etiquette
Bottom center of your screen is where you will find the icons. If they disappear, click anywhere on the screen.
Please keep microphone muted until invited to speak by WebEx Leader.
Please use "Chat" feature and select "everyone" if you desire to comment/ask a question and the "Participants" to see who is talking/commenting.
Reminder that you may have your video "on" that allows you and your actions to be visible to others on this WebEx.
If you cannot hear please select *Audio* on the top left and adjust volume.

2

5/12/2020

Agenda

- Introductions
- Airport Master Plan
- Focus Group Objectives
- Facility Discussions

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Airport Master Plan

- "Road Map" for meeting aviation demands
- Preserves flexibility to respond to the future
- Allows airport to cost-effectively keep pace with aviation growth
- Considers environmental and socioeconomic impact of development
- Why is a Master Plan Updated needed now?
  - Last Airport Master Plan completed in 2014 but forecasted numbers have been surpassed
  - Continuity of operations – develop a plan to eliminate or minimize closure time of RAP's primary runway. Examples: Reconstruction, Aircraft Incidents, etc.

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2

5/12/2020


Airport Master Plan
We Are Here
Pre-Planning
Facility and Environmental Inventory
Aviation Forecasts
Capacity Analysis & Facility Requirements
Alternative Concept Formulation
Alternatives Analysis
Identify Preferred Alternative
Financial Analysis
Implementation Plan
Master Plan Documentation
Airport Layout Plan (ALP)
PUBLIC INVOLVEMENT
Airport Approval Point
FAA Approval Point
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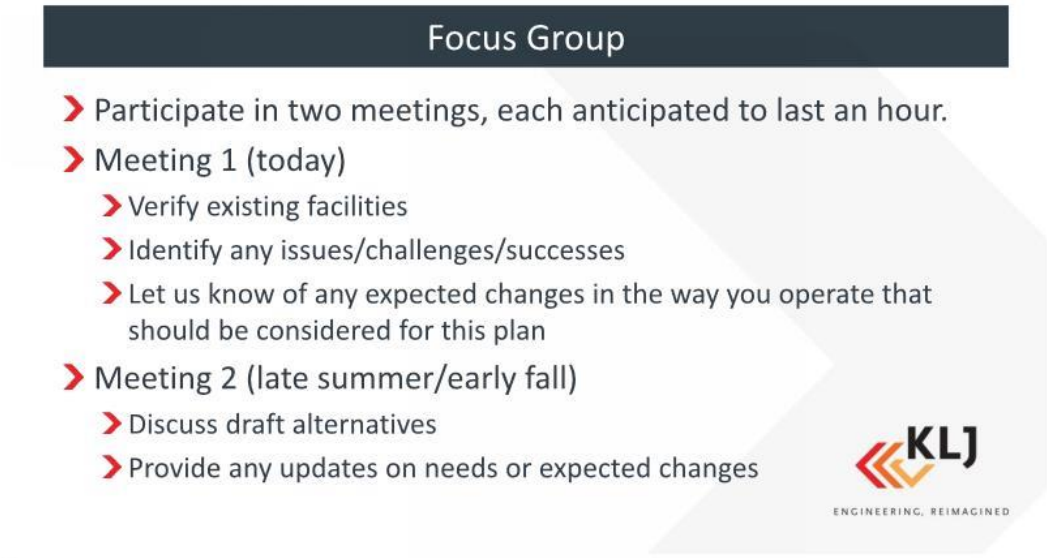
5


Focus Group
Participate in two meetings, each anticipated to last an hour.
Meeting 1 (today)
Verify existing facilities
Identify any issues/challenges/successes
Let us know of any expected changes in the way you operate that should be considered for this plan
Meeting 2 (late summer/early fall)
Discuss draft alternatives
Provide any updates on needs or expected changes
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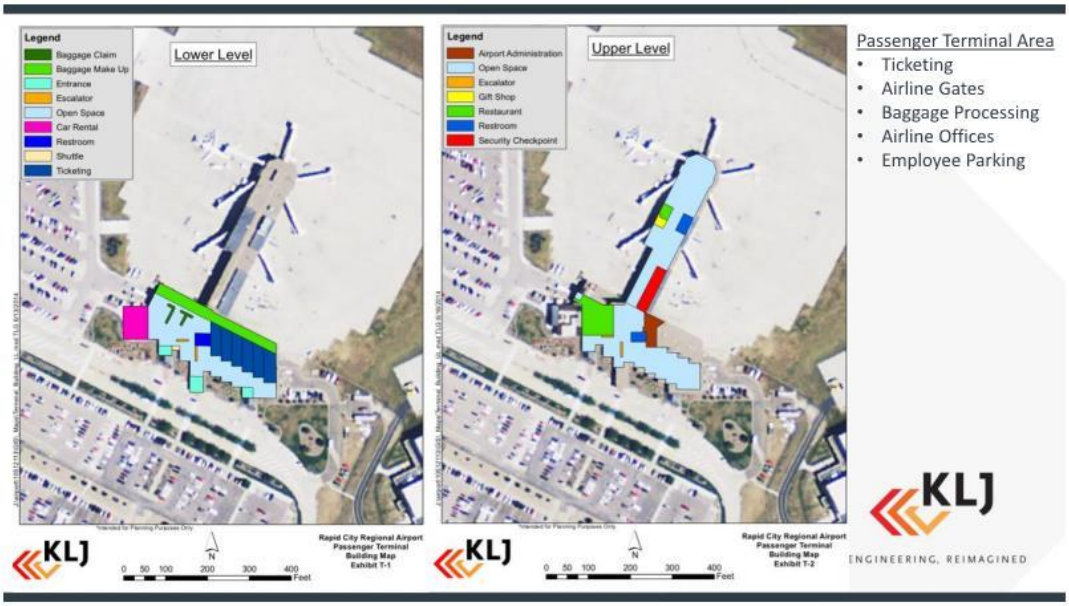
5/12/2020



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5/12/2020

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ATTENDANCE LIST

RAPID CITY REGIONAL AIRPORT

Airline Representative Focus Group Kickoff Meeting
Tuesday May 12, 2020 at 9:00 a.m.
Webex Video Conference

Name:	Organization/Business:	Phone:	Email:
Chris Deitz	RAP		chris.deitz@rcgov.org
Lori Lowery	Delta / United		lorie.lowery@delta.com
Tom Schauer	KLJ		
Matt Nisbet	KLJ		
Trent Penney	KLJ		
Amber Channel	KLJ		

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Terminal Concessions Focus Group Kickoff Meeting – May 2020

5/12/2020

Rapid City Regional Airport

Master Plan Update
Terminal Concessions Focus Group Kickoff Meeting
May 12, 2020

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WebEx Controls and Etiquette

- Bottom center of your screen is where you will find the icons. If they disappear, click anywhere on the screen.
- Please keep microphone muted until invited to speak by WebEx Leader.
- Please use "Chat" feature and select "everyone" if you desire to comment/ask a question and the "Participants" to see who is talking/commenting.
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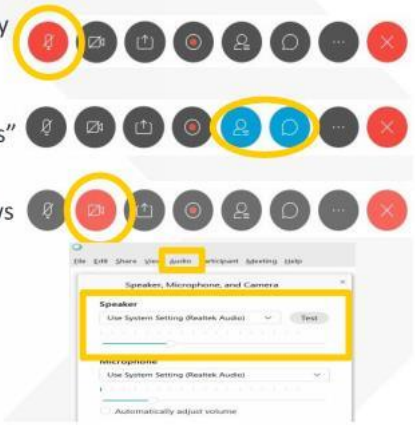

2

1

5/12/2020

Agenda

- Introductions
- Airport Master Plan
- Focus Group Objectives
- Facility Discussions

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3

Airport Master Plan

- "Road Map" for meeting aviation demands
- Preserves flexibility to respond to the future
- Allows airport to cost-effectively keep pace with aviation growth
- Considers environmental and socioeconomic impact of development
- Why is a Master Plan Updated needed now?
  - Last Airport Master Plan completed in 2014 but forecasted numbers have been surpassed
  - Continuity of operations – develop a plan to eliminate or minimize closure time of RAP's primary runway. Examples: Reconstruction, Aircraft Incidents, etc.

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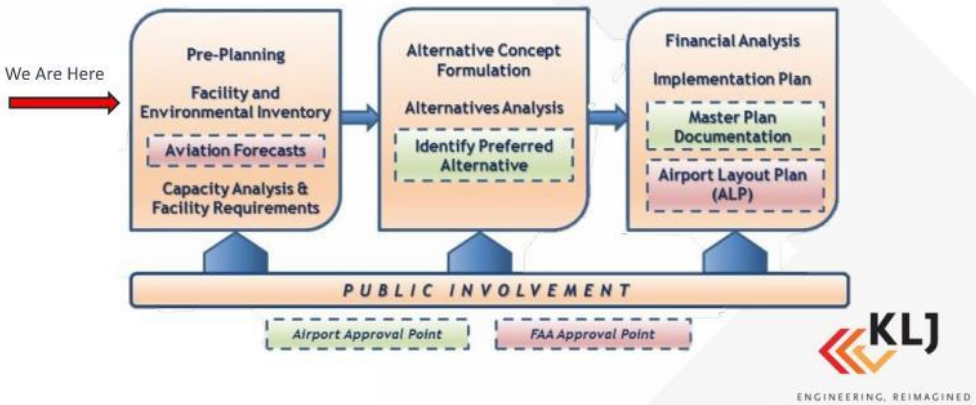
4

2

5/12/2020

Airport Master Plan



5

Focus Group

- Participate in two meetings, each anticipated to last an hour.
- Meeting 1 (today)
  - Verify existing facilities
  - Identify key issues & provide recommendations for improvements.
  - Let us know of any upcoming/expected changes in the way you operate that should be considered for this plan
- Meeting 2 (late summer/early fall)
  - Discuss draft alternatives
  - Provide any updates on needs or expected changes

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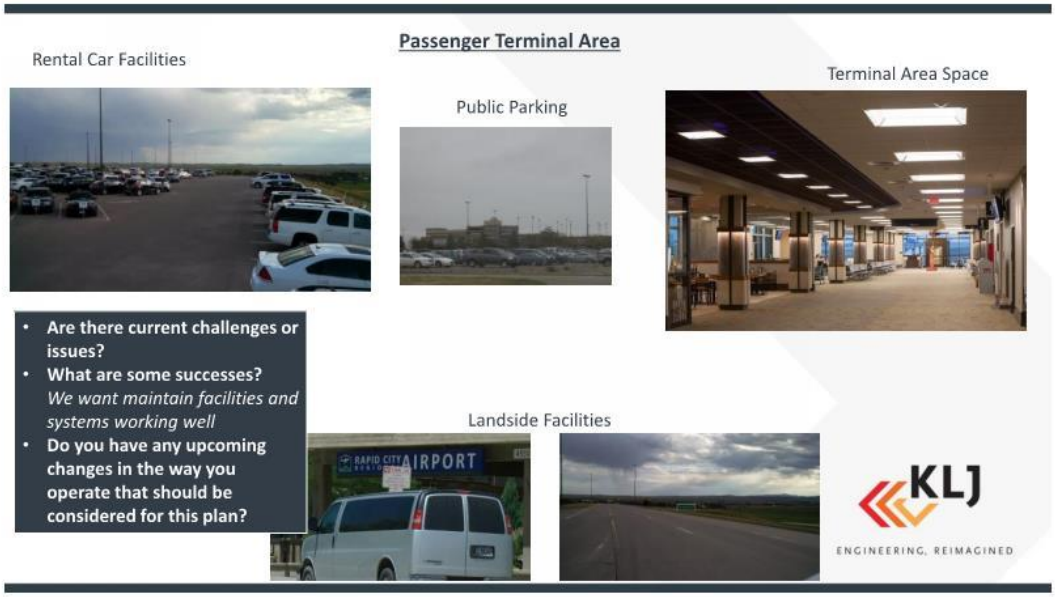
6

3

5/12/2020


Passenger Terminal Area
Rental Car Facilities
Public Parking
Terminal Area Space
Are there current challenges or issues?
What are some successes?
We want maintain facilities and systems working well
Do you have any upcoming changes in the way you operate that should be considered for this plan?
Landside Facilities
RAPID CITY AIRPORT
KLJ
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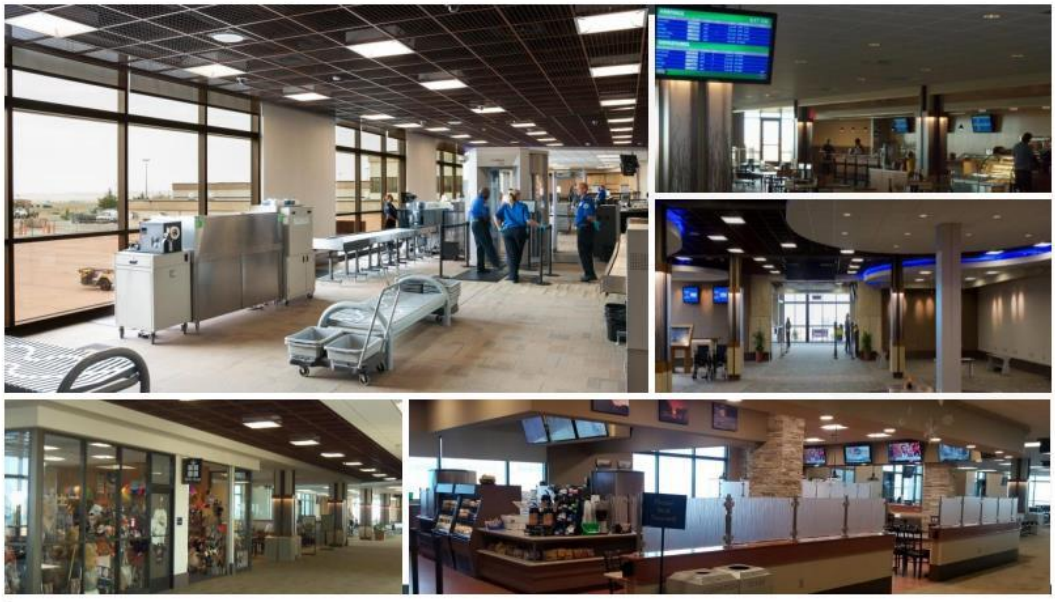
7

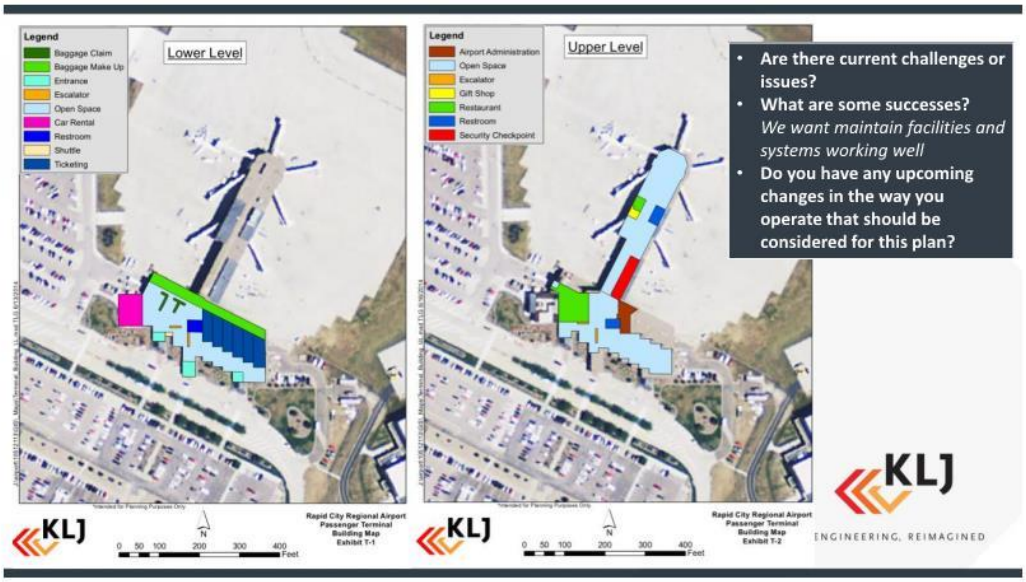


8

4

Terminal Concessions Focus Group Kickoff Meeting – May 2020 (continued)

5/12/2020



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5/12/2020

Next Steps

- Aviation Activity Forecasts
- Facility Requirements
- Alternatives
  - Second Focus Group meeting will be held after alternatives have been developed (late summer / early fall).

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11

Questions & Comments

Matt Nisbet
Aviation Planner
matt.nisbet@kljeng.com
701.355.8449

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12

ATTENDANCE LIST

RAPID CITY REGIONAL AIRPORT
Terminal Concessions Focus Group Kickoff Meeting
Tuesday May 12, 2020 at 1:30 p.m.
Webex Video Conference

Name:	Organization/Business:	Phone:	Email:
Chris Deitz	RAP		chris.deitz@rcgov.org
Matt Nisbet	KLJ		
Tom Schaver	KLJ		
Kent Penney	KLJ		
Amber Channel	KLJ		

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5/14/2020


Rapid City Regional Airport
Master Plan Update
Government Operators and Airspace Focus Group
Kickoff Meeting - May 13, 2020
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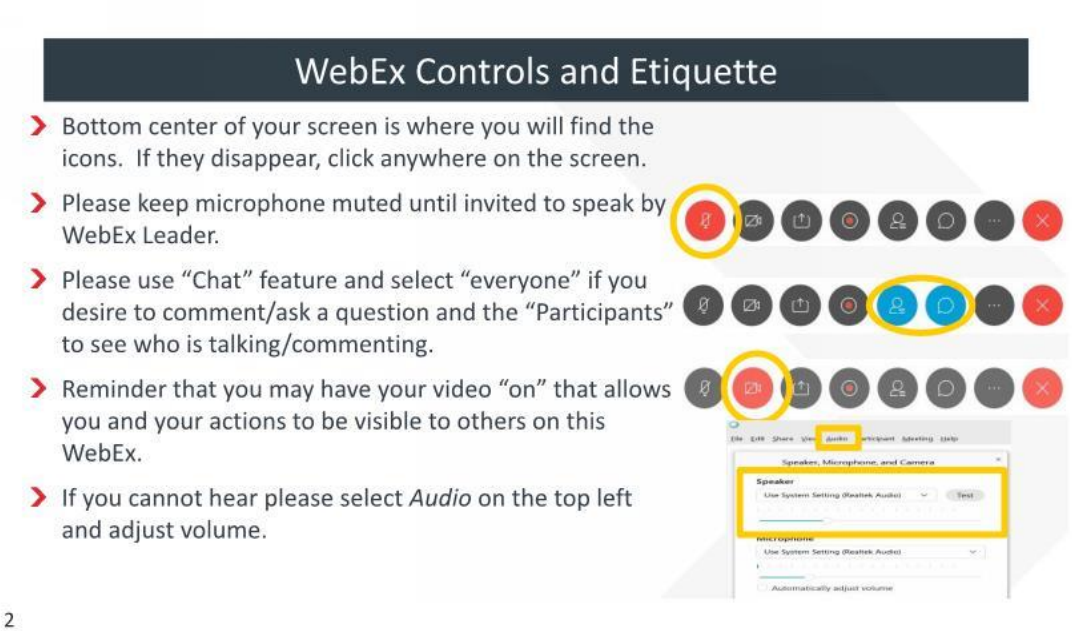
1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2

5/14/2020

Agenda

- Introductions
- Airport Master Plan
- Focus Group Objectives
- Facility Discussions

KLJ ENGINEERING, REIMAGINED

3

Airport Master Planning

- "Road Map" for meeting aviation demands
- Preserves flexibility to respond to the future
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  - Continuity of operations – develop a plan to eliminate or minimize closure time of RAP's primary runway. Examples: Reconstruction, Aircraft Incidents, etc.

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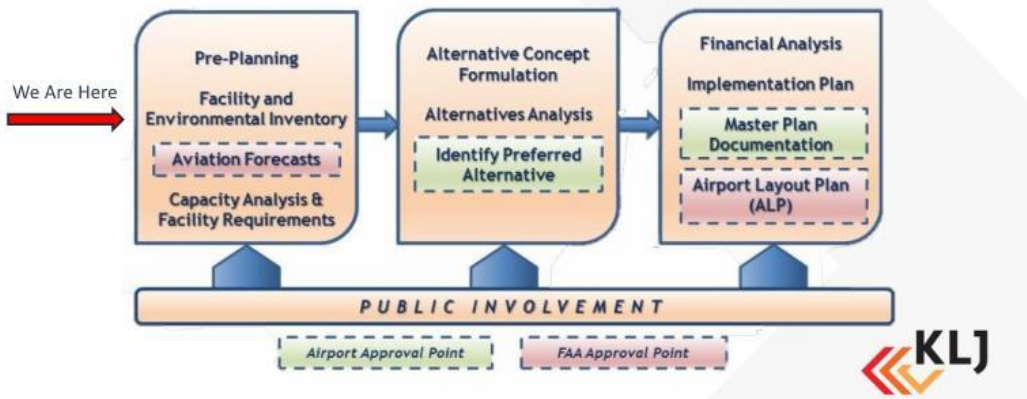
4

2

5/14/2020

Airport Master Planning



5

Focus Group

- Participate in two meetings, each anticipated to last an hour.
- Meeting 1 (today)
  - Identify any issues/challenges/successes
  - Let us know of any upcoming/expected changes in the way you operate that should be considered for this plan
- Meeting 2 (late summer/early fall)
  - Discuss draft alternatives
  - Provide any updates on needs or expected changes

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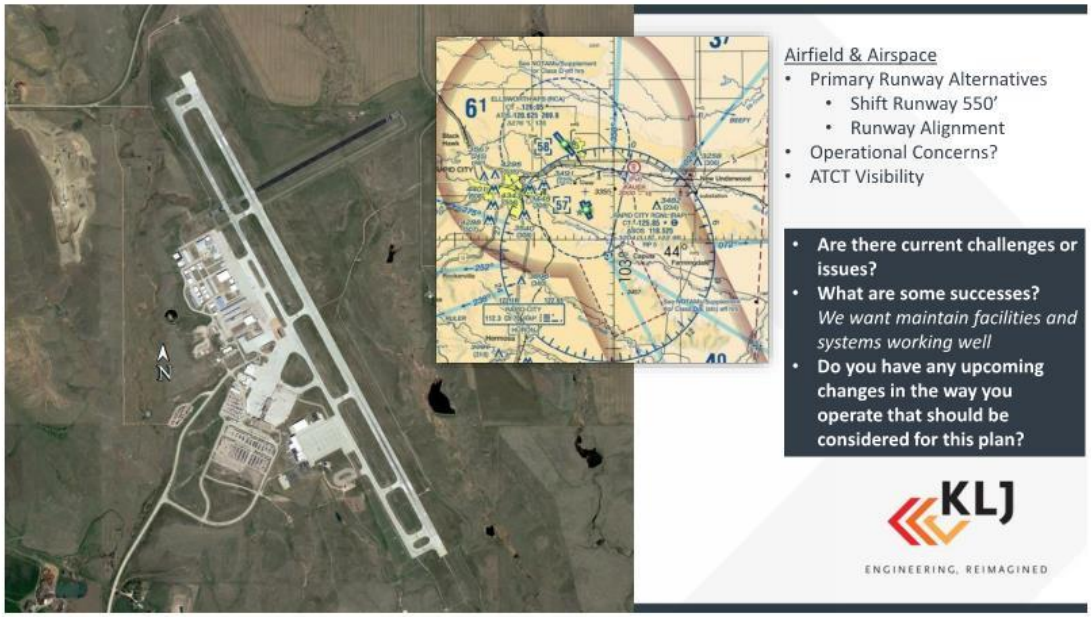
5/14/2020


Airfield & Airspace
• Primary Runway Alternatives
• Shift Runway 550'
• Runway Alignment
• Operational Concerns?
• ATCT Visibility
• Are there current challenges or issues?
• What are some successes?
We want maintain facilities and systems working well
• Do you have any upcoming changes in the way you operate that should be considered for this plan?
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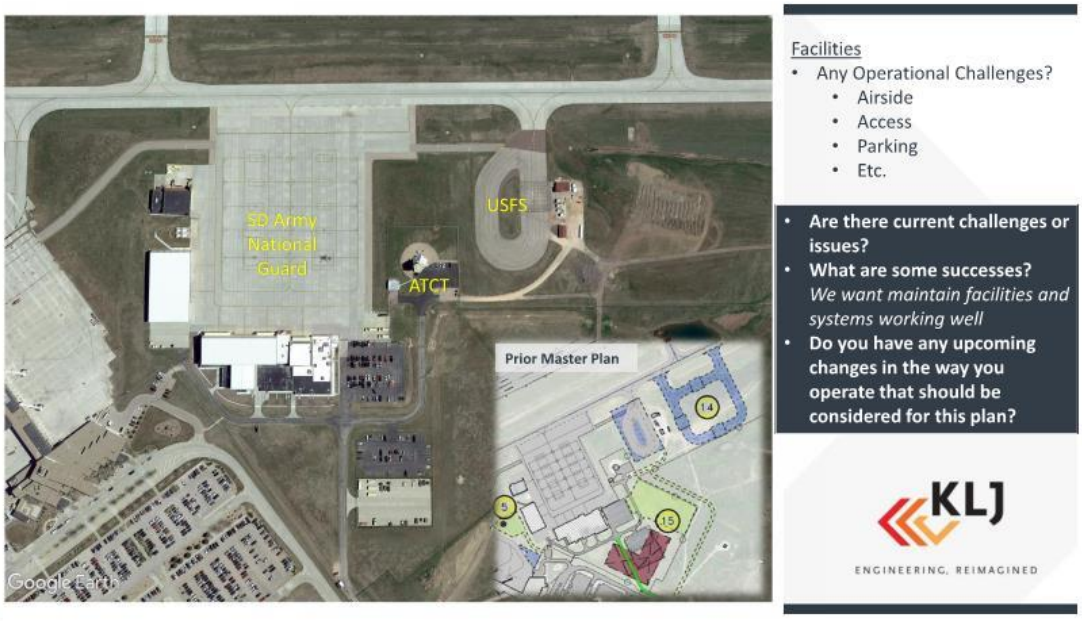
SD Army National Guard
USFS
ATCT
Prior Master Plan
Google Earth
Facilities
• Any Operational Challenges?
• Airside
• Access
• Parking
• Etc.
• Are there current challenges or issues?
• What are some successes?
We want maintain facilities and systems working well
• Do you have any upcoming changes in the way you operate that should be considered for this plan?
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4

Next Steps

- Aviation Activity Forecasts
- Facility Requirements
- Alternatives
  - Second Focus Group meeting will be held after alternatives have been developed (late summer / early fall).

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9

Questions & Comments

Matt Nisbet
Aviation Planner
matt.nisbet@kljeng.com
701.355.8449

KLJ
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10

ATTENDANCE LIST

RAPID CITY REGIONAL AIRPORT
Governmental Users & Air Traffic Controllers
Focus Group Kickoff Meeting
Wednesday May 13, 2020 at 11:00 a.m.
Webex Video Conference

Name:	Organization/Business:	Phone:	Email:
Kevin Merrill	USFS		kevin.merrill@usda.gov
Maurine Wrede	RAP ATC		maurine.wrede@midwestatcs.com
Gary Cozzetti	Ellsworth Approach		gary.cozzetti@us.af.mil
Martin Yost	National Guard		martin.r.yost.mil@mail.mil
Patrick Dame	RAP		patrick.dame@rcgov.org
Matt Nisbet	KLJ		
Tom Schauer	KLJ		
Kent Penney	KLJ		
Amber Channel	KLJ		

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5/14/2020

Rapid City Regional Airport

Master Plan Update
Airport Operations & Maintenance Focus Group
Kickoff Meeting - May 13, 2020

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2

5/14/2020

Agenda

- Introductions
- Airport Master Plan
- Focus Group Objectives
- Facility Discussions

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3

Airport Master Planning

- "Road Map" for meeting aviation demands
- Preserves flexibility to respond to the future
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- Why is a Master Plan Updated needed now?
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  - Continuity of operations – develop a plan to eliminate or minimize closure time of RAP's primary runway. Examples: Reconstruction, Aircraft Incidents, etc.

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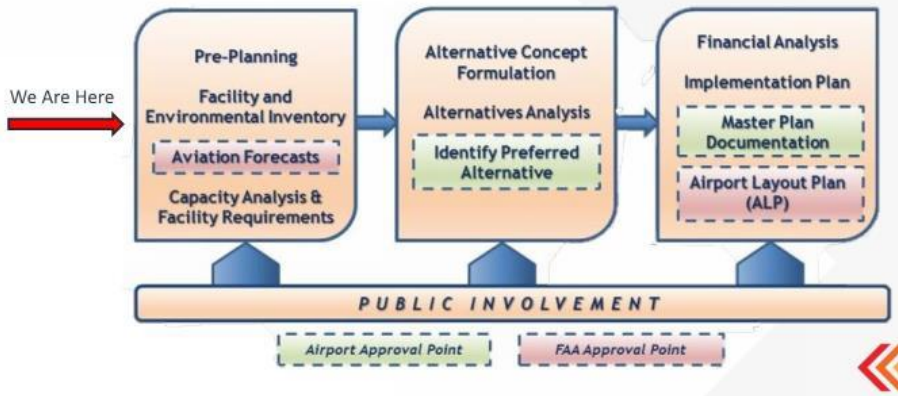
4

2

5/14/2020

Airport Master Planning



5

Focus Group

- Participate in two meetings, each anticipated to last an hour.
- Meeting 1 (today)
  - Identify any issues/challenges/successes
  - Let us know of any expected changes in the way you operate that should be considered for this plan
- Meeting 2 (late summer/early fall)
  - Discuss draft alternatives

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3

5/14/2020

Airfield
- Continuity of Operations & Primary Runway Alternatives
  - Shift Runway 550'
  - Runway Alignment
- Crosswind Runway
- Taxiways

- **Are there current challenges or issues?**
- **What are some successes?** *We want maintain facilities and systems working well*
- **Do you have any upcoming changes in the way you operate that should be considered for this plan?**

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Passenger Terminal Area
- Airside / Jet Bridges
- ARFF Station
- Rental Car Facilities
- Terminal Area Space
- Access & Parking

- **Are there current challenges or issues?**
- **What are some successes?** *We want maintain facilities and systems working well*
- **Do you have any upcoming changes in the way you operate that should be considered for this plan?**

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4

5/14/2020

General Aviation Area
- SRE/Maintenance Buildings
- Air Cargo Space
- Roads
- Hangars
- FBO/SASO

- **Are there current challenges or issues?**
- **What are some successes?** *We want maintain facilities and systems working well*
- **Do you have any upcoming changes in the way you operate that should be considered for this plan?**

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South Area
- SD Army National Guard
- Air Traffic Control Tower
- US Forest Service

- **Are there current challenges or issues?**
- **What are some successes?** *We want maintain facilities and systems working well*
- **Do you have any upcoming changes in the way you operate that should be considered for this plan?**

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10

5

5/14/2020

11

12

6

ATTENDANCE LIST

RAPID CITY REGIONAL AIRPORT

Airport Operations Focus Group Kickoff Meeting
Wednesday May 13, 2020 at 1:00 p.m.
Webex Video Conference

Name:	Organization/Business:	Phone:	Email:
Mehdi Bagheri Jafari	Airport maint.	720 841 0448	mehdi.bj19@gmail.com
Cody L Warren	Airport OPS	605-351-9457	Cody.Warren@RCGov.org
Zeb Handeland	Airport operations	605-593-3419	Zebediah.handeland@rcgov.org
JON BUXTON	AIRPORT OPS	605 484-8240	JON.BUXTON@RCGOV.ORG
GARY English	Airport OPS	605 5933419	Gary.english@RCGOV.ORG
KEVIN HITTLE	AIRPORT OPS	605-593-3419	kevin.hittle@rcgov.org
Chris Deitz	RCRA	605-791-6780	Chris.Deitz@rcgov.org
Patrick Dame	RAP		patrick.dame@rcgov.org
HUNTER HANEISTER	RAP Maint.		hunter.haneister@rcgov.org
ROBERT NOBLITT	RAP Maint.		Rob.NOBLITT@RCGOV.ORG
Brad Anderson	Operations	605-593-3419	brad.anderson@rcgov.org
Matt Nisbet	KLJ		
Tom Schaver	KLJ		
Kent Penney	KLJ		
Amber Channel	KLJ		

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5/14/2020


Rapid City Regional Airport
Master Plan Update
Cargo Focus Group Kickoff Meeting
May 14, 2020
KLJ
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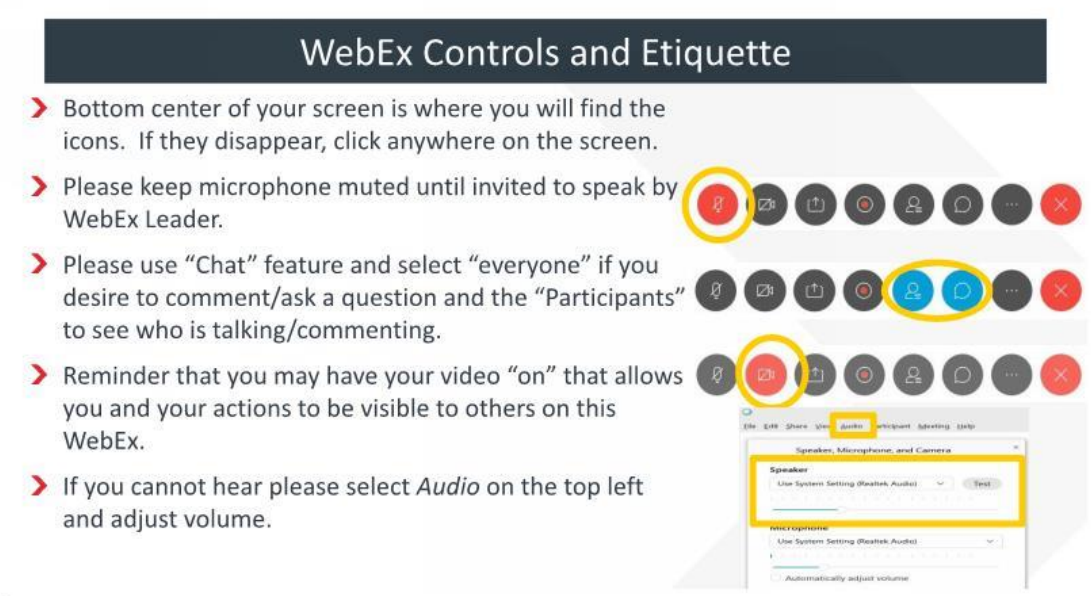
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2

5/14/2020

Agenda

- Introductions
- Airport Master Plan
- Focus Group Objectives
- Facility Discussions

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3

Airport Master Planning

- "Road Map" for meeting aviation demands
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2

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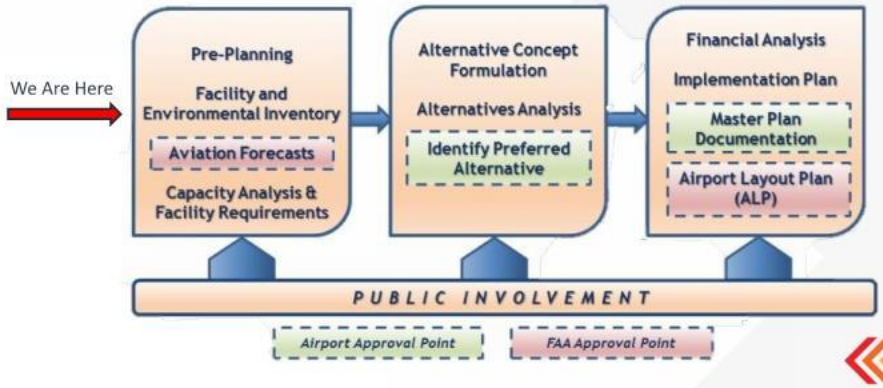
Airport Master Planning



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5

Focus Group

- Participate in two meetings, each anticipated to last an hour.
- Meeting 1 (today)
  - Verify existing operations
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Cargo Operations
• Existing Operations/Service
• Air Cargo Apron Space
• Landside Access
• Hangar/Office Needs
• Aircraft Fleet Mix
• Are there current challenges or issues?
• What are some successes?
We want maintain facilities and systems working well
• Do you have any upcoming changes in the way you operate that should be considered for this plan?
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Google Earth
Airfield
• Continuity of Operations / Runway Needs
• Air Cargo Alternatives
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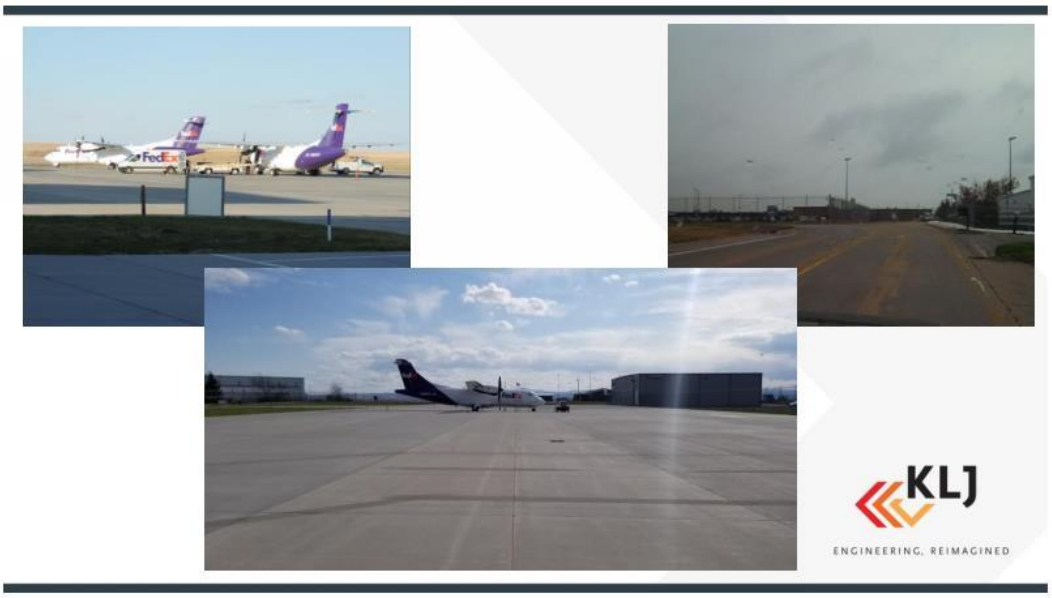
4

5/14/2020



9

Next Steps

- Aviation Activity Forecasts
- Facility Requirements
- Alternatives
  - Second Focus Group meeting will be held after alternatives have been developed (late summer / early fall).

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5/14/2020


Questions & Comments
Matt Nisbet
Aviation Planner
matt.Nisbet@kljeng.com
701.355.8449
KLJ
ENGINEERING, REIMAGINED

11

6

ATTENDANCE LIST

RAPID CITY REGIONAL AIRPORT

Cargo Focus Group Kickoff Meeting
Thursday May 14, 2020 at 9:00 a.m.
Webex Video Conference

Name:	Organization/Business:	Phone:	Email:
Todd Schettler	Alpine Air		tschettler@alpine-air.com
Patrick Dame	RAP		patrick.dame@rcgov.org
Tim Castro	Fedex		tcastro@hcinet.net
Matt Nisbet	KLJ		
Brent Penney	KLJ		
Amber Channel	KLJ		

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5/14/2020


Rapid City Regional Airport
Rapid City Regional Airport
Planning and Engineering Focus Group
Kickoff Meeting May 14, 2020
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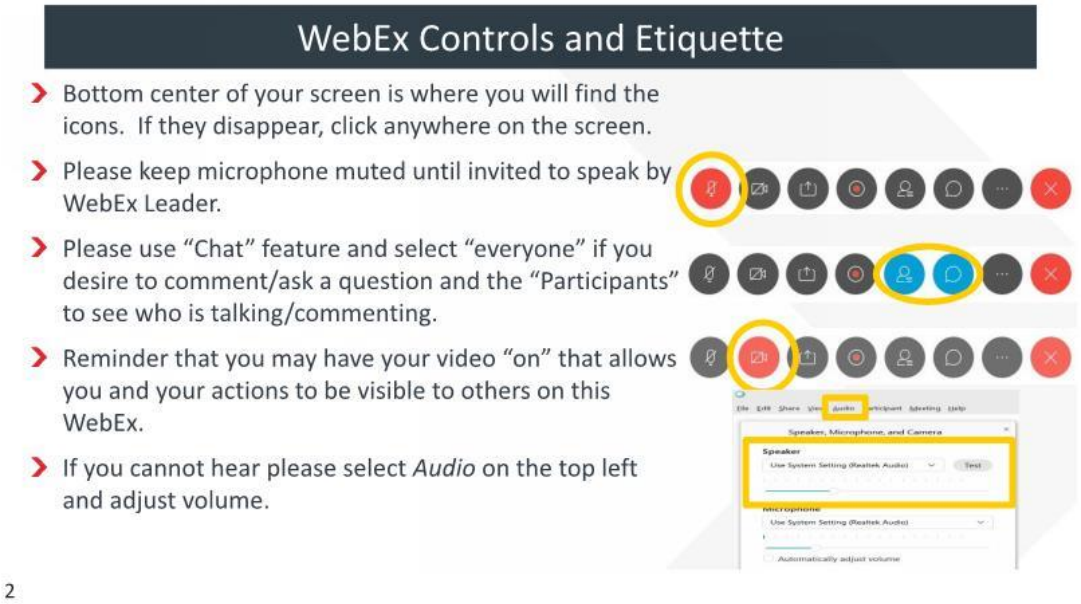
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2

5/14/2020

Agenda

- Introductions
- Airport Master Plan
- Focus Group Objectives
- Facility Discussions

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3

Airport Master Planning

- "Road Map" for meeting aviation demands
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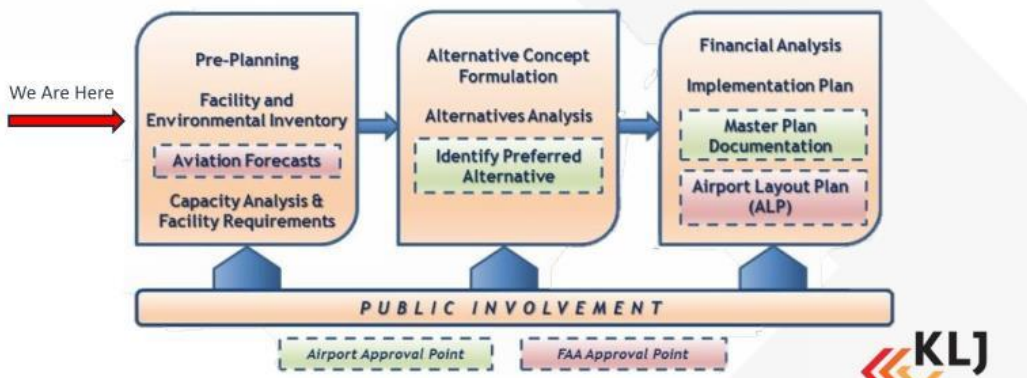
4

2

5/14/2020

Airport Master Planning



5

Focus Group

- Participate in two meetings, each anticipated to last an hour.
- Meeting 1 (today)
  - Project Overview
  - Discuss issues/successes and any recommendations
  - Discuss any upcoming development plans or infrastructure that should be considered for this airport master plan
- Meeting 2 (late summer/early fall)
  - Discuss draft alternatives

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5/14/2020


What are some focus areas of this AMP?
• Continuity of operations - runway needs
• Passenger terminal needs
• Rental car facilities
• General aviation facilities
• Air cargo space requirements
• Non-aeronautical land uses
• Landside Facilities
Putting available/developable space to its best use
KLJ
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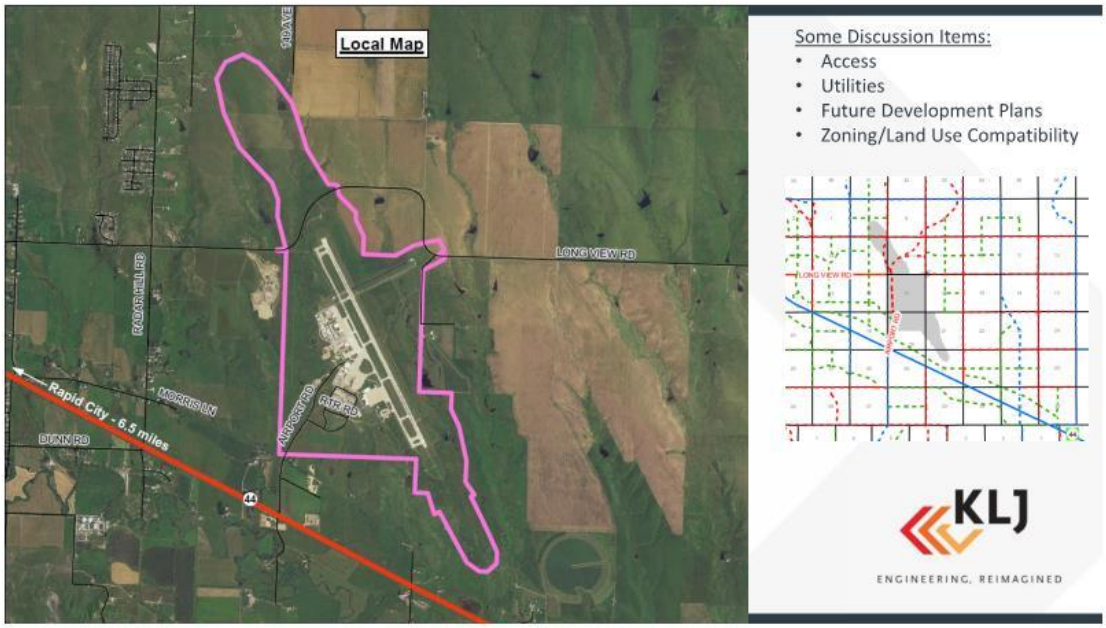
7


Local Map
LONG VIEW RD
RADAR HILL RD
MORRIS LN
DUNN RD
AIRPORT RD
Rapid City - 6.5 miles
Some Discussion Items:
• Access
• Utilities
• Future Development Plans
• Zoning/Land Use Compatibility
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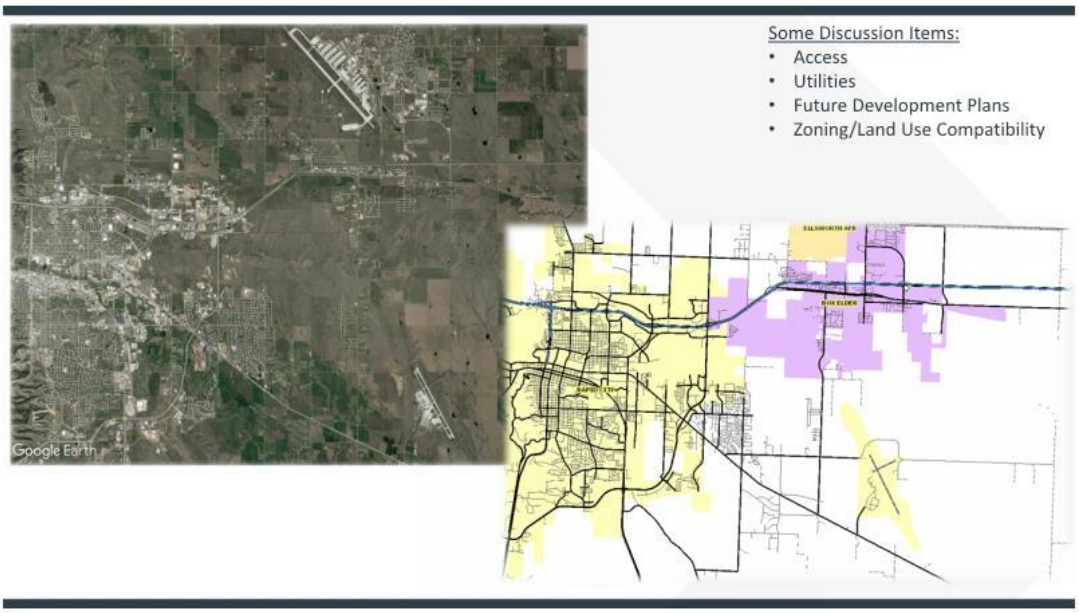
8

5/14/2020



9

Next Steps

- Aviation Activity Forecasts
- Facility Requirements
- Alternatives
  - Second Focus Group meeting will be held after alternatives have been developed (late summer / early fall).

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10

5

5/14/2020


Questions & Comments
Matt Nisbet
Aviation Planner
matt.nisbet@kljeng.com
701.355.8449
KLJ
ENGINEERING, REIMAGINED

11

6

ATTENDANCE LIST

RAPID CITY REGIONAL AIRPORT

Planning/Engineering Focus Group Kickoff Meeting
Thursday May 14, 2020 at 2:00 p.m.
Webex Video Conference

Name:	Organization/Business:	Phone:	Email:
Kip Harrington	City of Rapid City		kip.harrington@rcgov.org
Blaise Emerson	Box Elder		blaise.emerson@boxelder.us
Ken Young	City of Rapid City		ken.young@rcgov.org
Dale Tech	City of Rapid City		dale.tech@rcgov.org
Patrick Dame	RAP		patrick.dame@rcgov.org
Rod Sean	KLJ		
Matt Nisbet	KLJ		
Kent Penney	KLJ		
Amber Channel	KLJ		

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FBO & SASO Focus Group Kickoff Meeting – May 2020

5/18/2020

Rapid City Regional Airport

Master Plan Update
FBO & SASO Focus Group
Kickoff Meeting - May 18, 2020

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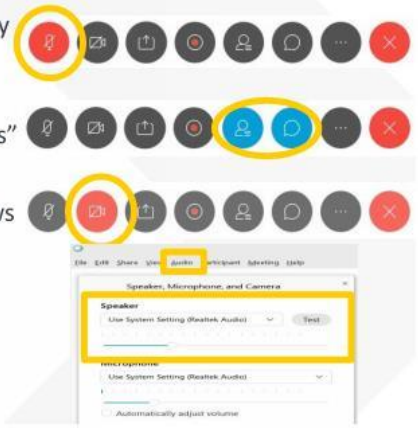

2

1

5/18/2020

Agenda

- Introductions
- Airport Master Plan
- Focus Group Objectives
- Facility Discussions

KLJ ENGINEERING, REIMAGINED

3

Airport Master Planning

- "Road Map" for meeting aviation demands
- Preserves flexibility to respond to the future
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- Why is a Master Plan Update needed now?
  - Last Airport Master Plan completed 2014 but forecasted numbers have been surpassed
  - Continuity of operations – develop a plan to eliminate or minimize closure time of RAP's primary runway.
    Examples: Reconstruction, Aircraft Incidents, etc.

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2

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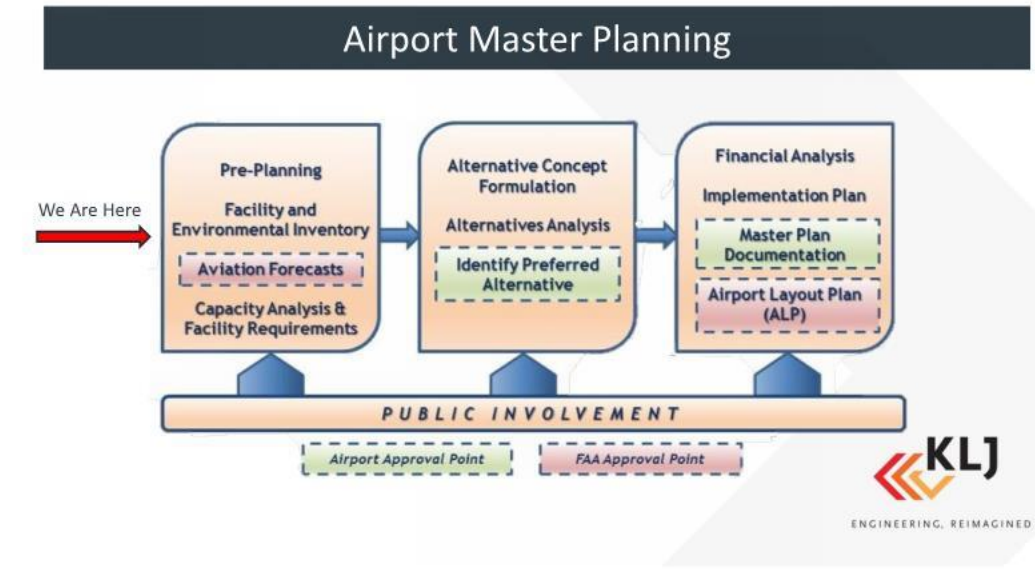
Airport Master Planning
We Are Here
Pre-Planning
Facility and Environmental Inventory
Aviation Forecasts
Capacity Analysis & Facility Requirements
Alternative Concept Formulation
Alternatives Analysis
Identify Preferred Alternative
Financial Analysis
Implementation Plan
Master Plan Documentation
Airport Layout Plan (ALP)
PUBLIC INVOLVEMENT
Airport Approval Point
FAA Approval Point
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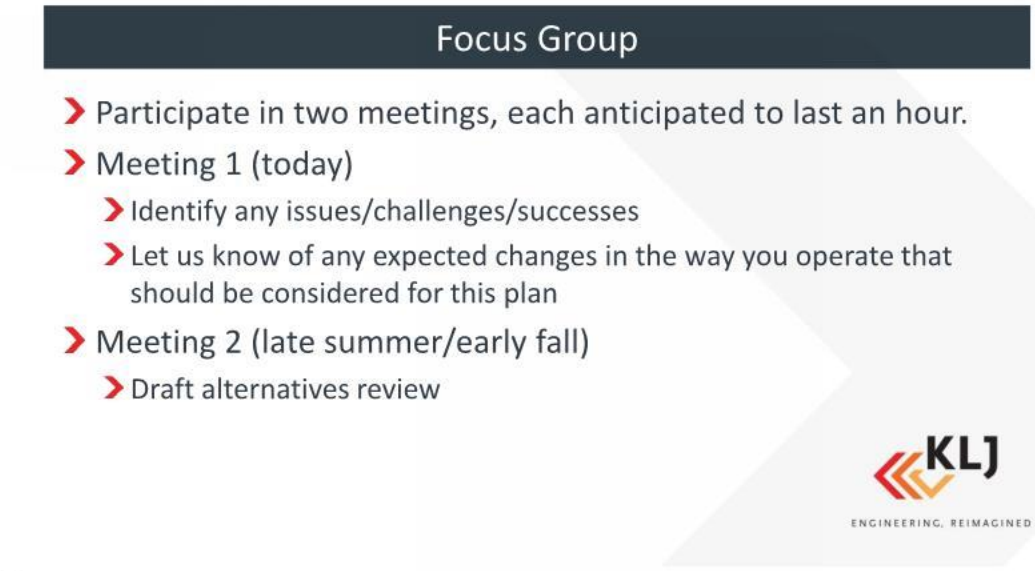
5


Focus Group
Participate in two meetings, each anticipated to last an hour.
Meeting 1 (today)
Identify any issues/challenges/successes
Let us know of any expected changes in the way you operate that should be considered for this plan
Meeting 2 (late summer/early fall)
Draft alternatives review
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Airfield

- Continuity of Operations & Primary Runway Alternatives
  - Shift Runway 550'
  - Runway Alignment
- Crosswind Runway
- Taxiways

- **Are there current challenges or issues?**
- **What are some successes?** *We want maintain facilities and systems working well*
- **Do you have any upcoming changes in the way you operate that should be considered for this plan?**

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7

General Aviation Area

- Apron Areas
- Hangars
- Roads/Access
- Parking
- Other Facilities/Operations

- **Are there current challenges or issues?**
- **What are some successes?** *We want maintain facilities and systems working well*
- **Do you have any upcoming changes in the way you operate that should be considered for this plan?**

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4

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Terminal / South Area

- **Are there current challenges or issues?**
- **What are some successes?** *We want maintain facilities and systems working well*
- **Do you have any upcoming changes in the way you operate that should be considered for this plan?**

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9

Next Steps

- Aviation Activity Forecasts
- Facility Requirements
- Alternatives
  - Second Focus Group meeting will be held after alternatives have been developed (late summer / early fall).

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10

5

5/18/2020


Questions & Comments
Matt Nisbet
Aviation Planner
matt.nisbet@kljeng.com
701.355.8449
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11

6

ATTENDANCE LIST

RAPID CITY REGIONAL AIRPORT

FBO & SASO Tenants Focus Group Kickoff Meeting
Monday May 18, 2020 at 1:00 p.m.
Webex Video Conference

Name:	Organization/Business:	Phone:	Email:
Linda Rydstrom	Westjet	605-393-2500	Linda@westjetair.com
Bijan Maleki	Plane Training	605-939-9326	bijan@planeflighttraining.com
Teresa Farnsworth	Black Hills Life Flight		teresa.farnsworth@airmethods.com
Beth Mahnke	Advanced Aero Tech.		beth.mahnke@advancedaerotech.com
Matt Nisbet	KLJ		
Tom Schaver	KLJ		
Trent Penney	KLJ		
Amber Channel	KLJ		

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5/19/2020


Rapid City Regional Airport
Master Plan Update
General Aviation Focus Group
Kickoff Meeting - May 18, 2020
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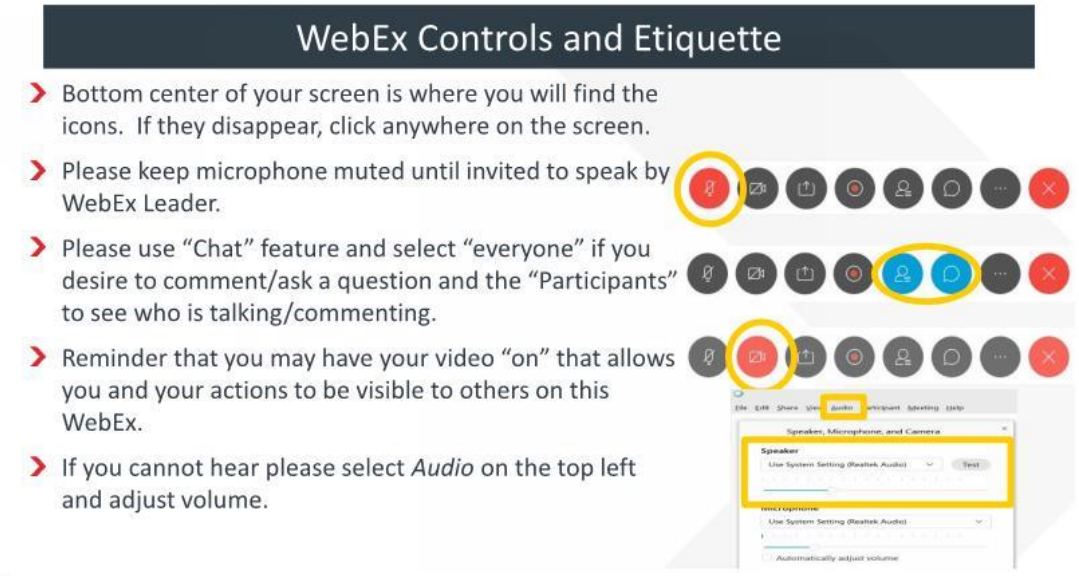
1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Agenda

- Introductions
- Airport Master Plan
- Focus Group Objectives
- Facility Discussions

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3

Airport Master Planning

- "Road Map" for meeting aviation demands
- Preserves flexibility to respond to the future
- Allows airport to cost-effectively keep pace with aviation growth
- Considers environmental and socioeconomic impact of development
- Why is a Master Plan Update needed now?
  - Last Airport Master Plan completed 2014 but forecasted numbers have been surpassed
  - Continuity of operations – develop a plan to eliminate or minimize closure time of RAP's primary runway.
    Examples: Reconstruction, Aircraft Incidents, etc.

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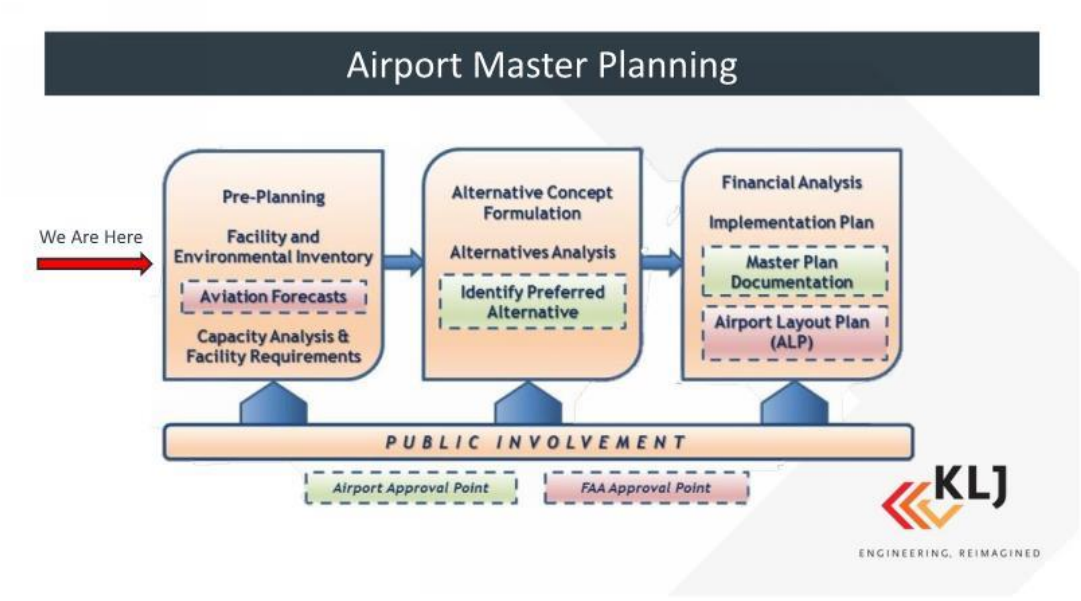
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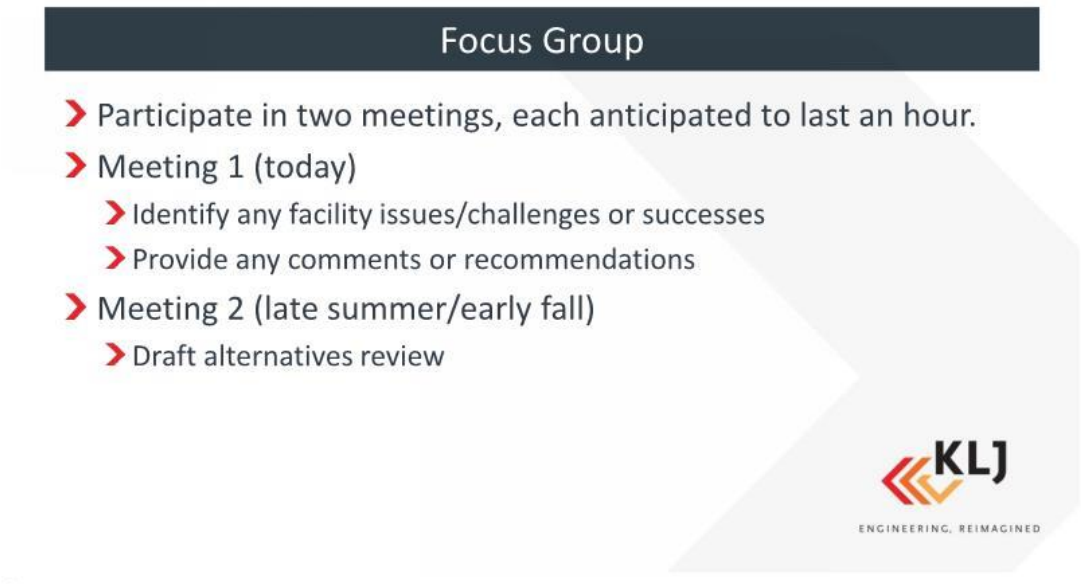
Focus Group
Participate in two meetings, each anticipated to last an hour.
Meeting 1 (today)
Identify any facility issues/challenges or successes
Provide any comments or recommendations
Meeting 2 (late summer/early fall)
Draft alternatives review
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5/19/2020

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ATTENDANCE LIST

RAPID CITY REGIONAL AIRPORT

General Aviation Focus Group Kickoff Meeting
Monday May 18, 2020 at 5:00 p.m.
Webex Video Conference

Name:	Organization/Business:	Phone:	Email:
Bert Corwin			bccorwin@rap.midco.net
John Glasford			glasfordjo@gmail.com
Stephen Eckrich			sjunkbone@rap.midco.net
Geoffrey Slingsby			jgslingsby@yourvisioncare.net
Gary Telkamp			garytelkamp@gmail.com
Jerry Densmore			densmorejerry@gmail.com
Robert Allen			capt.allen@gmail.com
Kathy Reishus			customconcretecutting1@gmail.com
Dean Beresford			ccpilots@icloud.com
Matt Nisbet	KLJ		
Tom Schaver	KLJ		
Kent Penney	KLJ		
Amber Channel	KLJ		

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Agenda

- Introductions
- Airport Master Plan
- Focus Group Objectives
- Facility Discussions

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3

Airport Master Planning

- "Road Map" for meeting aviation demands
- Preserves flexibility to respond to the future
- Allows airport to cost-effectively keep pace with aviation growth
- Considers environmental and socioeconomic impact of development
- Why is a Master Plan Update needed now?
  - Last Airport Master Plan completed 2014 but forecasted numbers have been surpassed
  - Continuity of operations – develop a plan to eliminate or minimize closure time of RAP's primary runway.
    Examples: Reconstruction, Aircraft Incidents, etc.

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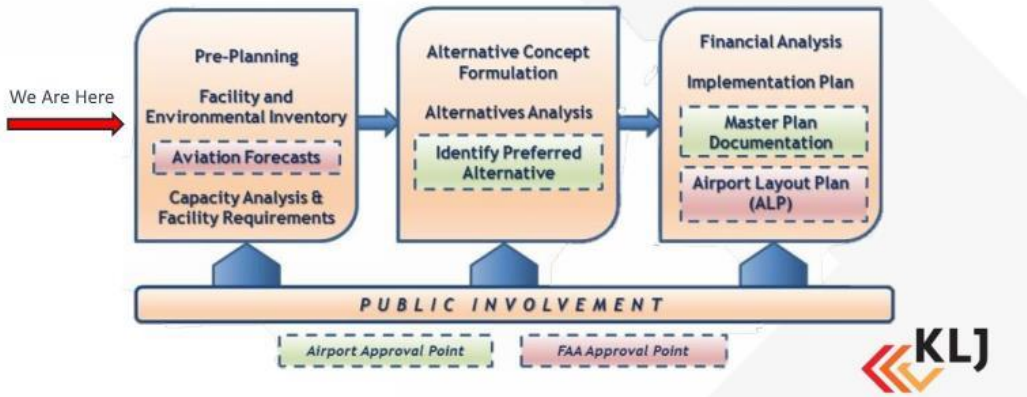
Airport Master Planning



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Focus Group

- Participate in two meetings, each anticipated to last an hour.
- Meeting 1 (today)
  - Identify any issues/challenges/successes
  - Let us know of any expected changes in the way you operate that should be considered for this plan
  - If time, go over preliminary feedback from Focus Groups
- Meeting 2 (late summer/early fall)
  - Discuss draft alternatives

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5/20/2020

Airfield

- Continuity of Operations & Primary Runway Alternatives
  - Shift Runway 550'
  - Runway Alignment
- Crosswind Runway
- Instrument Approaches
- Taxiways

- **Are there current challenges or issues?**
- **What are some successes?** *We want maintain facilities and systems working well*
- **Do you have any upcoming changes in the way you operate that should be considered for this plan?**

7

General Aviation Area

- SRE/Maintenance Buildings
- Air Cargo Space
- Roads
- Hangars
- FBO/SASO
- Access/Parking
- Fuel Farm

- **Are there current challenges or issues?**
- **What are some successes?** *Keep facilities and systems working well*
- **Do you have any upcoming changes in the way you operate that should be considered for this plan?**

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South Area
- SD Army National Guard
- Air Traffic Control Tower
- US Forest Service

- **Are there current challenges or issues?**
- **What are some successes?** *We want maintain facilities and systems working well*
- **Do you have any upcoming changes in the way you operate that should be considered for this plan?**

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Passenger Terminal Area
- Airside / Jet Bridges
- ARFF Station
- Rental Car Facilities
- Terminal Area Space
- Access & Parking
- Nonaeronautical Development

- **Are there current challenges or issues?**
- **What are some successes?** *We want maintain facilities and systems working well*
- **Do you have any upcoming changes in the way you operate that should be considered for this plan?**

10

5

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Passenger Terminal Area

Rental Car Facilities

Public Parking

Terminal Area Space

Other Landside Facilities

Nonaeronautical Development Opportunities

- **Are there current challenges or issues?**
- **What are some successes?** *We want maintain facilities and systems working well*
- **Do you have any upcoming changes in the way you operate that should be considered for this plan?**

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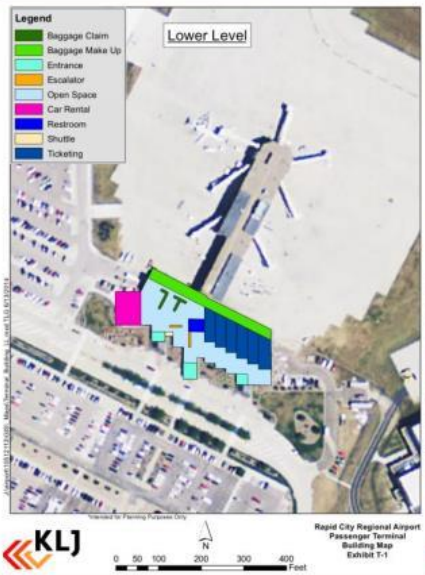

- **Are there current challenges or issues?**
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- **Do you have any upcoming changes in the way you operate that should be considered for this plan?**

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12

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13

Focus Group Feedback

Airlines

Lori Lowery (Delta/United)

- Lori believes this summer will have lower than anticipated enplanements because of COVID-19 but next summer the airlines should have a better idea as to when things will get back on track.
- Lori didn't express any issues with the terminal area.
- Aircraft Size:
  - Expects 76- seaters will stick around and be used at Gate 2 while Gate 3 & 4 will hold the bigger main line aircraft
  - She is not aware of an increase in aircraft size in the next five years.

Terminal Concessions
No Attendance

Gov. Operators & Airspace

- A runway shift would not affect Ellsworth operations.
- Look into a MOA for the private grass field and how they would operate with a runway shift.
- Alternative road being used by ATC and USFS because of new SDARNG building - needs to be reevaluated for a long-term solution.
- Potential for partnerships between RAP and SDARNG (lagoon, road improvements, etc.)
- Look into pavement needs for USFS and add into capital improvement planning.

Martin Yost – South Dakota Army National Guard
Gary Cozzetti – Ellsworth App/Dep Control
Kevin Merrill – United States Forest Service
Maruine Wrede – RAP Air Traffic Control Tower

14

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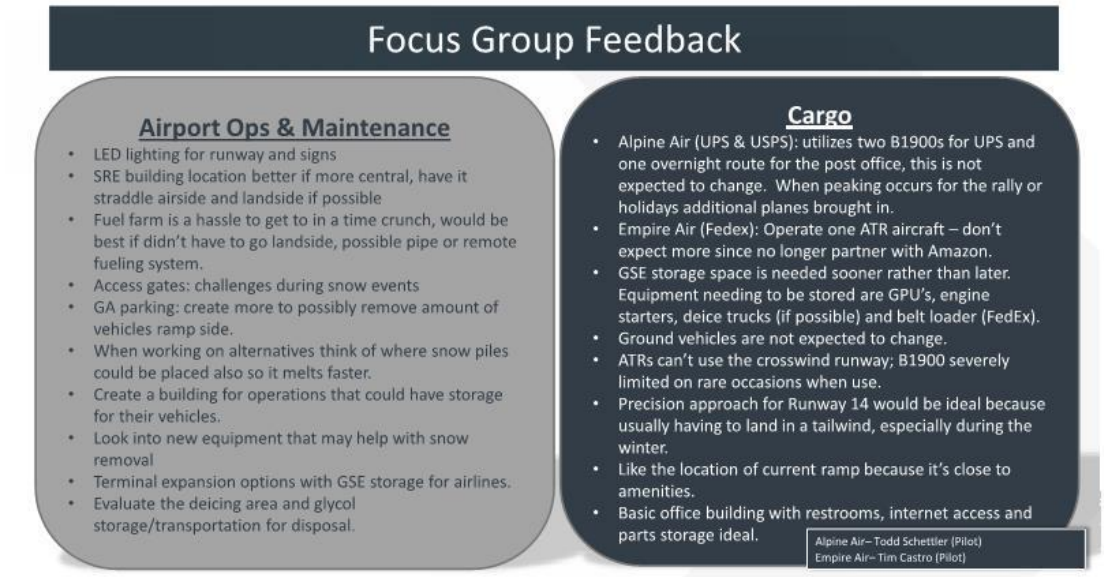

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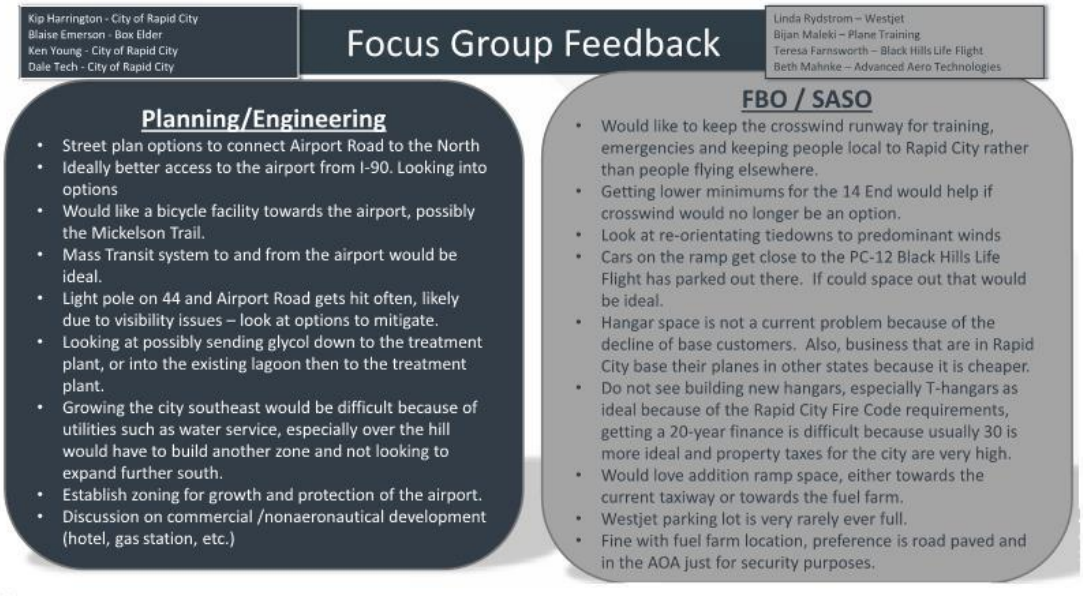

16

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Focus Group Feedback

General Aviation

- Would like to keep crosswind because it gets used not only by GA but business jets and medical flights and for intense/fast changing winds at the airport.
- A wind rose at the airport would be helpful for maintenance on the north end. And could use for VOR check point.
- Assign a designated area for temporary or visiting GA cars to park with easy access to the ramp that they do not have to go through an FBO like what Montgomery Field has in San Diego.
- A place to eat for the GA side like a café or burger place to it is easier to access and not that far of a walk to promote a fun spot for a fuel stop because when planning a flight the two things that are looked at the most are fuel prices and a place to eat.
- Designated tie down area.

In Attendance:
Burt Corwin – former Chair of GA Committee
John Glasford
Stephen Eckrich
Geoffrey Slingsby
Gary Telkamp
Jerry Densmore
Jim Schroeder
Robert Allen – Chair of GA Committee
Kathy Reishus
Dean Beresford

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Next Steps

- Aviation Activity Forecasts
- Facility Requirements
- Alternatives
  - Second Focus Group meeting will be held after alternatives have been developed (late summer / early fall).

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18

9

5/20/2020

19

10

ATTENDANCE LIST

RAPID CITY REGIONAL AIRPORT

Airport Executive Staff Focus Group Kickoff Meeting
Tuesday May 19, 2020 at 11:00 a.m.
Webex Video Conference

Name:	Organization/Business:	Phone:	Email:
Lindsey Martin	RAP	605 3944195	lindsey.martin@rcgov.org
Toni Broom	RAP	605 3944195	toni.broom@rcgov.org
PATRICK DAME	RAP	"	patrick.dame@rcgov.org
Chris Deitz	RAP	"	chris.deitz@rcgov.org
Matt Nisbet	KLJ		
Tom Schaver	KLJ		
Kent Penney	KLJ		
Amber Channel	KLJ		

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5/20/2020


Rapid City Regional Airport
Airport Master Plan
Economic Development Focus Group
Kickoff Meeting – May 19, 2020
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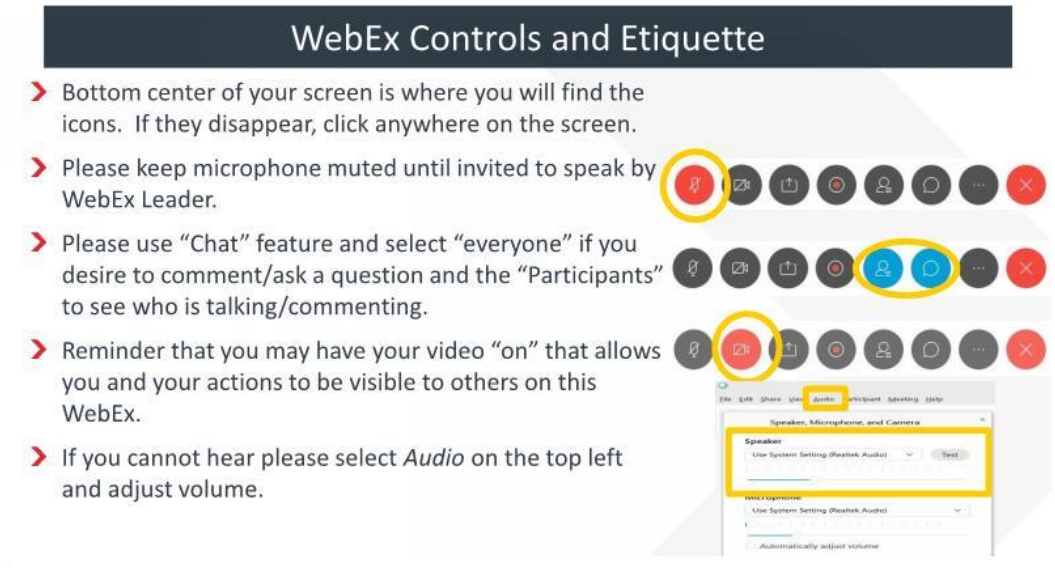
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5/20/2020

Agenda

- Introductions
- Airport Master Plan
- Focus Group Objectives
- Economic Development Discussion

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3

Airport Master Planning

- "Road Map" for meeting aviation demands
- Preserves flexibility to respond to the future
- Allows airport to cost-effectively keep pace with aviation growth
- Considers environmental and socioeconomic impact of development
- Why is a Master Plan Update needed now?
  - Last Airport Master Plan completed 2014 but forecasted numbers have been surpassed
  - Continuity of operations – develop a plan to eliminate or minimize closure time of RAP's primary runway.

Examples: Runway Reconstruction, Aircraft Incidents, etc.

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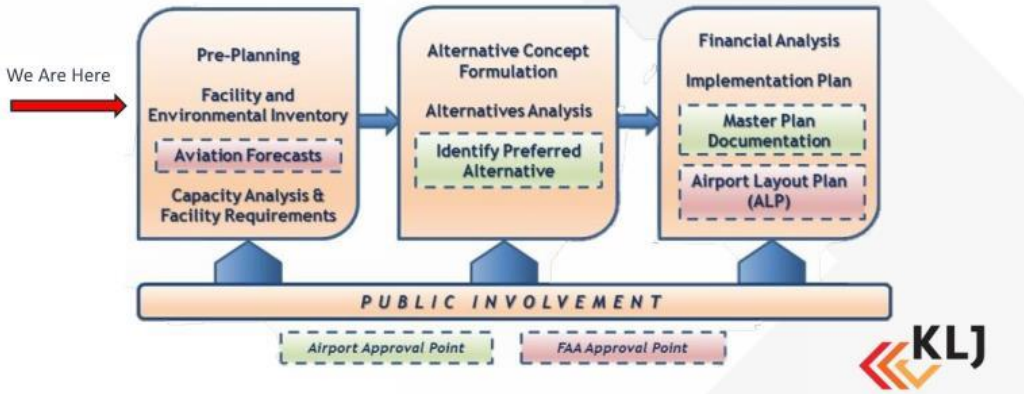
Airport Master Planning



5

Focus Group

- Participate in two meetings, each anticipated to last an hour.
- Meeting 1 (today)
  - Master Plan Focus Areas
  - Airport's role in regional economic development
  - Identify any issues, successes and opportunities
  - Provide any recommendations or ideas for improvements beneficial to the Airport and surrounding communities.
- Meeting 2 (late summer/early fall)
  - Discuss draft alternatives

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- Continuity of Operations-Primary Runway Needs
- Passenger Terminal
- Rental Car Parking Area
- General Aviation Facilities
- Air Cargo Space
- Non-Aeronautical Land Uses
- Landside Facilities

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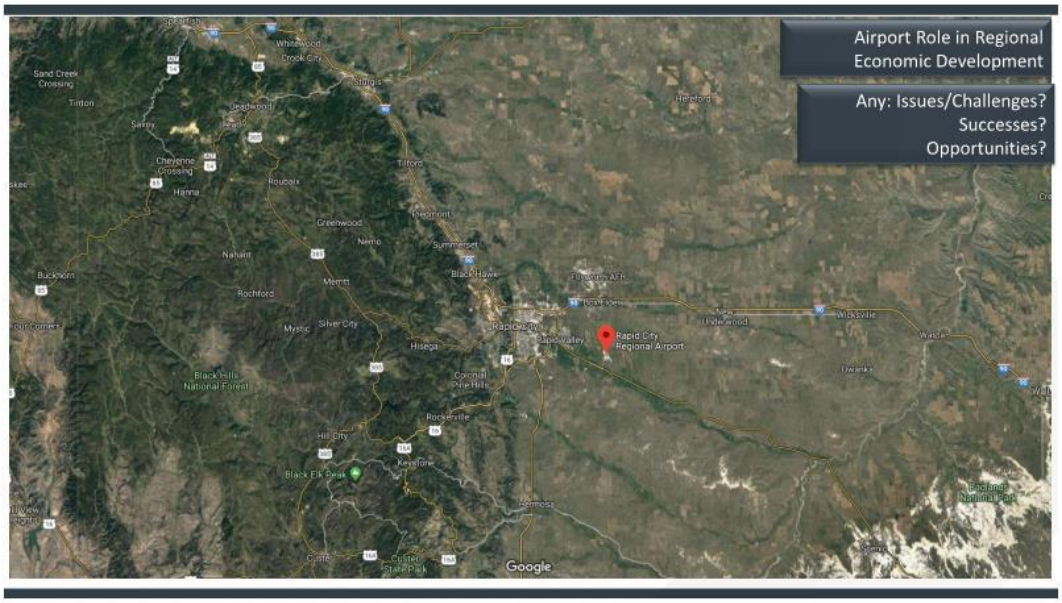

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Next Steps

- Aviation Activity Forecasts
- Facility Requirements
- Alternatives
  - Second Focus Group meeting will be held after alternatives have been developed (late summer / early fall).

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Questions & Comments

Matt Nisbet
Aviation Planner
matt.nisbet@kljeng.com
701.355.8449

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ATTENDANCE LIST

RAPID CITY REGIONAL AIRPORT

Economic Development Focus Group Kickoff Meeting
Tuesday May 19, 2020 at 3:00 p.m.
Webex Video Conference

Name:	Organization/Business:	Phone:	Email:
Kristi Wagner	Board of Tourism of SD		kristi@dakotaresources.org
Julie Jensen	Visit Rapid City		jensene visitrapidcity.com
Kevin Wagner	Lead/Deadwood Eco. Development		kevinwagnersdeg@gmail.com
Tom Johnson	Elevate Rapid City		tom.johnson@elevaterapidcity.com
Lee Harsted	Deadwood Chamber		leee@deadwood.org
Jason Lambert	Monumental Health		jlambert2@regionalhealth.org
Patrick Dame	RAP		patrick.dame@rcgov.org
Matt Nisbet	KLJ		
Tom Schaver	KLJ		
Kent Penney	KLJ		
Amber Channel	KLJ		

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Rapid City Regional Airport
Master Plan Update
Advisory Committee Kickoff Meeting
May 20, 2020
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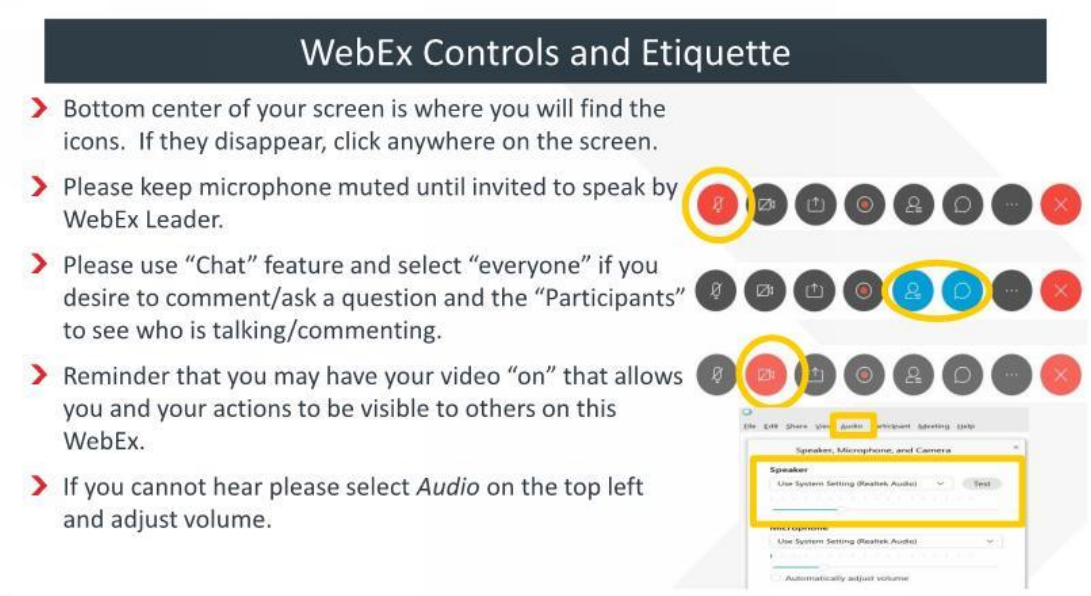
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5/20/2020

Agenda

- Introductions
- Roles & Responsibilities
- Airport Master Plan Process
- Focus Areas
- Next Steps

RAPID CITY REGIONAL AIRPORT

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3

Roles & Responsibilities

- RCRA / City of Rapid City
  - Provide Guiding Principles
  - Make Decisions
  - Review and Approve Master Plan and ALP
- FAA & SD Office of Aeronautics
  - Provide Technical Guidance
  - Approve Aviation Forecasts
  - Review Master Plan
  - Approve ALP
- KLJ Planning Team
  - Manage Study
  - Complete Technical Work
  - Provide Analysis

RAPID CITY
Kent Penney A.A.E., Senior Aviation Planner
605 939 5794
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BISMARCK
Matt Nisbet, Aviation Planner
701 355 8449
matt.Nisbet@kljeng.com

BISMARCK
Tom Schauer, Senior Aviation Advisor
701 250 5944
tom.schauer@kljeng.com

RAPID CITY
Amber Channel, Aviation Planner
605 939 9144
amber.channel@kljeng.com

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Roles & Responsibilities

- Advisory Committee
  - Why me?
    - Role in Decision
    - Stake in the Outcome
    - Valued Resource
  - Identify Key Issues
  - Review Documents
  - Provide Input and Recommendations

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Roles & Responsibilities

- Other Groups included in the study
  - Strategic Partner Committee
    - Rapid City Government
    - Rapid City ED
    - Pennington County
    - Box Elder
    - Sturgis
    - Spearfish
    - Deadwood
    - Ellsworth AFB
    - Hospitality
    - SDSM&T
  - Focus Groups
    - Airport Executive Staff
    - Airport Operations
    - Government Operators & Airspace
    - Economic Development
    - Planning/Engineering
    - Airline Representatives
    - TSA
    - Terminal Concessions
    - General Aviation Tenants
    - FBO/SASO Tenants
    - Cargo Representatives

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Airport Master Planning

- What is an Airport Master Plan?

"An Airport Master Plan is a comprehensive study of an airport and usually describes the short-, medium- and long-term development plans to meet future aviation demand"

Federal Aviation Administration (FAA)
Advisory Circular 150/5070-6B, Airport Master Plans

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7

Airport Master Planning

- "Road Map" for meeting aviation demands
- Preserves flexibility to respond to the future
- Allows airport to cost-effectively keep pace with aviation growth
- Considers environmental and socioeconomic impact of development
- Why is a Master Plan Update needed now?
  - Last Airport Master Plan completed 2014 but forecasted numbers have been surpassed
  - Continuity of operations – develop a plan to eliminate or minimize closure time of RAP's primary runway.

Examples: Reconstruction, Aircraft Incidents, etc.

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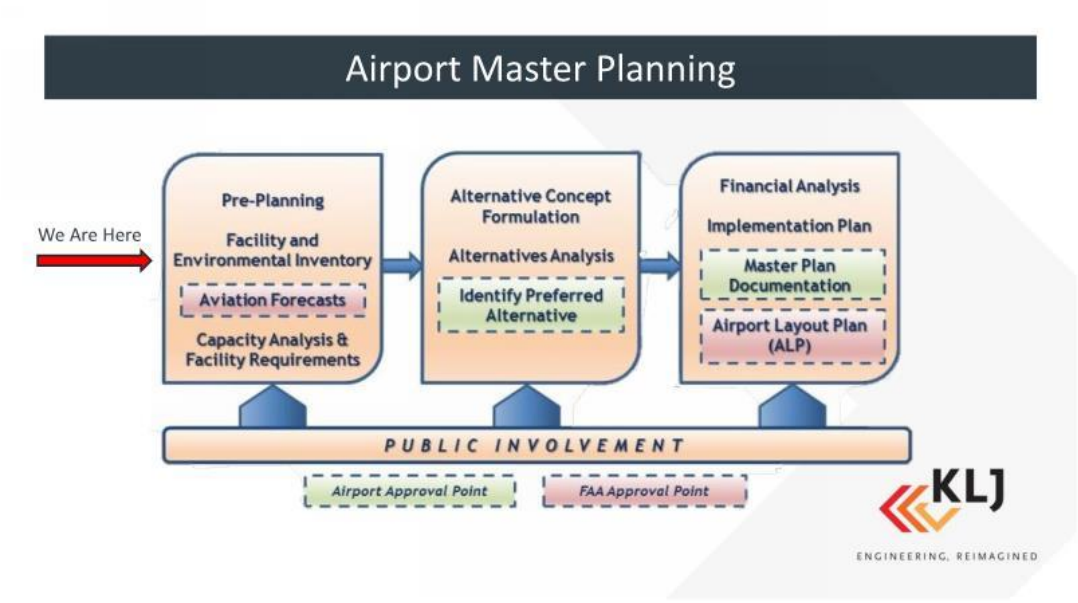

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Rapid City Regional Airport
Monthly Statistics

	December					Year-to-Date				
	2019	2018	2016 to 2018 average	% Chg 2019 vs. 2018	% Chg 2019 vs. 2016 to 2018 average	2019	2018	2016 to 2018 average	% Chg 2019 vs. 2018	% Chg 2019 vs. 2016 to 2018 average
Enplaned Passengers	27,525	19,504	20,406	41.1%	34.9%	350,960	310,810	295,194	12.9%	18.9%
Deplaned Passengers	26,694	19,793	20,515	34.9%	30.1%	354,156	315,108	299,124	12.4%	18.4%
Total passengers	54,219	39,297	40,921	38.0%	32.5%	705,116	625,918	594,319	12.7%	18.6%
Total available seats	66,560	46,002	53,476	44.7%	24.5%	854,080	733,886	718,752	16.4%	18.8%
Load Factor	81.5%	85.4%	76.5%	-4.6%	6.5%	82.6%	85.3%	82.7%	-3.2%	-0.2%
Airline Flights Operated	473	364	395	29.9%	19.6%	6,187	5,641	5,444	9.7%	13.6%

Source: rapairport.com, "Rapid City Regional Airport Monthly Statistics, December 2019"

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5/20/2020

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5/20/2020

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5/20/2020

South Area
- SD Army National Guard
- Air Traffic Control Tower
- US Forest Service
- Landside Facilities
- Potential for Air Cargo

- **Any challenges or issues?**
- **What are some successes?**
  We want to keep facilities and systems working well

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Next Steps

- Aviation Activity Forecasts
- Facility Requirements
- Alternatives
  - Next meeting will be held after alternatives have been developed (late summer / early fall).

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5/20/2020

Questions & Comments

rapidcityairportplan.com

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Passenger Terminal Area

Rental Car Facilities

Public Parking

Terminal Area Space

Other Landside Facilities

Nonaeronautical Development Opportunities

- **Any challenges or issues?**
- **What are some successes?**
  We want to keep facilities and systems working well

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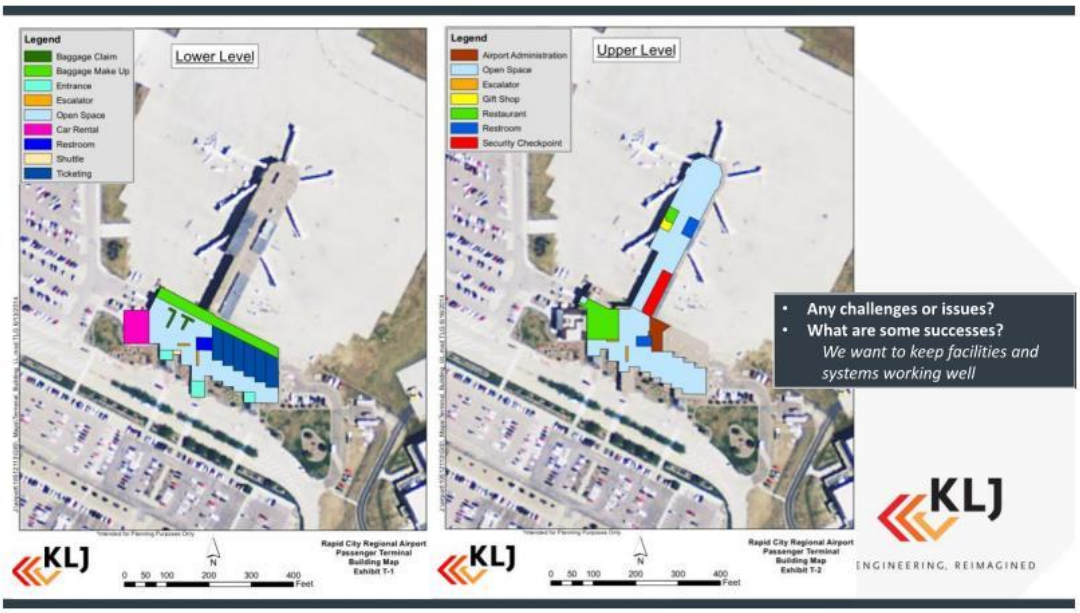
5/20/2020



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10

ATTENDANCE LIST

RAPID CITY REGIONAL AIRPORT

Advisory Committee Kickoff Meeting
Wednesday May 20, 2020 at 2:00 p.m.
Webex Video Conference

Name:	Organization/Business:	Phone:	Email:
Shawn Gabe	RAP Board		shawn.gabe@rcgov.org
Rod Pettigrew	RAP Board		pettigrewrod@gmail.com
Les Mittleider	L+D Aero		les@lndaero.com
Robert Allen	GA Committee		capt.allen@gmail.com
Martin Yost	SD ARNG		martin.r.yost.mil@mail.mil
Brittney Molitor	Pennington County		brittneym@pennco.org
Linda Rydstrom	Westjet		linda@westjetair.com
Sandy DePottey	FAA		sandy.depottey@faa.gov
David Anderson	FAA		david.p.anderson@faa.gov
Jon Becker	SD DOT		jon.becker@state.sd.us
Patrick Dame	RAP		patrick.dame@rcgov.org
Matt Nisbet	KLJ		
Tom Schaver	KLJ		
Ihent Penney	KLJ		
Amber Channel	KLJ		

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Rapid City Regional Airport - Master Plan Update
Strategic Partner Committee Meeting
October 6, 2020

The strategic planning process facilitates community collaboration to prepare for economic shifts, asset management, and regional vitality. The SWOT analysis (strengths, weaknesses, opportunities, and threats) session for this Airport Master Plan was conducted at a virtual meeting with regional stakeholders and critical community partners on October 6, 2020.

A SWOT analysis helps groups verbalize the internal (strengths and weaknesses) and external (opportunities and threats) factors impacting the functionality and success of a community, an entity or a business. It is one of the most commonly used business analyses and decision-making tools and assists in building strengths, minimizing weaknesses, seizing opportunities, and counteracting threats.

In summary, the SWOT analysis for this project revealed that the Rapid City Airport is very accessible, has been successful at drawing visitors into the area, provides generally updated facilities, creates ease of travel and connections to area communities, and is currently under effective and positive leadership. In discussing areas for improvement, stakeholders verbalized the need for additional capital improvements, including covered parking, increases in drop-off and pick-up areas, increased signage that notifies visitors as to airline desk and rental car hours, and technologies that would improve the speed at which baggage handling and claims are handled.

There was significant discussion as to the current and future impacts of Covid and related travel for the airport and the communities it serves. Overall, the group indicated they believed Covid provided a long-term opportunity for growth, especially given the rural nature of the communities the facility serves and the ongoing desire of travelers to be away from dense urban centers. "Overseas travel has come to a halt, and domestic travel will be picking up. There is a considerable opportunity to capture domestic travel increase and make Rapid City the leisure destination."

Specific information related to attendees, background and comments in each of the SWOT areas follows.

Attendees: Beka Zerbst, Sturgis City Council; Jonathan Wyatt, USAF, Ellsworth Airforce Base Air Traffic Control; Jerilyn Roberts, SD School of Mines; Kathryn Johnson, Retired USAF; Michelle Thomson, RCRA Airport Board; Tim Johnson, Diamond Hospitality; Calab Arceneaux, LIV Hospitality; Patrick Dame, Airport Director; Chris Dietz, Airport Operations; Toni Broom, Airport Deputy Director, and various KLJ staff.

Following introductions and discussion of the meeting agenda and ground rules, Patrick Dame led the meeting with a short welcome and discussion of the airport's master planning process. He indicated that the last master plan was good, but that growth exceeded estimations, resulting in the need for the airport to re-evaluate their numbers and think bigger. He reiterated the importance of regional stakeholder input as the airport considers how their work reaches out past Rapid City into all of western South Dakota and how the facilities and operations can serve the greater South Dakota Community.

Tom Schauer with KLJ set the stage for the SWOT by outlining how the discussion would be part of the larger master planning efforts currently being conducted as the airport continued to determine the "bigger picture" that Patrick discussed in his opening comments. Tom indicated that among other things, KLJ and the airport are considering substantial capital improvement needs. The runway is coming closer the end of its useful life within the next 10 years and this will be essential to address. Tom discussed how funding for these types of projects is generally allocated (phased over several years) and that when the Rapid City airport was last reconstructed, the Air Force Base served as an alternate runway. That was before 9/11 and with new security requirements, that is no longer an option. Based on this, Tom did ask people to consider as part of their conversation how the airport specifically impacts the business, organization or community each stakeholder represents and how closure of the runway for replacement would impact each business, organization or community.

Becky with KLJ facilitated the SWOT discussion. Specific comments in each area are noted below:

Strengths:

- Accessibility. The airport offers the small town feel and personal service. (The thought of shutting down the runway for any length of time is not acceptable).
- Facilities are great and updated.
- Airport has done a great job of getting direct flights. They work well with South Dakota Tourism and other marketing efforts to bring people to the region.
- The airport has been very successful bringing visitors to the region.
- Airport marketing is a strength. The marketing plan looks at visitors and designs efforts to bring them to the Rapid City region. The campaign is designed to bring people into the region.
- The Airport has been working with consulting firms to reach people who are traveling to the Rapid City area. Other airports with scheduled air service are up to 4 hours away from destinations in the region.
- The ease of flying into Rapid City and access to services (car pickup, travel to Sturgis, etc.) for the Sturgis Rally is a strength
- Flow of traffic when you walk into the terminal is a considerable strength.
- Leadership at the airport is good.
- There are record numbers of people flying in, growth is seen year over year
- Airport management has evaluated the functionality and flow of people through the airport to identify operational inefficiencies (Awareness in general of weaknesses and concerns)

Weaknesses:

- The existing runway is coming to the end of its useful life
- There is no/limited covered parking
- Lack of ample drop off and pickup areas
- Lack of instruction/informational signage. When visitors come in and airline desks are not open this causes panic and distress as flyers are not aware when desks open prior to flights
- Baggage handling and baggage claim is too slow
- Prices on airline tickets is a perceived weakness
- Size of the catchment area is too small

- "Unseen" and back-door terminal infrastructure is dated resulting in impacts to issues such as the previously noted baggage handling and claims speed. These are infrastructure areas unseen by the public as the "public facing" terminal improvements are modernized and listed as a strength.
- Lack of access to rental car services
- There is more room for improvement in food and retail space
- Lack of cargo capabilities (especially as on-line shopping/shipping continues to increase)
- Transportation to and from the airport (Uber and Lyft especially) is very limited in the area
- Limited Developable Space
    - Putting space to "highest and best use" is a balancing act that can be difficult
    - More costly development (ex. additional earthwork due to terrain challenges)
- Significant amount of infrastructure needs (and associated costs) in the next decade
    - Maintain existing facilities
    - Improve facilities to accommodate existing demand and future growth
- State Funding Levels

Opportunities:

- Ellsworth Air Force Base expansion will result in an increase in population. This will result in an increase in travel, especially military travel which is essential even during the pandemic.
- Possibility of a partnership with the Base to make Rapid City an alternative runway for Ellsworth Air Force or Joe Foss Field. DOD or FAA funding may be available if Rapid City serves as an alternative landing for the Ellsworth or Joe Foss Field Air Force Base.
- Overseas travel has come to a halt, and domestic travel will be picking up. There is a considerable opportunity to capture increases in domestic travel and make Rapid City more popular as a leisure destination.
- Increased Vacation Rentals by Owner (VRBO) and Air Bed and Breakfast (AirBnB) operations in the area
- Marketing the great outdoors and open spaces (non-urban)
- Facility expansion related to increased travelers and tourism
- Innovation center going in and companies coming into the area
- Covid has resulted in more online shopping and increases in cargo (both an opportunity and a threat given current cargo capacity)
- Growth in offering Uber/Lyft

Threats:

- VRBO and AirBnB increased operations in the area threatens the neighborhood feel and connectivity in communities but offers opportunities for travelers at the airport.
- The potential need to close the airport while runway reconstruction occurs.
- Lack of adequate cargo capabilities will limit growth in the cargo realm.
- Political threats to the area depending on upcoming state and federal election outcomes
- Potential to fall behind during the pandemic and letting the competition "sneak" in

Following the formal SWOT discussion, Becky asked participants to consider if they had to prioritize one thing the airport could focus on in the upcoming months (strength, weakness, opportunity or threat), what would that be. Answers/suggestions were as follows:

- Airport shuttle and transportation options
- Continuing to add more direct flights and stretch the season where there are already direct flights
- Continued efforts focusing on additional air service and continuing to increase passenger counts
- Make sure the airport structure and facilities can accommodate expanded operations
- Continued and increased focus on the tourism industry
- Continue marketing the growing region as an appealing place to live with exceptional quality of life
- COVID could be looked at as an opportunity and threat given Black Hills tourism provides escape for some people from highly populated areas. . . or workplace/lifestyle preferences may change, and people may wish to move to the region permanently.
- Be a proactive airport (seeking funding, attracting airlines, etc.)

Tom concluded discussions by briefly outlining the next steps and reminding participants of how/where information and input provided will be utilized moving forward. The Team will next be evaluating the input gathered and developing alternatives related to baggage claim improvements, covered parking, improvements to retail and vending and possible identification of the addition of nearby hotel/lodging opportunities, as well as continued discussion of capital improvements (such as the runway) critical to airport functionality. The Rapid City Regional Airport is built on a bluff which brings unique challenges that must also be considered.

Ongoing and future funding ideas and discussion will also be part of the final Master Plan. Kathryn's suggestion related to DOD funding as it relates to the use of the Rapid City airport as an alternate runway route for Ellsworth or Joe Foss will be pursued and further discussed. Ultimately, the intent is to capture as much input and as many voices in the planning process as possible to ensure the airport is considering the "big picture" moving forward.

Information will be presented to Airport Advisory Committee, focus groups, and the public. The intent is to provide proposed solutions and a timeline to the Airport team in early 2021. If additional information is requested or needed from today's session, follow up meetings will be scheduled, however, this is not anticipated to be necessary at this time. There will, however, be an additional meeting invitation sent to stakeholders for discussion related to the overall key elements proposed in the full Airport Master Plan (AMP) once this has been drafted and discussed with Airport management and board members.

1/26/2021


Rapid City Regional Airport
Development Concepts
January 26, 2021
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1


Development Areas
Determine developable areas & put space to its best use
Constraints/Challenges
• Terrain
• Design Standards
• Existing Leaseholds
Use
Area
SRE/Ops./Maint
FBO/FBO Hangars
SASO
Lg./Corp. Hangars
GA Hangars
Cargo
USPS
Parking
Fuel Farm
Rental Car
Hotel
Misc./Nonaero
Airport Road Reconfiguration

2

1/26/2021


North GA Area – Development Concepts
Option 1
Preserve for future apron frontage or parking
Option 2
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3


South GA / Corporate Development Concepts
Option 1a
FBO Option
Option 2a
FBO Option

4

2

1/26/2021


South GA / Corporate Development Concepts
Option 1b
Potential Access/Parking
FBO Option
Option 2b
Potential Access/Parking
FBO Option

5


South GA / Corporate Development Phasing
Initial Phase Option
Parking or second hangar
FBO Option
Key Considerations
• Existing Leaseholds
• Initial Access/Parking
• Meeting Design Standards
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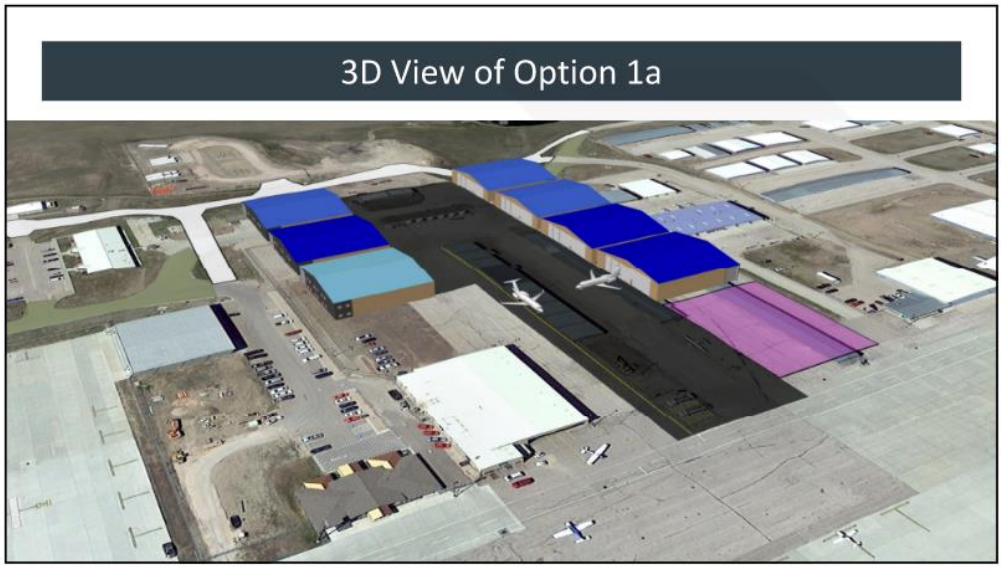
Google Earth

6

3

1/26/2021



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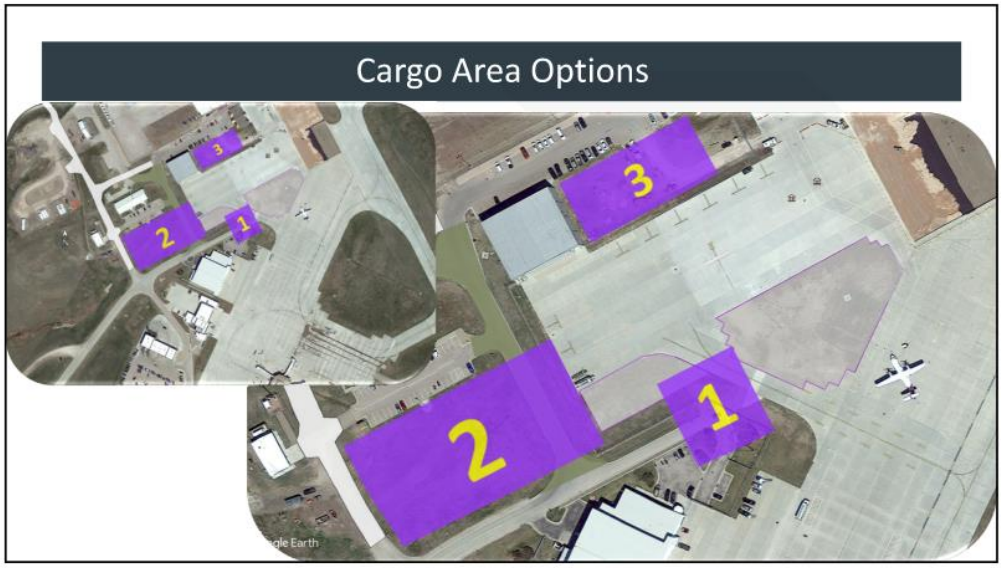

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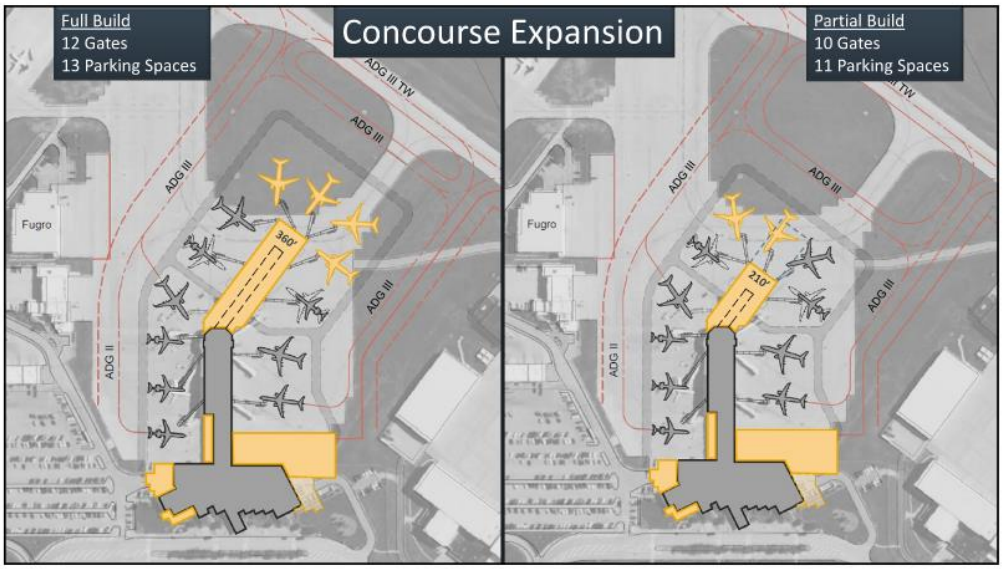

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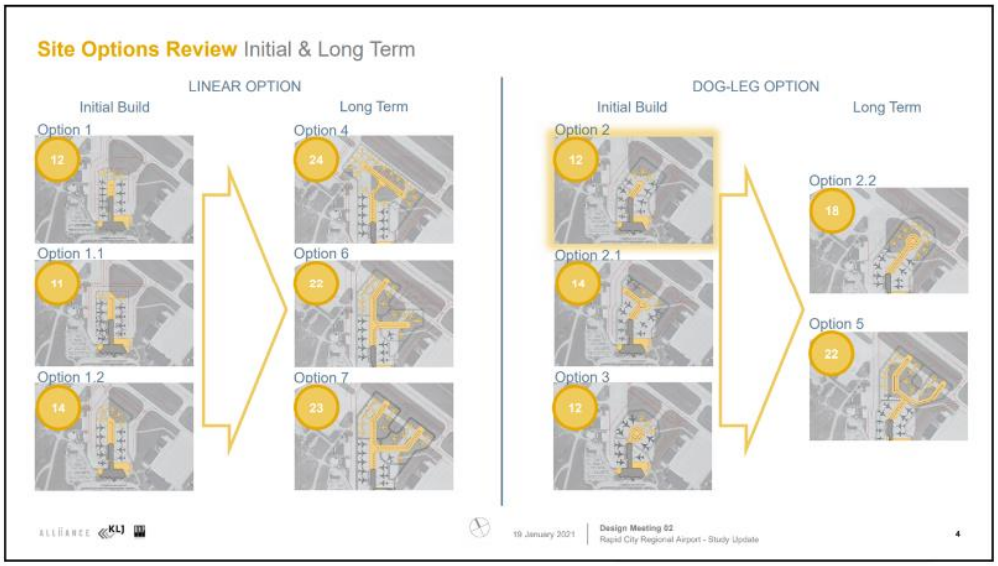
Site Options Review Initial & Long Term
LINEAR OPTION
Initial Build
Long Term
Option 1
12
Option 1.1
11
Option 1.2
14
Option 4
24
Option 6
22
Option 7
23
DOG-LEG OPTION
Initial Build
Long Term
Option 2
12
Option 2.1
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Option 3
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Option 2.2
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Option 5
22
19 January 2021
Design Meeting 02
Rapid City Regional Airport - Study Update
4

14

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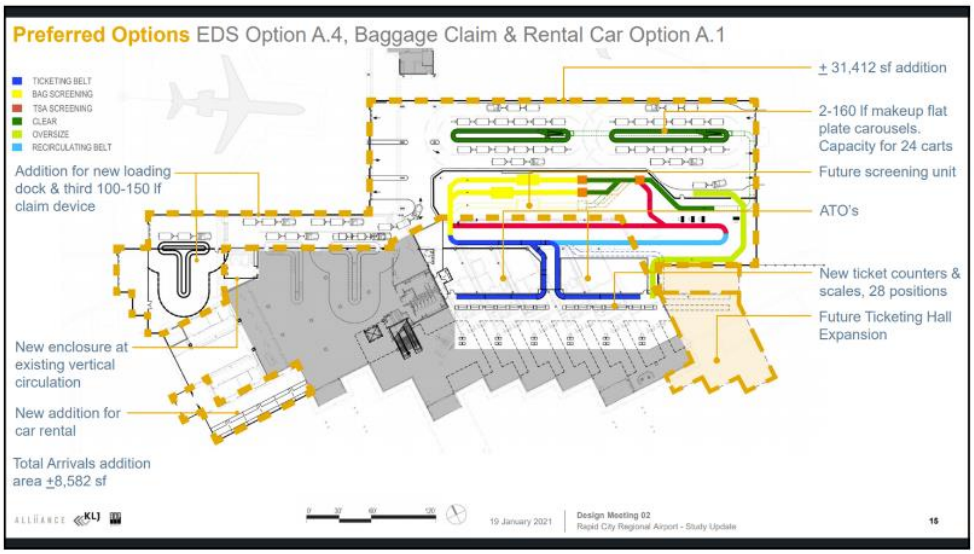
Preferred Options EDS Option A.4, Baggage Claim & Rental Car Option A.1
TICKETING BELT
BAG SCREENING
TSA SCREENING
CLEAR
OVERSIZE
RECIRCULATING BELT
± 31,412 sf addition
2-160 lf makeup flat plate carousels. Capacity for 24 carts
Future screening unit
ATO's
New ticket counters & scales, 28 positions
Future Ticketing Hall Expansion
Addition for new loading dock & third 100-150 lf claim device
New enclosure at existing vertical circulation
New addition for car rental
Total Arrivals addition area ±8,582 sf
19 January 2021
Design Meeting 02
Rapid City Regional Airport - Study Update
15

15


Next Steps
Review Development Concepts with FAA & SDDOT
Finalize Requirements Chapter
Focus Group & Advisory Committee Follow-Up Meetings
Public Meeting
Finalize:
Alternatives Chapter
Implementation Chapter
Airport Layout Plan (ALP)
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1/26/2021


FBO
Rental Car / Parking Garage
HOTEL
Thank You!
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17

9


Rapid City Regional Airport
Master Plan Update
Rental Car Focus Group Meeting
February 4, 2021
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1


Agenda
Introductions
Airport Master Plan Background
Rental Car Facility Needs
Existing
Future
Expansion Areas / Preliminary Concepts
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2

Airport Master Plan

- "Road Map" for meeting aviation demands over the next 20 years
- Help RAP preserve flexibility to respond to future needs
- Some critical reasons a Master Plan Update was needed:
  - 20-year activity forecasts from the 2014 Airport Master Plan were already surpassed in 2019.
  - Continuity of operations – develop a plan to eliminate or minimize closure time of RAP's primary runway when major runway reconstruction becomes necessary.

Currently working through Facility Requirements & Preliminary Concepts Phase of the Master Plan

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3

Facility Needs

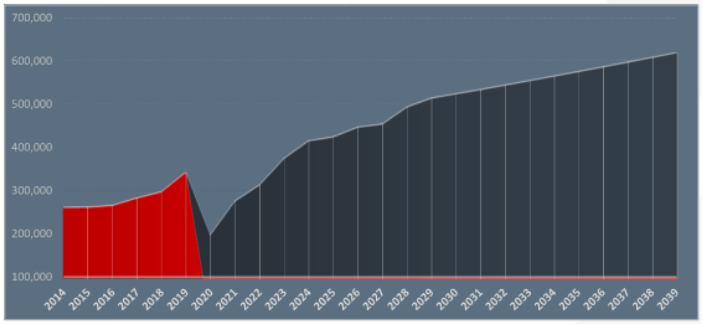
- Existing challenges or issues?
- What's working well?
- Any upcoming changes in the way you operate that should be considered for this plan?

4

2019 Baseline & Long-Range Enplanement Forecasts

- Forecasting is far from an exact science (especially since COVID-19 came along)
- Detailed 10-year enplanement forecast shown on the following slide

Forecast	2019	2024	2029	2034	2039	2019 to 2029 CAGR	2019 to 2039 CAGR
Enplanements	343,926	416,470	514,497	565,267	619,525	4.11%	2.98%



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2019 Baseline & 10 Year Enplanement Forecasts

Month	2019	2021	2023	2025	2027	2029	CAGR
January	19,142	11,318	14,189	17,036	17,036	20,501	0.69%
February	17,594	12,124	14,521	17,363	17,923	23,322	2.92%
March	19,956	16,911	20,566	22,523	24,022	26,387	2.83%
April	20,778	18,470	22,077	24,063	24,980	30,188	3.81%
May	27,778	20,224	25,353	32,921	33,422	42,055	4.20%
June	37,764	33,168	49,848	56,956	63,154	73,156	6.84%
July	**43,259**	39,845	58,214	65,398	73,195	**79,248**	6.24%
August	**41,062**	38,118	56,185	63,369	70,315	**76,944**	6.48%
September	37,732	28,494	38,805	46,641	48,072	56,655	4.15%
October	30,379	23,785	30,025	32,114	35,186	36,265	1.79%
November	21,515	16,007	22,448	22,448	22,448	23,494	0.88%
December	26,964	19,184	23,675	24,439	25,203	26,282	-0.26%
Total	**343,926**	**277,647**	**375,906**	**425,272**	**454,956**	**514,497**	**4.11%**

Potential for peak month enplanements to nearly double over the next 10 years

6

Relationship Between Enplanements/Deplanements & Rental Car Transactions

2019 Activity							
Month	**# of Trans**	**Avg. Trans Per Day**	**Avg. Trans Per Week**	**CFC Days**	**CFC Days Per Trans**	**Enplanements**	**Passengers Per Transaction**
JANUARY	2,759	89	623	9,720	3.5	19,142	6.9
FEBRUARY	2,361	84	590	8,210	3.5	17,495	7.4
MARCH	2,870	93	648	10,153	3.5	19,956	7.0
APRIL	3,839	128	896	13,930	3.6	20,778	5.4
MAY	6,026	194	1,361	24,162	4.0	27,880	4.6
JUNE	**8,019**	**267**	**1,871**	**37,293**	**4.7**	**37,764**	**4.7**
JULY	**9,108**	**294**	**2,057**	**44,430**	**4.9**	**43,259**	**4.7**
AUGUST	**9,002**	**290**	**2,033**	**44,037**	**4.9**	**41,062**	**4.6**
SEPTEMBER	**8,833**	**294**	**2,061**	**41,889**	**4.7**	**37,732**	**4.3**
OCTOBER	6,580	212	1,486	26,732	4.1	30,379	4.6
NOVEMBER	3,765	126	879	14,080	3.7	21,515	5.7
DECEMBER	2,927	94	661	10,425	3.6	26,964	9.2

- Is CFC Days Per Transaction a good representation of length of rental use? I imagine there may be some overlap with returns and new transactions occurring the same day.
- Passengers Per Transaction could be applied to forecasts for a general expectation of future needs.

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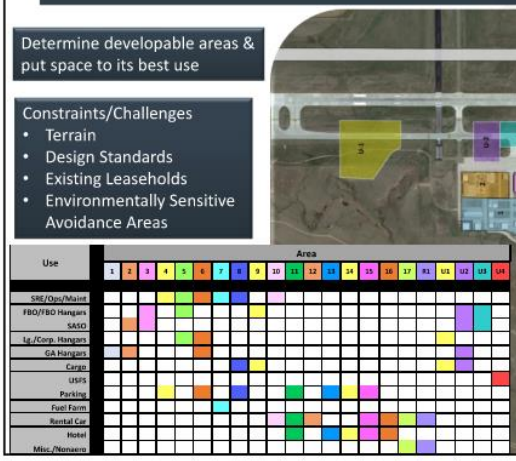
7

Overall Development Areas

Determine developable areas & put space to its best use

Constraints/Challenges
- Terrain
- Design Standards
- Existing Leaseholds
- Environmentally Sensitive Avoidance Areas



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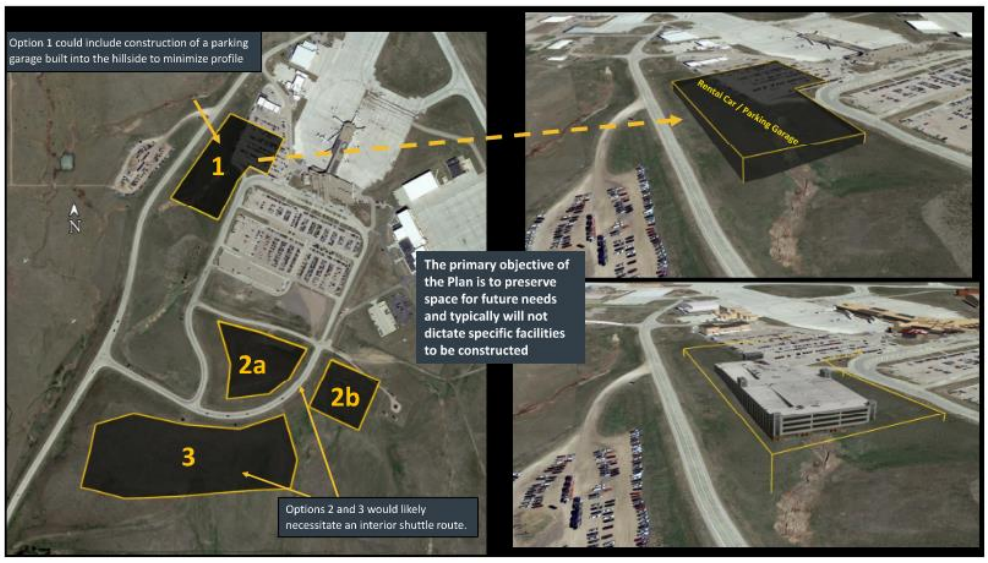
2/4/2021


Option 1 could include construction of a parking garage built into the hillside to minimize profile
1
N
2a
2b
3
Options 2 and 3 would likely necessitate an interior shuttle route.
The primary objective of the Plan is to preserve space for future needs and typically will not dictate specific facilities to be constructed
Rental Car / Parking Garage

9


3D Parking Garage Model is Approximately 450' x 250'

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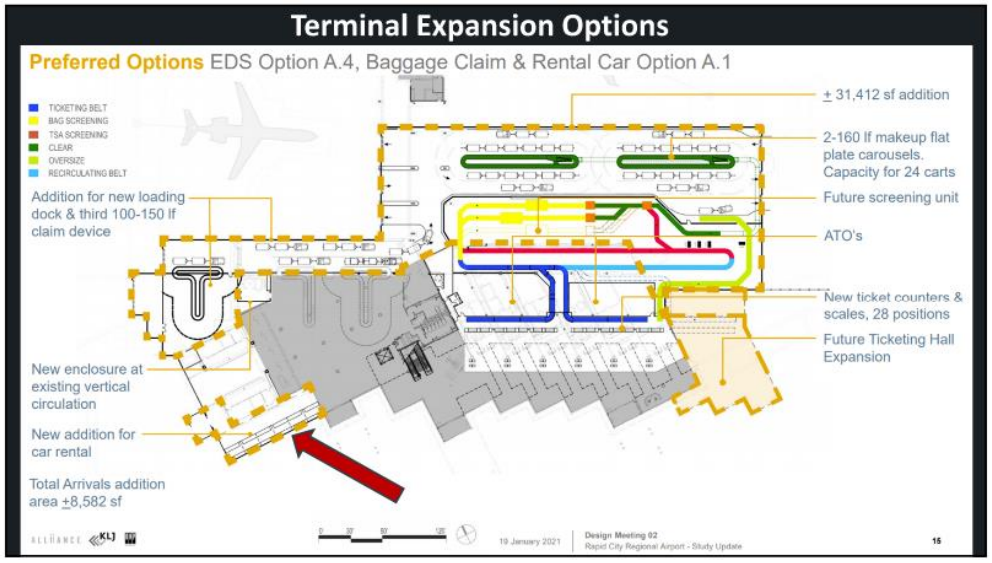

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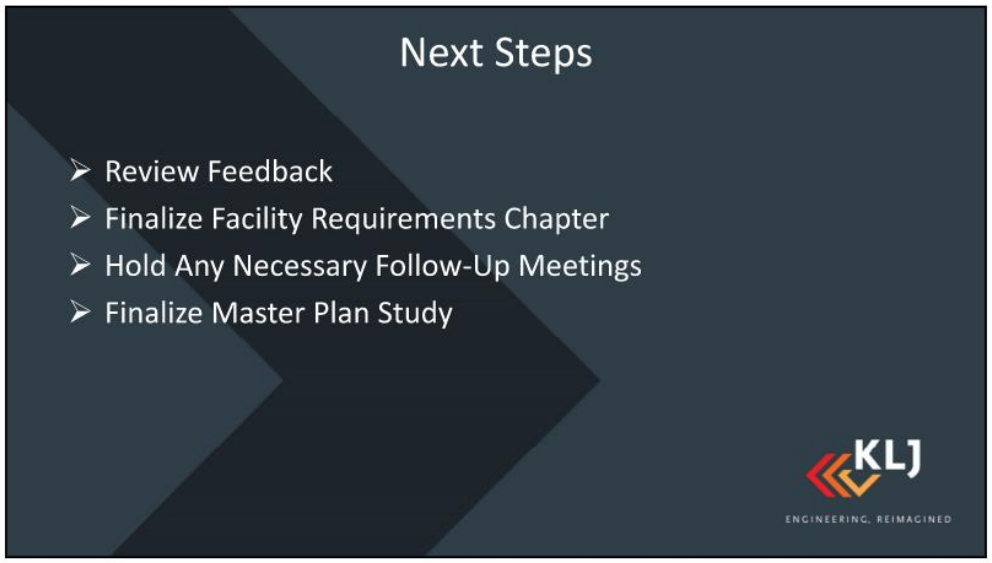

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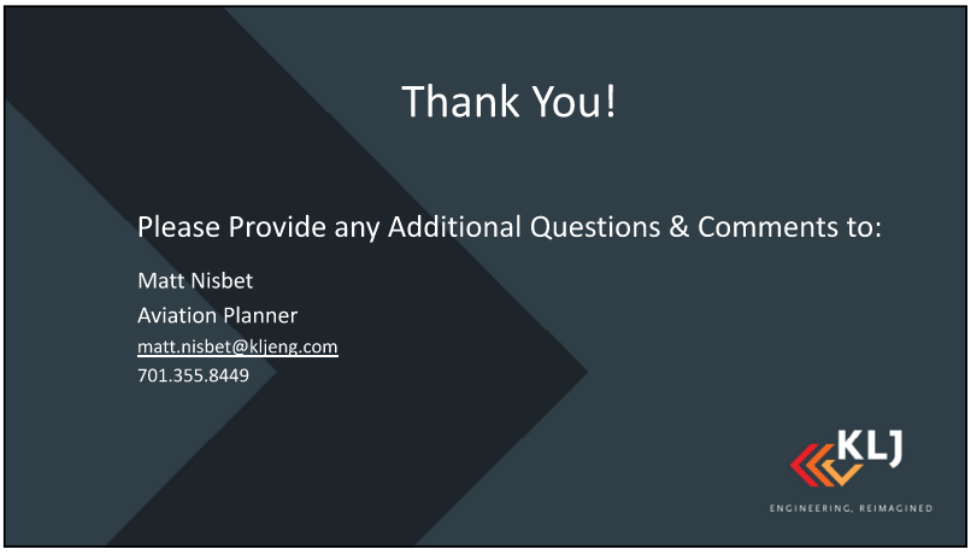
Thank You!
Please Provide any Additional Questions & Comments to:
Matt Nisbet
Aviation Planner
matt.nisbet@kljeng.com
701.355.8449
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15

8


Rapid City Regional Airport
Runway & Terminal Concepts
April 27, 2021
This presentation includes planning level concepts and cost estimates. Further analysis and environmental clearance (including opportunities for public input) will occur prior to implementation.
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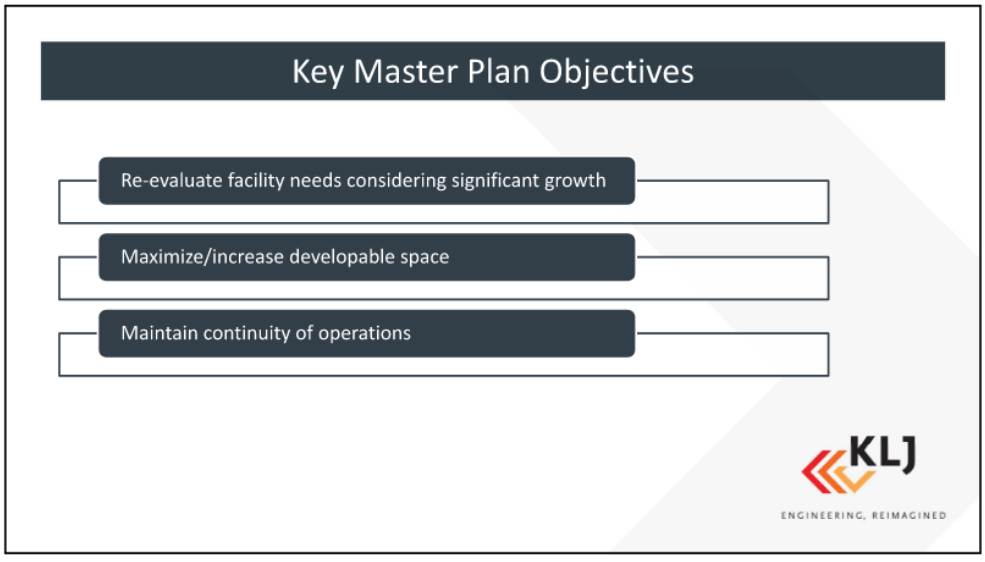
Key Master Plan Objectives
Re-evaluate facility needs considering significant growth
Maximize/increase developable space
Maintain continuity of operations
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2


Future Runway Options
Runway 14-32 pavement will likely require reconstruction in the next 10 years
Runway options available
Reconstruct existing runway
Expand crosswind runway
Construct "new" Runway 14-32 east of the existing
N
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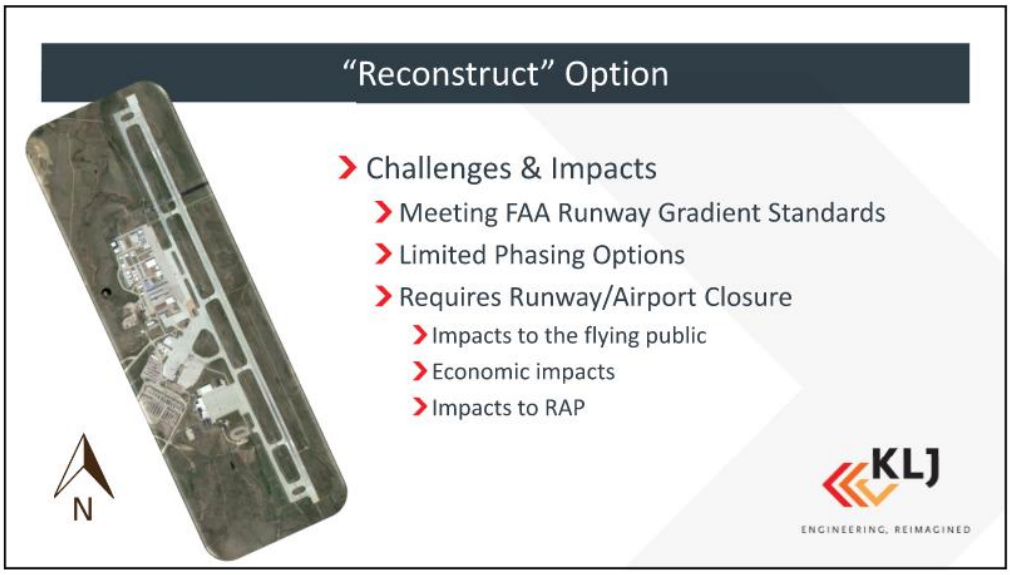
3


"Reconstruct" Option
Challenges & Impacts
Meeting FAA Runway Gradient Standards
Limited Phasing Options
Requires Runway/Airport Closure
Impacts to the flying public
Economic impacts
Impacts to RAP
N
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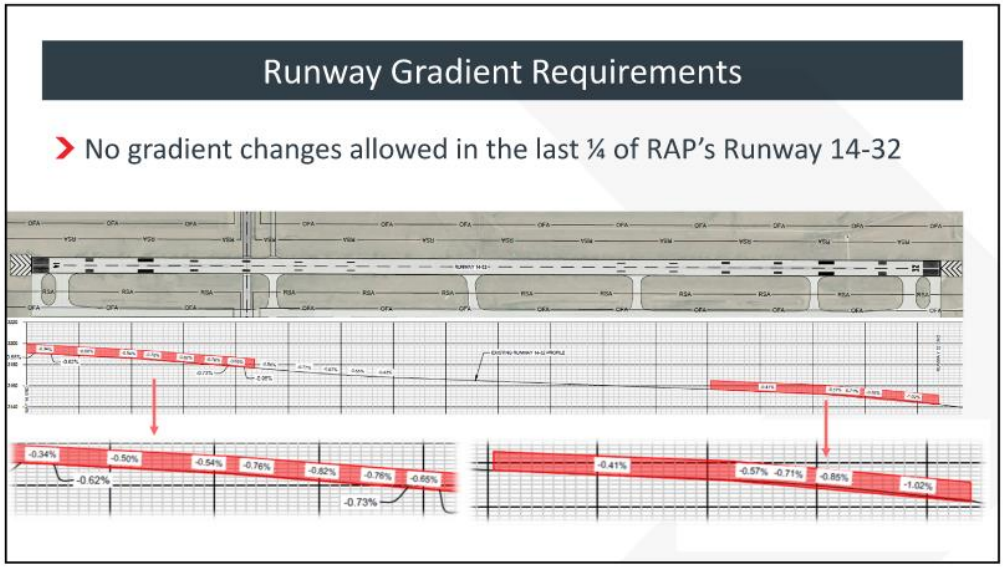
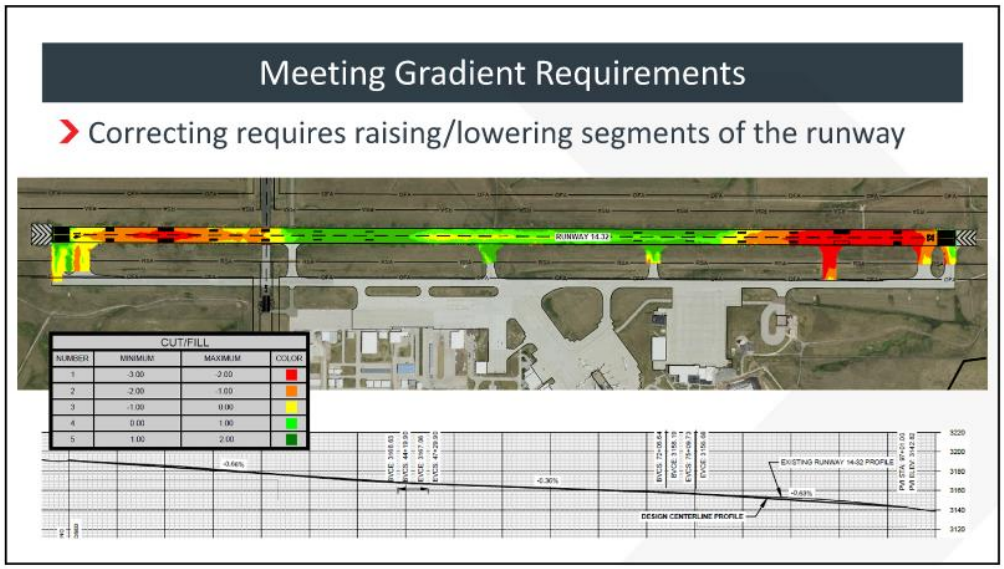
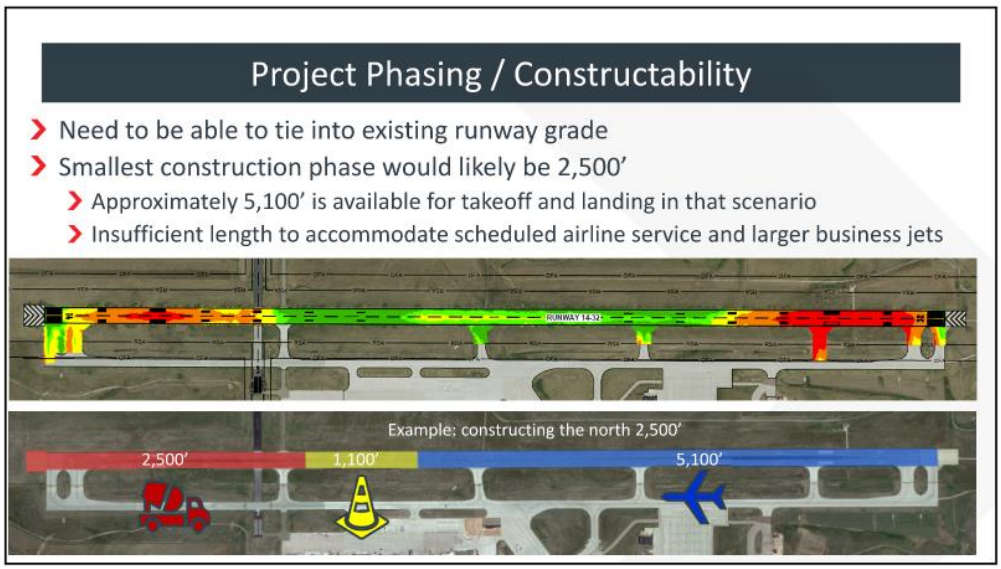

Runway Gradient Requirements
No gradient changes allowed in the last ¼ of RAP's Runway 14-32
-0.34%
-0.50%
-0.54%
-0.76%
-0.82%
-0.76%
-0.65%
-0.62%
-0.73%
-0.41%
-0.57%
-0.71%
-0.85%
-1.02%

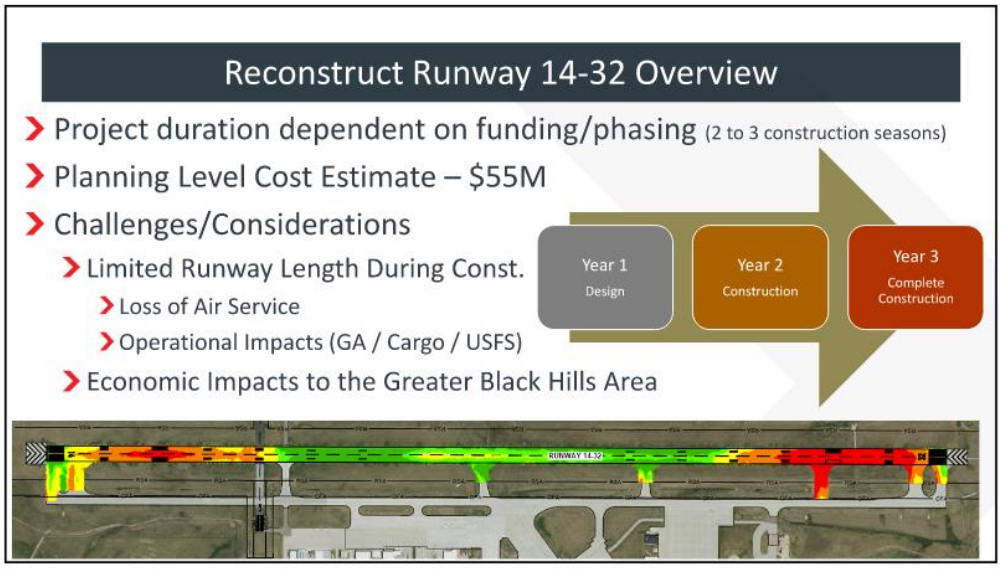
5


Meeting Gradient Requirements
Correcting requires raising/lowering segments of the runway
RUNWAY 14-32
CUT/FILL
NUMBER
MINIMUM
MAXIMUM
COLOR
EXISTING RUNWAY 14-32 PROFILE
DESIGN CENTERLINE PROFILE

6


Project Phasing / Constructability
Need to be able to tie into existing runway grade
Smallest construction phase would likely be 2,500'
Approximately 5,100' is available for takeoff and landing in that scenario
Insufficient length to accommodate scheduled airline service and larger business jets
RUNWAY 14-32
Example: constructing the north 2,500'
2,500'
1,100'
5,100'

7


Reconstruct Runway 14-32 Overview
Project duration dependent on funding/phasing (2 to 3 construction seasons)
Planning Level Cost Estimate – $55M
Challenges/Considerations
Limited Runway Length During Const.
Loss of Air Service
Operational Impacts (GA / Cargo / USFS)
Economic Impacts to the Greater Black Hills Area
Year 1
Design
Year 2
Construction
Year 3
Complete Construction
RUNWAY 14-32

8

Airport Economic Impact

SOUTH DAKOTA 2020 State Aviation System Plan

https://dot.sd.gov/transportation/aviation/aviation-systems-plan

Airport Location		Airport Classification	
Associated City:	Rapid City	Federal:	Nonhub
County:	Pennington	State:	Commercial Service

Airport Activity 2018			
Commercial Operations	15,755	GA Operations	28,985
Commercial Enplanements	303,659	GA Visitors	22,931
Commercial Visitors	151,830	Military Operations	1,736

Airport Economic Impacts

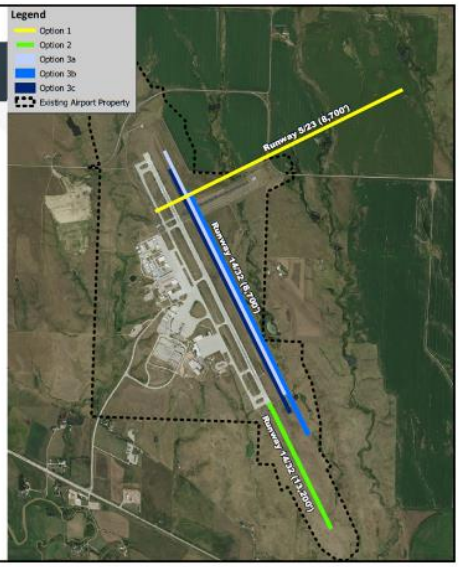
Source of Impact	Category of Impact	Jobs	Earnings	GDP	Economic Activity
On-Airport – Airport Operations	Direct	618	$36,242,000	$41,745,000	$75,200,000
	Subtotal Direct	618	$36,242,000	$41,745,000	$75,200,000
	Indirect	179	$9,467,000	$13,817,000	$24,569,000
	Induced	248	$11,051,000	$18,517,000	$33,077,000
	Subtotal Multiplier Effects	426	$20,518,000	$32,334,000	$57,646,000
	Airport Operations Subtotal	1,044	$56,760,000	$74,079,000	$132,846,000
On-Airport – Capital Improvements	Direct	25	$1,346,000	$1,510,000	$3,135,000
	Subtotal Direct	25	$1,346,000	$1,510,000	$3,135,000
	Indirect	6	$295,000	$480,000	$900,000
	Induced	9	$395,000	$662,000	$1,183,000
	Subtotal Multiplier Effects	14	$690,000	$1,142,000	$2,083,000
	Capital Improvements Subtotal	39	$2,036,000	$2,652,000	$5,218,000
Off-Airport – Visitor Spending	Direct	1,364	$33,838,000	$48,969,000	$89,885,000
	Subtotal Direct	1,364	$33,838,000	$48,969,000	$89,885,000
	Indirect	161	$7,443,000	$13,658,000	$24,928,000
	Induced	182	$8,057,000	$13,505,000	$24,114,000
	Subtotal Multiplier Effects	343	$15,500,000	$27,163,000	$49,042,000
	Visitor Spending Subtotal	1,707	$49,338,000	$76,132,000	$138,927,000
Off-Airport – Visitor Spending from Sturgis / Pheasant Hunting Only	Direct	63	$1,559,000	$2,257,000	$4,142,000
	Subtotal Direct	63	$1,559,000	$2,257,000	$4,142,000
	Indirect	7	$343,000	$629,000	$1,149,000
	Induced	8	$371,000	$622,000	$1,111,000
	Subtotal Multiplier Effects	16	$714,000	$1,251,000	$2,260,000
	Special Event Subtotal	79	$2,273,000	$3,508,000	$6,402,000
Total	Direct	2,069	$72,985,000	$94,481,000	$172,362,000
	Subtotal Direct	2,069	$72,985,000	$94,481,000	$172,362,000
	Indirect	353	$17,548,000	$28,584,000	$51,546,000
	Induced	447	$19,874,000	$33,306,000	$59,485,000
	Subtotal Multiplier Effects	800	$37,422,000	$61,890,000	$111,031,000
	Grand Total	2,869	$110,407,000	$156,371,000	$283,393,000

Notes: Readers are reminded that the figures shown are estimates generated by economic models and not an exact accounting. Totals may not sum due to rounding. Where the table indicates 0 jobs but also includes estimates for earnings, GDP, and economic output, individuals worked less than half-time on airport-related activities. A "-" indicates there was no measurable economic impact activity.

9

"New" Runway Options

- Options Considered But Discarded
  - 1 Expand Crosswind Runway 5-23
  - 2 Extend Existing Runway 14-32
- Options Carried Forward For Further Analysis
  - 3a New Runway 14-32
    Offset 550' from existing & no shift
  - 3b New Runway 14-32
    Offset 550' from existing & 1,500' shift
  - 3c New Runway 14-32
    Offset 550' from existing & 600' shift



10

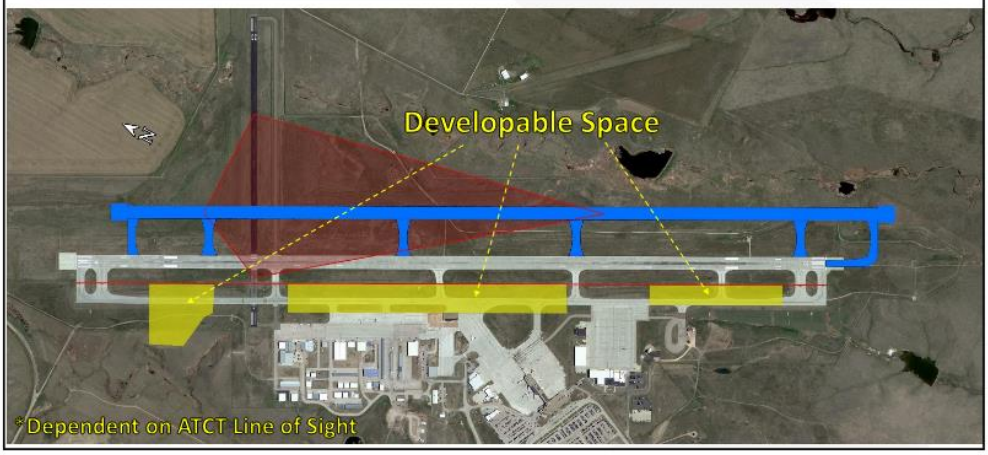
Options Carried Forward

Options 3a, 3b and 3c

- Offset 550' from Existing Runway 14-32
- Convert existing runway to a taxiway
- Increase developable space

11

Increased Developable Space



12

6

Options Carried Forward

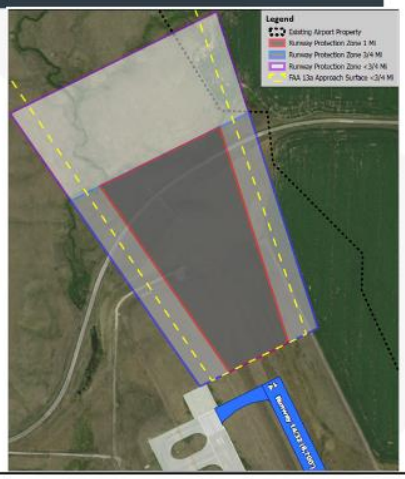
Options 3a, 3b and 3c

- Difference is the southerly shift
  - Degree a shift is necessary is primarily dependent on:
    - FAA Design Standard Policy
    - Desired Instrument Approach Capability
  - Greater shift results in more earthwork and higher costs

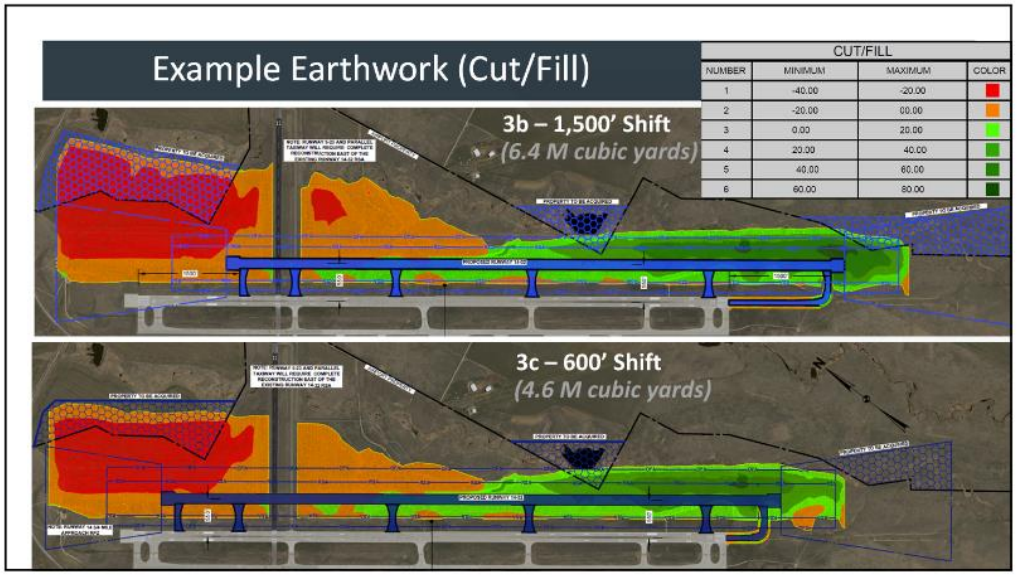
13

Design Standards & Instrument Approach Capability

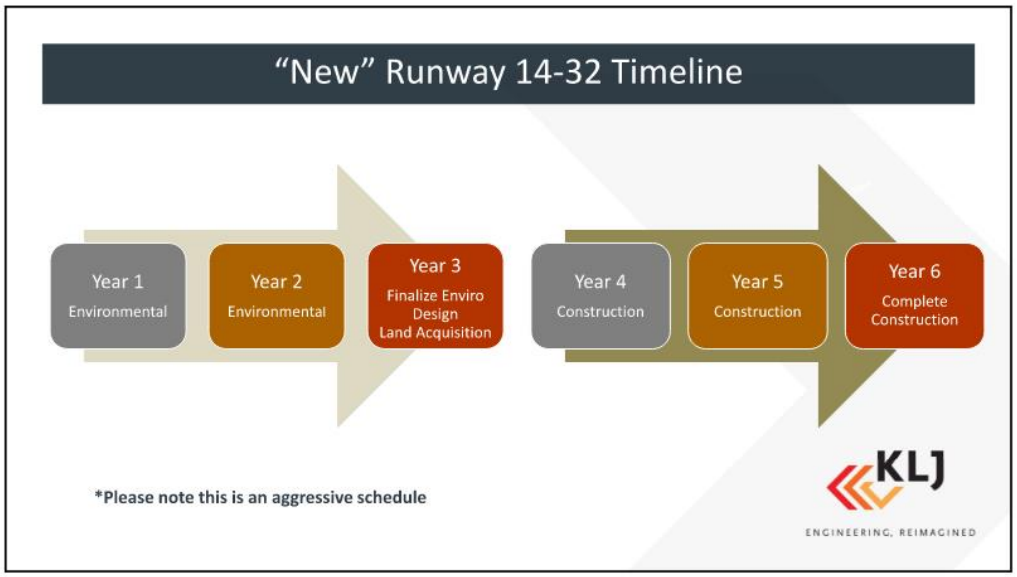
- Runway Protection Zones
  - "The RPZ function is to enhance the protection of people and property on the ground".
  - Focus is on the type of use/activity within the RPZs
- Approach Surfaces
  - "Approach surfaces are designed to protect the use of the runway in both visual and instrument meteorological conditions near the airport.
  - Focus is on the height of objects within the approach surface



14


Example Earthwork (Cut/Fill)
CUT/FILL
NUMBER MINIMUM MAXIMUM COLOR
1 -40.00 -20.00
2 -20.00 0.00
3 0.00 20.00
4 20.00 40.00
5 40.00 60.00
6 60.00 80.00
3b – 1,500' Shift
(6.4 M cubic yards)
3c – 600' Shift
(4.6 M cubic yards)

15


"New" Runway 14-32 Timeline
Year 1
Environmental
Year 2
Environmental
Year 3
Finalize Enviro Design
Land Acquisition
Year 4
Construction
Year 5
Construction
Year 6
Complete Construction
*Please note this is an aggressive schedule
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16

Runway Option Summary

Category	Reconstruct	Option 3a	Option 3b	Option 3c
Operational Performance				
Alignment	14-32	14-32	14-32	14-32
Runway Length	8,700'	8,700'	8,700'	8,700'
Best Planning Tenets and Other Factors				
Impact to RAP Operations	Requires Runway Closure to Air Carrier	No Runway Closure Required Requires Displaced Threshold When Constructing Connecting Taxiways Runway Threshold Displacement Occurs for Part of Construction		
Timeframe Estimates	2-3 Construction Seasons	3 Construction Seasons		
North RPZ (14 end) South RPZ (32 end)	Road in RPZ Clear	Road in RPZ Clear	Clear Clear	Clear for ¼-Mile Approach Clear
Adds Developable Space	No	Yes	Yes	Yes
Environmental				
Wetland Impacts	No	3a, 3b and 3c are similar		
Env. Sensitive Areas	None	3a, 3b and 3c are similar		
Estimated Land Acquisition	None	55 Acres	100 Acres	70 Acres
Fiscal Factors				
Planning Level Estimate	**$55 Million**	**$70 Million**	**$85 Million**	**$75 Million**

17

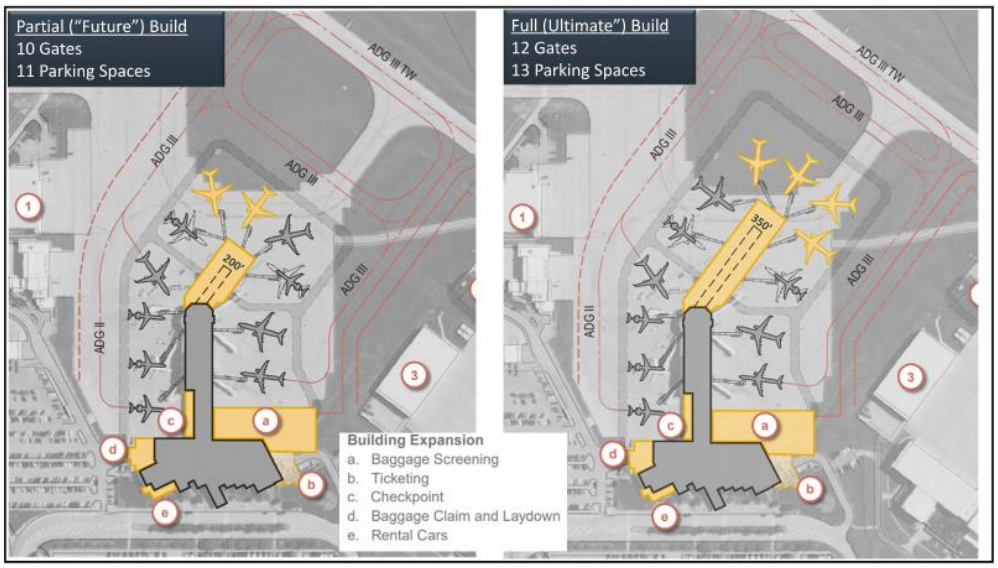
Terminal Study

- Increasing Activity
  - Annual
  - Peak Day / Design Day
  - Peak Hour / Design Hour
- Expansion Concepts
  - Concourse
  - Arrivals Area
    - Baggage Claim
    - Car Rental Offices
  - Departures Area
    - Ticketing
    - Baggage screening & makeup
  - Administration and Concessions

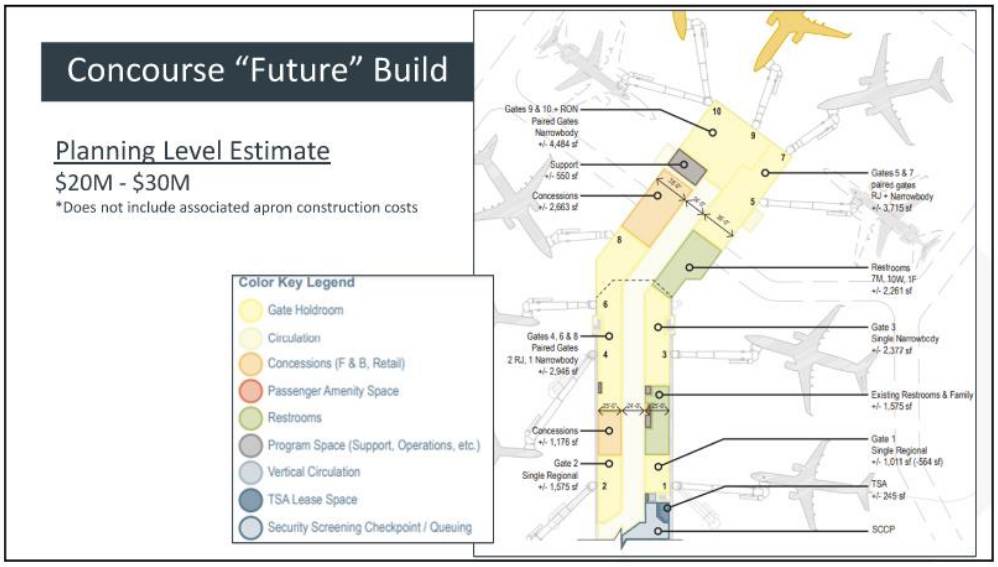
RAP Demand Comparison	2019 Existing	2019 Recommended	2019 Capacity Threshold	Forecast 2029	Forecast Capacity Threshold
General					
Annual Enplanements	343,926			514,497	
Aircraft Gates/PBB	7	8		10	
Aircraft Positions	9	8		10 +2	
Public Space					
Circulation (public seating, ticketing, concourse, bag claim, general circ)	26,090 s.f.	36,340 s.f.	✗	48,120 s.f.	✗
Ticket Lobby Queue	2,735 s.f.	3,370 s.f.	✗	4,530 s.f.	✗
Passenger Security Screening & TSA Offices	7,843 s.f.	6,380 s.f.	✓	8,780 s.f.	✗
Passenger Holdrooms	8,843 s.f.	13,770 s.f.	✗	22,490 s.f.	✗
Baggage Claim (retrieval/device/meeter&greeter)	5,369 s.f.	8,100 s.f.	✗	8,390 s.f.	✗
Restrooms (pre/post security)	3,229 s.f.	5,160 s.f.	✗	6,830 s.f.	✗
Other (Misc Tenant, information)	656 s.f.	650 s.f.	✓	650 s.f.	✓
Airline Space					
Ticketing (counter, ATO)	4,735 s.f.	4,550 s.f.	!	6,150 s.f.	✗
Outbound Baggage Screening	565 s.f.	18,000 s.f.	✗	18,000 s.f.	✗
Outbound Baggage Makeup	4,617 s.f.	6,960 s.f.	✗	12,320 s.f.	✗
Airside Ops/Storage	744 s.f.	760 s.f.	✗	990 s.f.	✗
Inbound Bag Claim Laydown	3,395 s.f.	3,900 s.f.	✗	3,900 s.f.	✗
Inbound/Outbound Baggage Circulation	3,325 s.f.	1,630 s.f.	✓	2,430 s.f.	✓
Baggage Service Offices (BSO)	0 s.f.	400 s.f.	!	400 s.f.	!
Concessions					
Landside/Storage (includes Rental Cars)	5,630 s.f.	4,270 s.f.	✓	5,370 s.f.	!
Airside/Storage	1,882 s.f.	3,330 s.f.	✗	4,980 s.f.	✗
Non-Public Space					
Airport Administration	2,474 s.f.	4,130 s.f.	✗	4,130 s.f.	✗
Restrooms/Circulation	1,423 s.f.	2,570 s.f.	✗	3,060 s.f.	✗
Airport Operations (Maintenance,Janitorial,Storage,Shops)	6,703 s.f.	2,490 s.f.	✓	3,230 s.f.	✓
Building Systems (MEP,Communications/IT,Loading Docks,Structure)	14,676 s.f.	13,290 s.f.	!	17,370 s.f.	✗
TOTAL GROSS (sq ft)	**104,963 s.f.**	**140,050 s.f.**	✗	**182,120 s.f.**	✗

18

4/27/2021



19



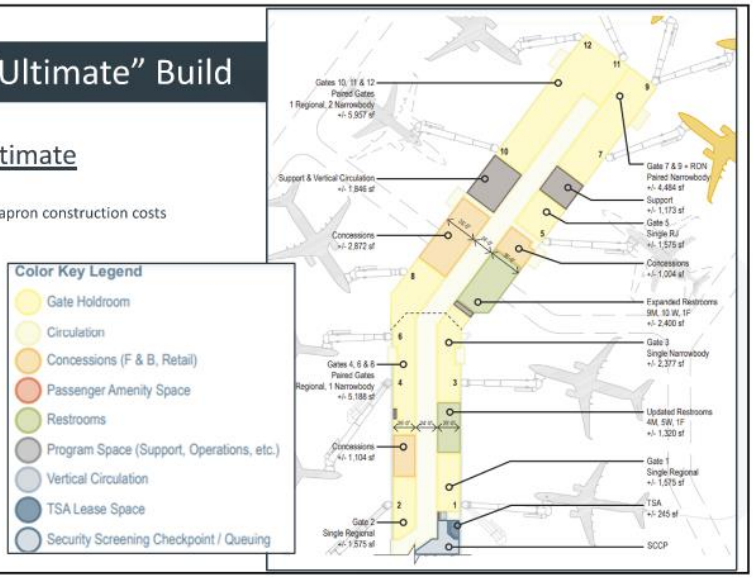
20

Concourse "Ultimate" Build

Planning Level Estimate

$35M - $50M

*Does not include associated apron construction costs

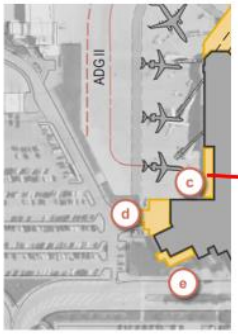


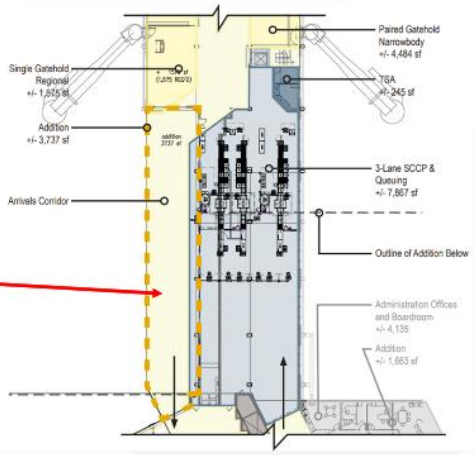
21

Security Checkpoint - Expansion Concept

Planning Level Estimate

$1.5M - $2.5M





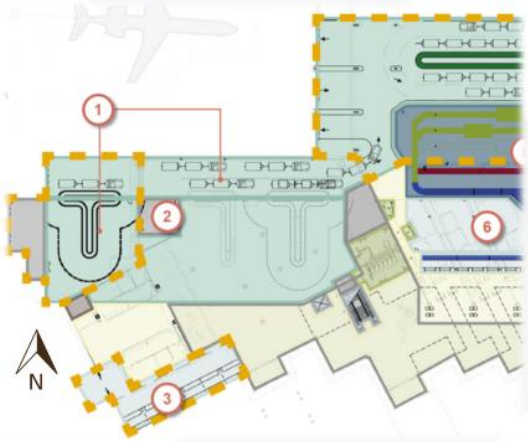
22

Terminal "Arrival Area" Expansion Concepts

- Baggage Claim
- Car Rental Offices

1. New Baggage Claim Device / Loading Dock expansion (+/- 6,000 sf)
2. New enclosure at existing vertical circulation
3. New addition for Car Rental (+/- 2,800 sf)

Planning Level Estimate
$7M - $11M



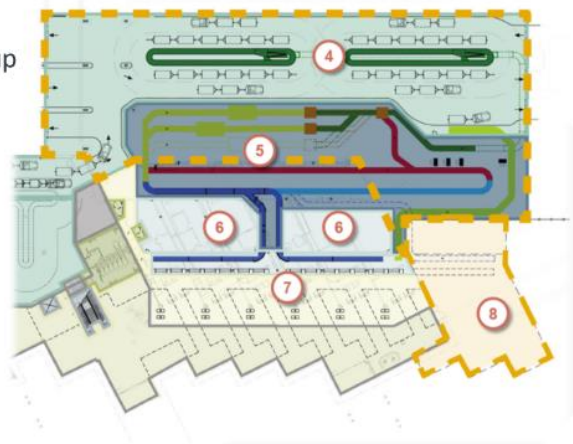
23

Terminal "Departure Area" Expansion Concepts

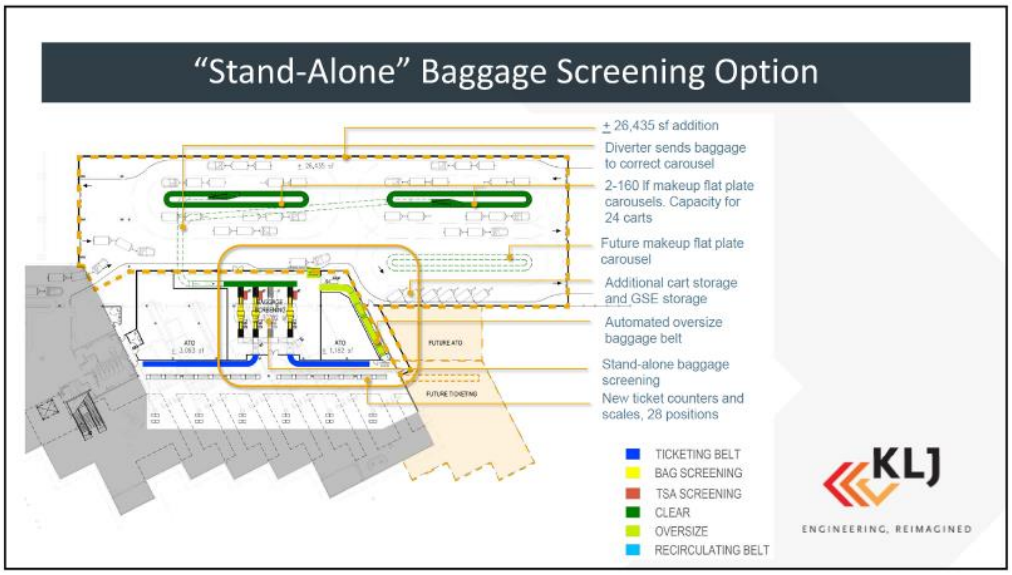
- Ticketing
- Baggage screening & makeup

4. Baggage Makeup Addition (+/- 20,000 sf)
   - Two 160 LF Baggage Makeup carousels
   - 24-cart capacity
5. Baggage Screening area (+/- 15,000 sf)
6. Airport Ticket Offices (ATOs)
7. New Ticket Counters & Scales: 28 positions
8. Future Ticketing Hall expansion (+/- 6,000 sf)

Planning Level Estimate
$21M - $28M
*Doesn't include est. $13M baggage screening equipment costs (eligible for TSA Reimbursement)



24


"Stand-Alone" Baggage Screening Option
± 26,435 sf addition
Diverter sends baggage to correct carousel
2-160 lf makeup flat plate carousels. Capacity for 24 carts
Future makeup flat plate carousel
Additional cart storage and GSE storage
Automated oversize baggage belt
Stand-alone baggage screening
New ticket counters and scales, 28 positions
TICKETING BELT
BAG SCREENING
TSA SCREENING
CLEAR
OVERSIZE
RECIRCULATING BELT
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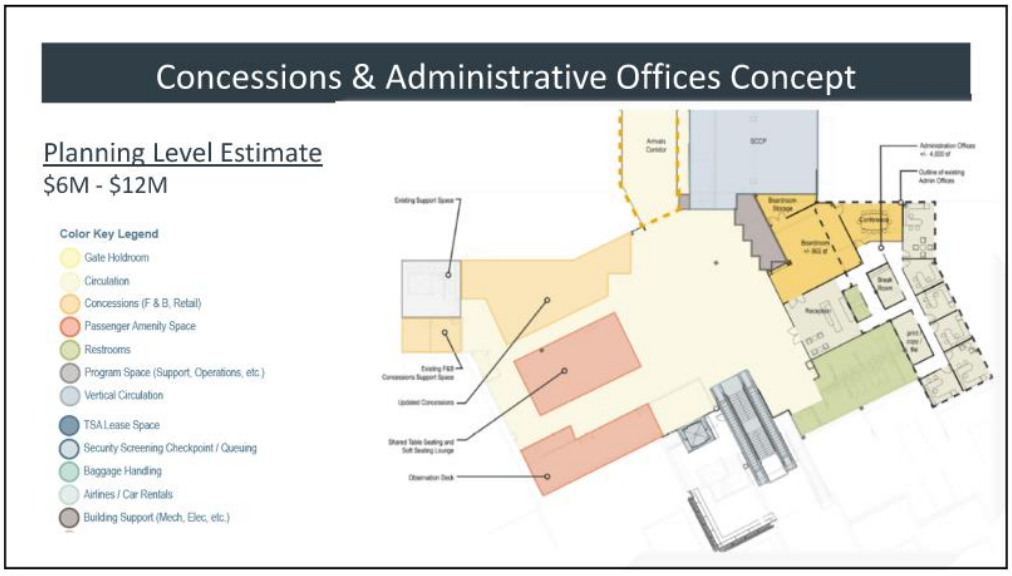
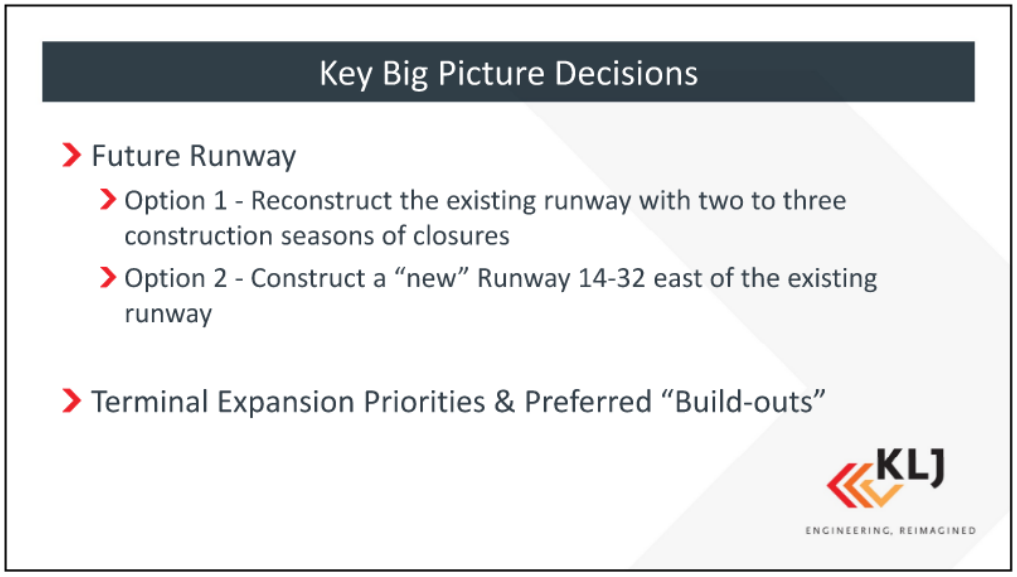
25


Concessions & Administrative Offices Concept
Planning Level Estimate
$6M - $12M
Color Key Legend
Gate Holdroom
Circulation
Concessions (F & B, Retail)
Passenger Amenity Space
Restrooms
Program Space (Support, Operations, etc.)
Vertical Circulation
TSA Lease Space
Security Screening Checkpoint / Queuing
Baggage Handling
Airlines / Car Rentals
Building Support (Mech, Elec, etc.)

26


Key Big Picture Decisions
Future Runway
Option 1 - Reconstruct the existing runway with two to three construction seasons of closures
Option 2 - Construct a "new" Runway 14-32 east of the existing runway
Terminal Expansion Priorities & Preferred "Build-outs"
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Next Steps
Focus Group & Advisory Committee Follow-Up Meetings
Public Meeting
Finalize Alternatives Chapter
Implementation Chapter / Prioritize Projects
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28

4/27/2021


Thank You!
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Matt Nisbet
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This presentation includes planning level concepts and cost estimates. Further analysis and environmental clearance (including opportunities for public input) will occur prior to implementation.

29

7/10/2021


Rapid City Regional Airport
GA Committee - Development Concept Discussion
July 10, 2021
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1


Development Areas
Determine developable areas & put space to its best use
Constraints/Challenges
• Terrain
• Design Standards
• Existing Leaseholds
Use
Area
SRE/Ops/Maint
FBO/FBO Hangars
SASO
Lg./Corp. Hangars
GA Hangars
Cargo
USFS
Parking
Fuel Farm
Rental Car
Hotel
Misc./Nonaero
Airport Road Reconfiguration

2

1


North GA Area – Development Concepts
Option 1
Preserve for future apron frontage or parking
Option 2
*Please keep in mind the Airport Layout Plan will typically just show developable lot space and not specify hangar dimensions. (Individual hangars shown to provide a general idea of development options.)
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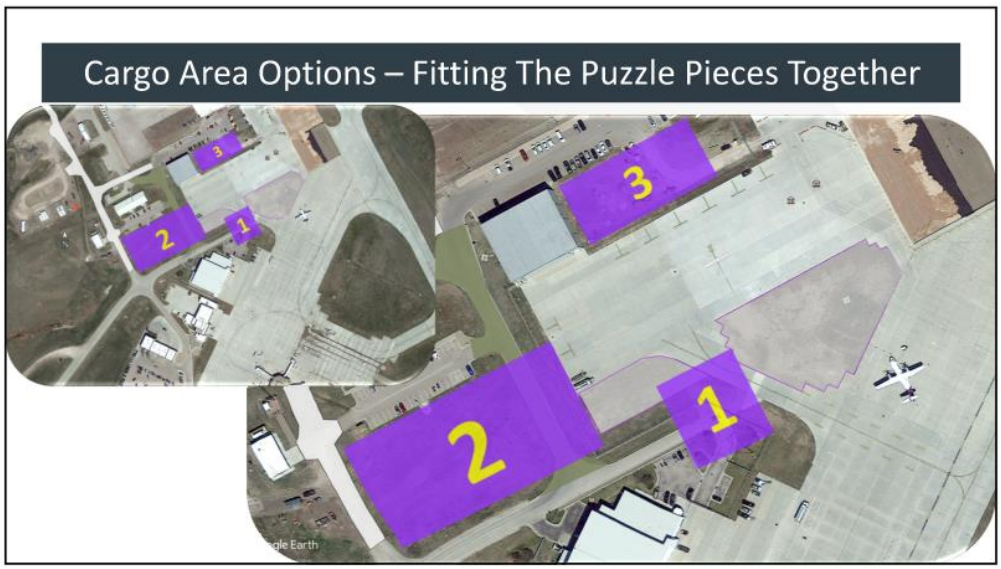
3


South GA / Corporate Development Concepts
Option 1a
FBO Option
Option 1b
Potential Access/Parking
FBO Option
Key Considerations
• Existing Leaseholds
• Initial Access/Parking
• Meeting Design Standards

4

7/10/2021


Cargo Area Options – Fitting The Puzzle Pieces Together
3
2
1
3
2
1

5


SRE/Ops/Maintenance Area Options
1
2
3
4

6

3


Refined Options
SRE/Ops/Maint
Parking
• Westjet Maintains Tiedowns
• Expanded Parking
• SRE/Ops/Maintenance
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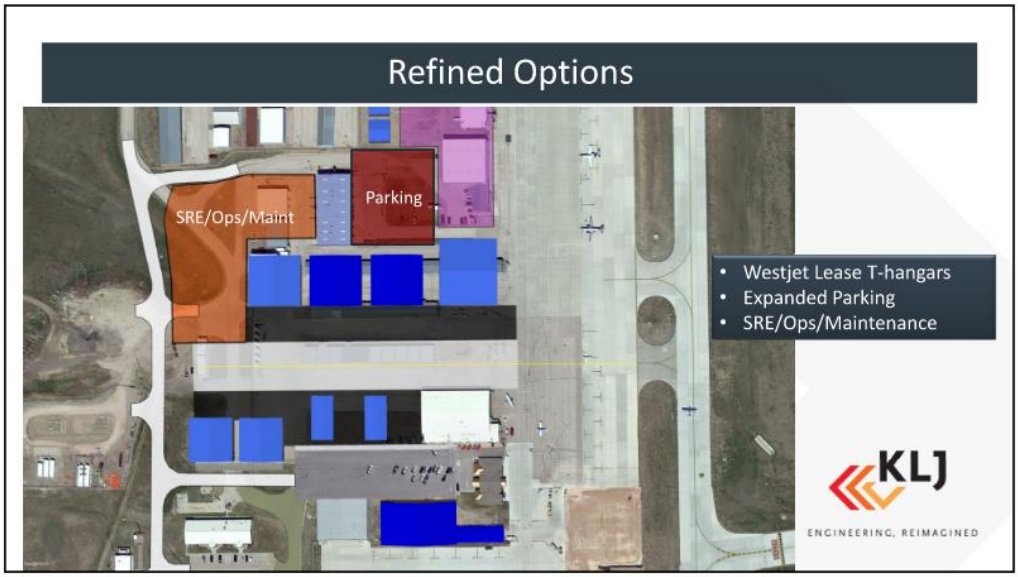
Refined Options
SRE/Ops/Maint
Parking
• Westjet Lease T-hangars
• Expanded Parking
• SRE/Ops/Maintenance
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8


Refined Options
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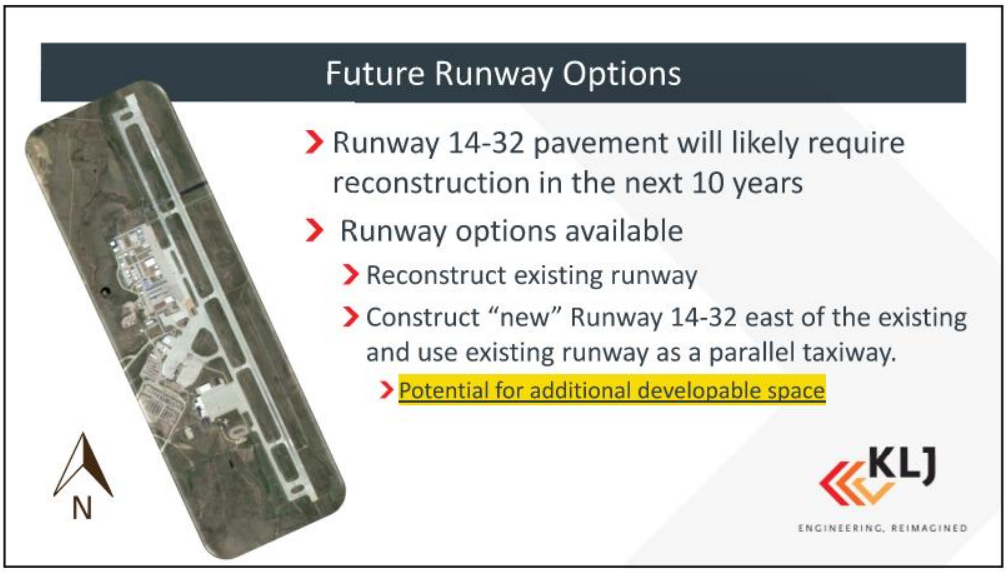
Future Runway Options
Runway 14-32 pavement will likely require reconstruction in the next 10 years
Runway options available
Reconstruct existing runway
Construct "new" Runway 14-32 east of the existing and use existing runway as a parallel taxiway.
Potential for additional developable space
N
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10

7/10/2021

11

12

6

7/10/2021


Thank You!
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13

7


Rapid City Regional Airport
Public Open House – Preferred Development Alternative
October 20, 2021
This presentation includes planning level concepts and cost estimates. Further analysis and environmental clearance (including opportunities for public input) will occur prior to implementation.
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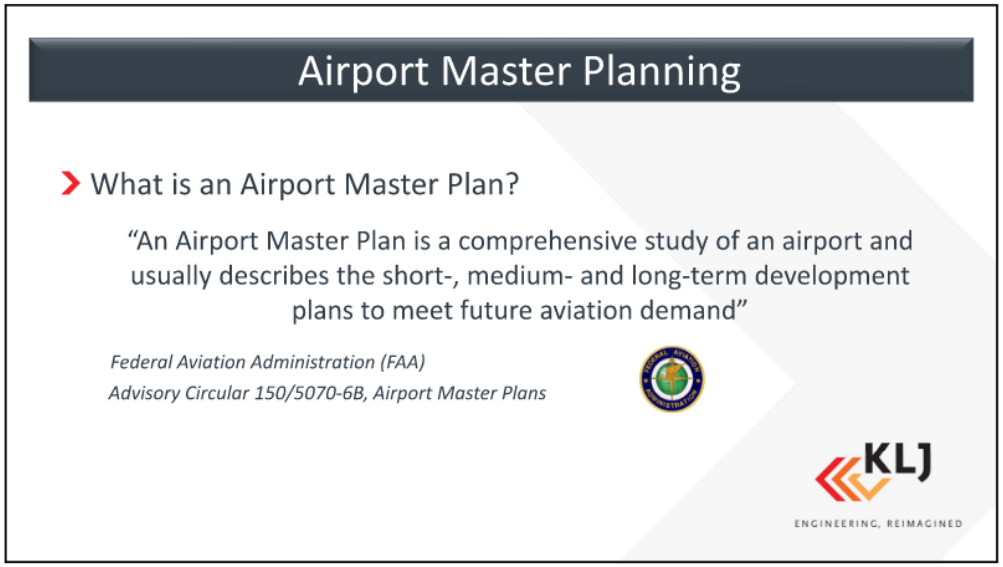
1


Airport Master Planning
What is an Airport Master Plan?
"An Airport Master Plan is a comprehensive study of an airport and usually describes the short-, medium- and long-term development plans to meet future aviation demand"
Federal Aviation Administration (FAA)
Advisory Circular 150/5070-6B, Airport Master Plans
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Roles & Responsibilities

- RCRA / City of Rapid City
  - Provide Guiding Principles
  - Make Decisions
  - Review and Approve Master Plan and ALP
- Advisory Committees (Focus Groups & Strategic Partner Committee
  - Identify Key Issues
  - Provide Input & Recommendations
- FAA & SD Office of Aeronautics
  - Provide Technical Guidance
  - Approve Aviation Forecasts
  - Review Master Plan
  - Approve ALP
- KLJ Planning Team
  - Manage Study
  - Complete Technical Work
  - Provide Analysis

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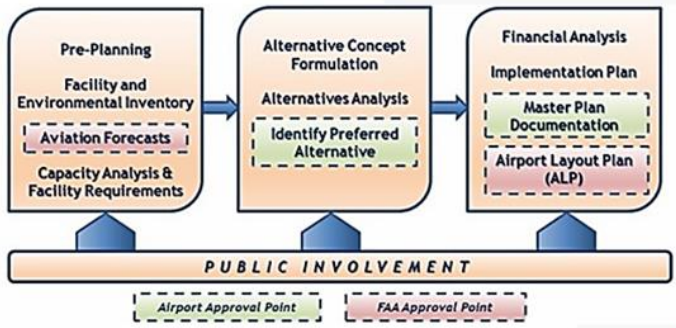
Airport Master Planning



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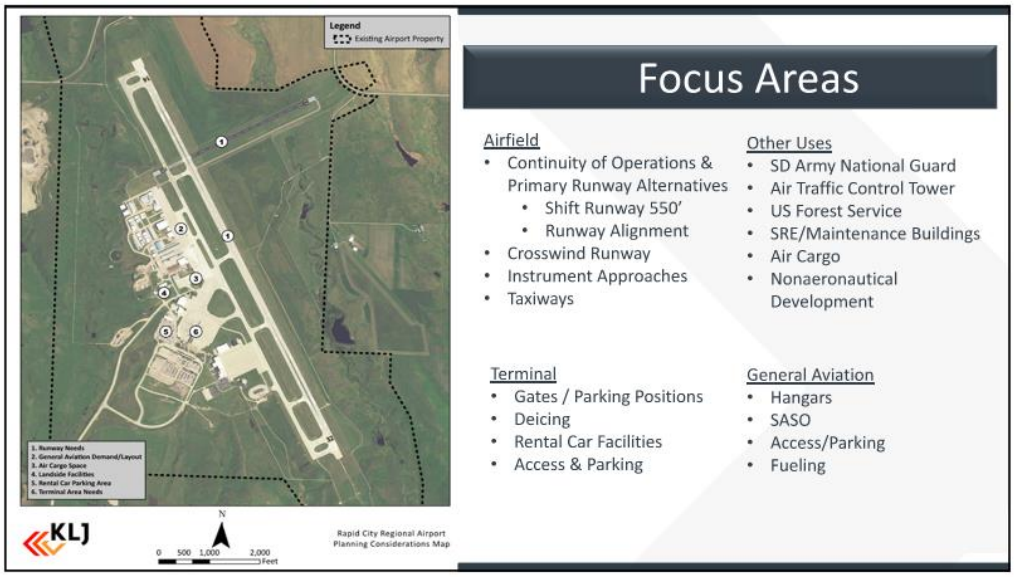

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Enplanements

Below are forecasted numbers through the planning period

Forecast	2019	2024	2029	2034	2039	2019 to 2029 CAGR	2019 to 2039 CAGR
Normal	343,926	416,470	514,497	616,987	736,334	*4.11%*	*3.88%*
Normal/Level	343,926	416,470	514,497	565,267	619,525	*4.11%*	*2.98%*
High	343,926	432,095	555,657	679,299	822,505	*4.91%*	*4.46%*
Preferred Normal/Level	343,926	416,470	514,497	565,267	619,525	*4.11%*	*2.98%*
FAA TAF	336,697	416,334	450,458	492,201	536,341	*2.95%*	*2.36%*

These are actual numbers as of August 2021, the enplanement activity has been rebounding

Month	2019 Actual	2020 Actual	2021 Actual	2021 Forecast
January	19,142	21,045	11,820	11,318
February	17,594	20,270	12,106	12,124
March	19,956	11,641	17,308	16,911
April	20,778	1,486	17,524	18,470
May	27,778	5,807	28,756	20,224
June	37,764	11,119	42,466	33,168
July	43,259	19,922	50,805	39,845
August	41,062	24,692	48,195	38,118
September	37,732	20,628	39,501	28,494
October	30,379	20,732		23,785
November	21,515	14,555		16,007
December	26,964	13,695		19,184
Total	343,926	185,592		277,647

6


Runway
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Runway Deficiencies
Runway 14-32 pavement will likely require reconstruction in the next 10 years during the high traffic season of summer.
Impacts the flying public
Economic impacts
Impacts to RAP
Challenges
Meeting FAA Runway Gradient Standards
Limited Phasing Options
Requires Runway/Airport Closure
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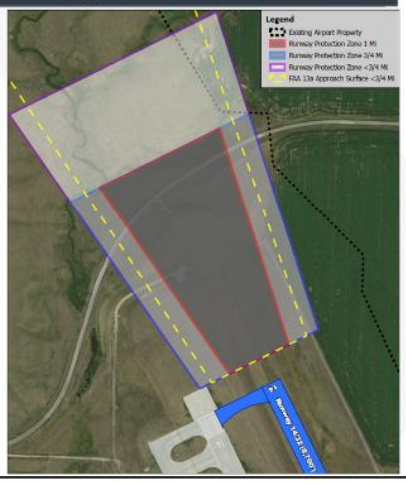
Design Standards & Instrument Approach Capability

- Runway Protection Zones
  - "The RPZ function is to enhance the protection of people and property on the ground".
  - Focus is on the type of use/activity within the RPZs
- Approach Surfaces
  - "Approach surfaces are designed to protect the use of the runway in both visual and instrument meteorological conditions near the airport.
  - Focus is on the height of objects within the approach surface



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Project Phasing / Constructabiltiy

- Need to be able to tie into existing runway grade
- Smallest construction phase would likely be 2,500'
  - Approximately 5,100' is available for takeoff and landing in that scenario
  - Insufficient length to accommodate scheduled airline service and larger business jets

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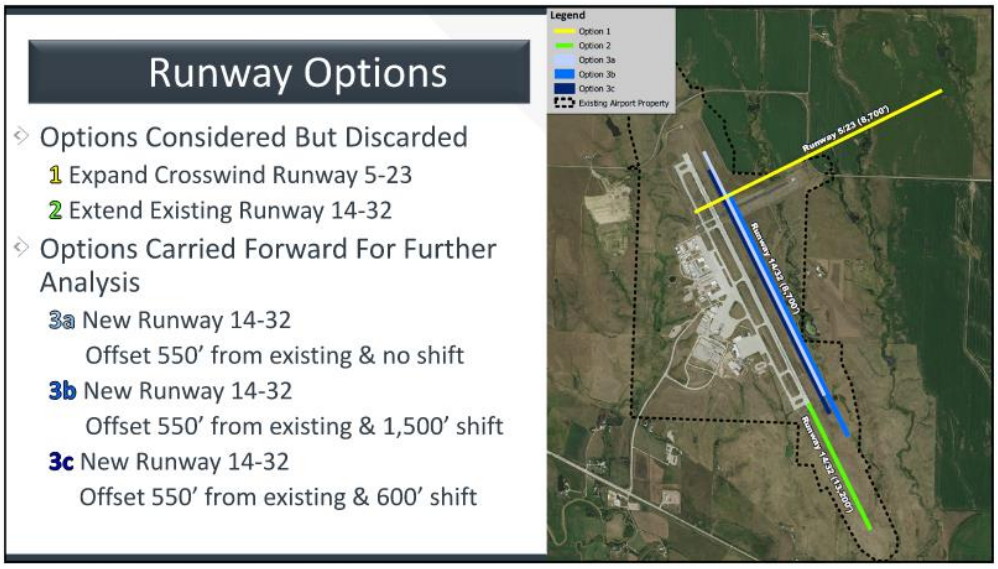
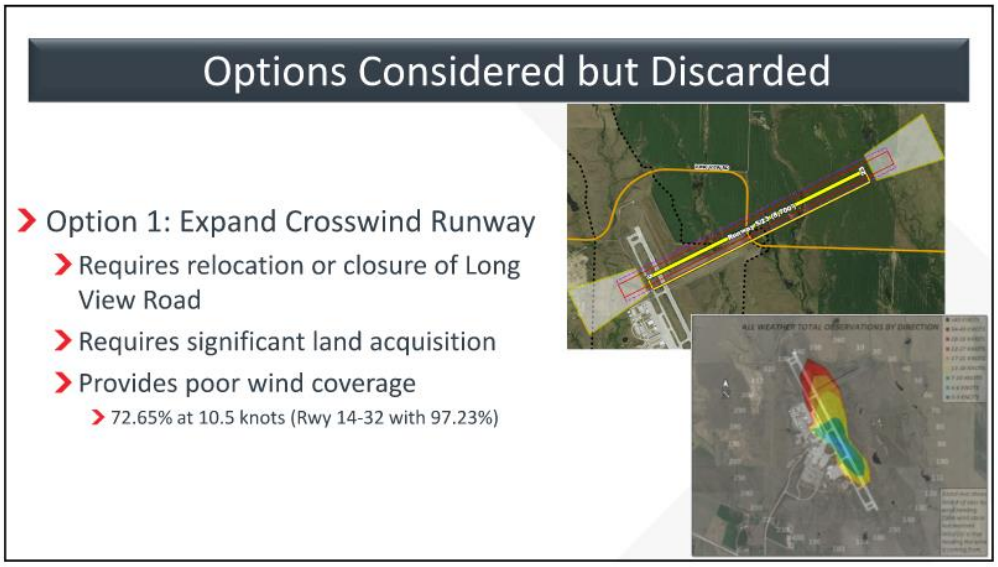

Runway Options
Options Considered But Discarded
1 Expand Crosswind Runway 5-23
2 Extend Existing Runway 14-32
Options Carried Forward For Further Analysis
3a New Runway 14-32
Offset 550' from existing & no shift
3b New Runway 14-32
Offset 550' from existing & 1,500' shift
3c New Runway 14-32
Offset 550' from existing & 600' shift
Legend
Option 1
Option 2
Option 3a
Option 3b
Option 3c
Existing Airport Property
Runway 5/23 (6,700')
Runway 14/32 (6,700')
Runway 14/32 (3,200')

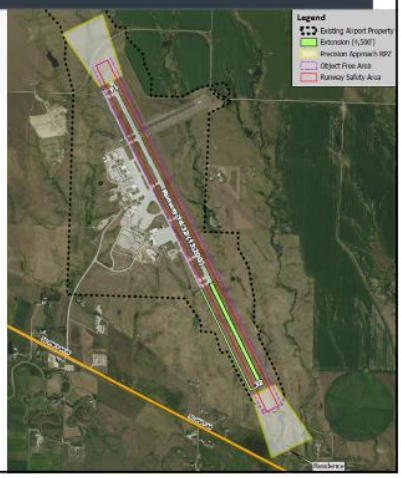
11


Options Considered but Discarded
Option 1: Expand Crosswind Runway
Requires relocation or closure of Long View Road
Requires significant land acquisition
Provides poor wind coverage
72.65% at 10.5 knots (Rwy 14-32 with 97.23%)

12

Options Considered but Discarded

- Option 2: Extend Runway 14-32
  - Extend 4,500' (8,700' → 13,200')
  - Allows for greater phasing flexibility
  - Requires significant land acquisition
  - High cost due to significant earthwork
    - Potentially $150M-$200M
    - Terrain drops to south faster than the runway is allowed to (.8% for last quarter)
    - 70'+ of fill would have to be brought in to build up a "plateau" for the runway and taxiway



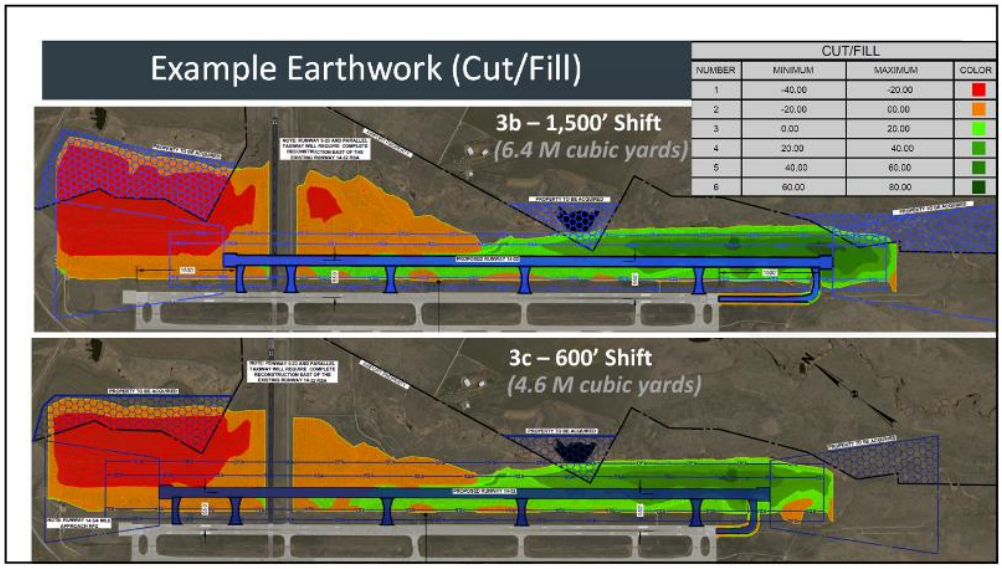
13

Constructing a New Runway

Options 3a, 3b and 3c

- Offset 550' from Existing Runway 14-32
- Convert existing runway to a taxiway
- Increase developable space
- Difference is the southerly shift
  - Degree a shift is necessary is primarily dependent on:
    - FAA Design Standard Policy
    - Desired Instrument Approach Capability
  - Greater shift results in more earthwork and higher costs

14



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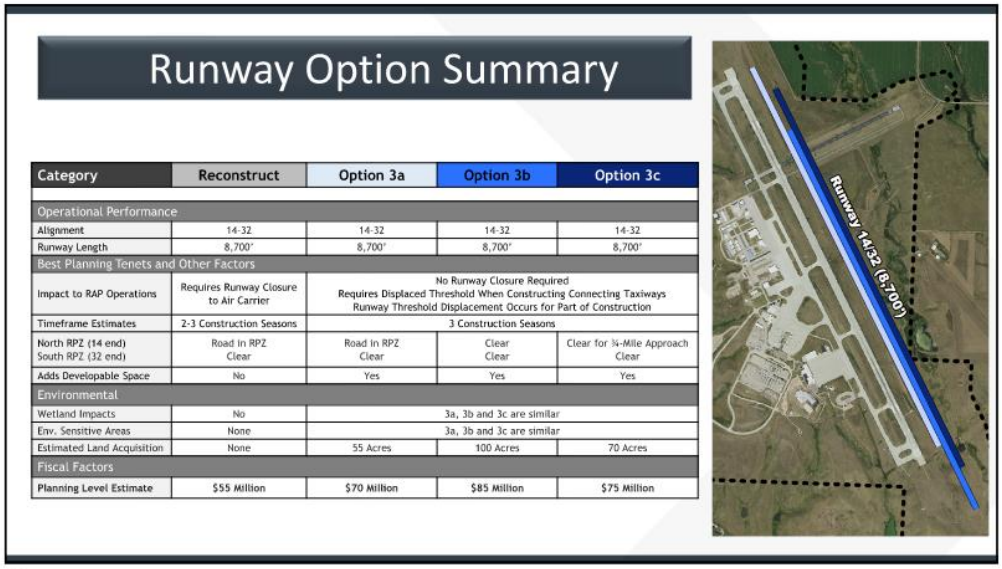

Category	Reconstruct	Option 3a	Option 3b	Option 3c
Operational Performance				
Alignment	14-32	14-32	14-32	14-32
Runway Length	8,700'	8,700'	8,700'	8,700'
Best Planning Tenets and Other Factors				
Impact to RAP Operations	Requires Runway Closure to Air Carrier	No Runway Closure Required Requires Displaced Threshold When Constructing Connecting Taxiways Runway Threshold Displacement Occurs for Part of Construction		
Timeframe Estimates	2-3 Construction Seasons	3 Construction Seasons		
North RPZ (14 end) South RPZ (32 end)	Road in RPZ Clear	Road in RPZ Clear	Clear Clear	Clear for ¾-Mile Approach Clear
Adds Developable Space	No	Yes	Yes	Yes
Environmental				
Wetland Impacts	No	3a, 3b and 3c are similar		
Env. Sensitive Areas	None	3a, 3b and 3c are similar		
Estimated Land Acquisition	None	55 Acres	100 Acres	70 Acres
Fiscal Factors				
Planning Level Estimate	**$55 Million**	**$70 Million**	**$85 Million**	**$75 Million**

16

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Final Runway Decision

- A hybrid alternative of option 3a and 3c was chosen
- Precision instrument approach procedures on both ends
- Potential extension/shift of 600' to the southeast

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New Runway 14-32 Timeline

*Please note this is an aggressive schedule

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Airline Passengers

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Passenger Terminal Needs

- Need for additional gates and parking positions
- Need for baggage screening system
- Expand baggage claim and car rental counter space
- Provide options for ticketing area expansion
- Provide an area for storage of GSE

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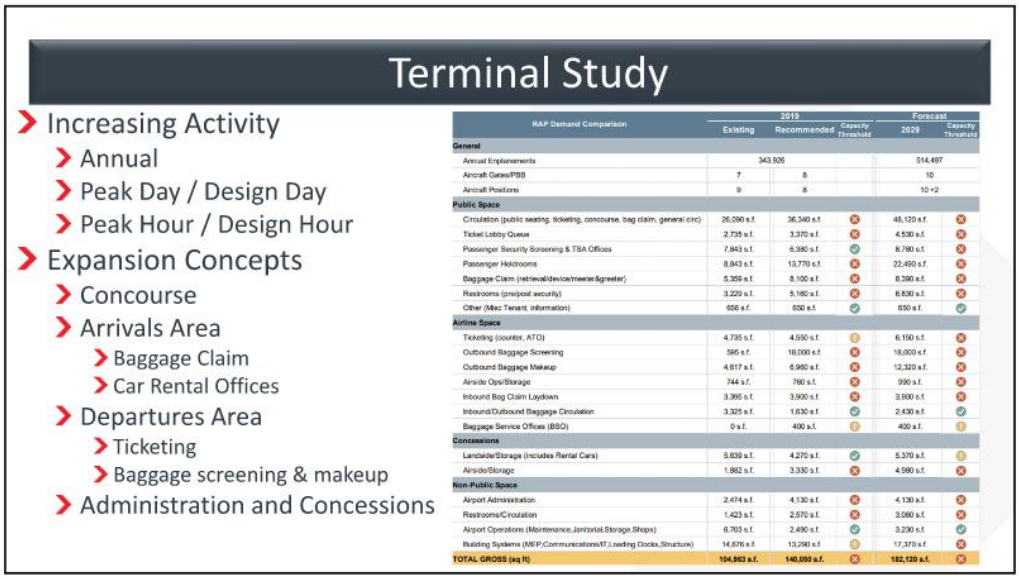

RAP Demand Comparison	2019 Existing	2019 Recommended	2019 Capacity Threshold	Forecast 2029	Forecast Capacity Threshold
General					
Annual Enplanements	343,926			514,497	
Aircraft Gates/PBB	7	8		10	
Aircraft Positions	9	8		10 +2	
Public Space					
Circulation (public seating, ticketing, concourse, bag claim, general circ)	26,090 s.f.	36,340 s.f.		48,120 s.f.	
Ticket Lobby Queue	2,735 s.f.	3,370 s.f.		4,530 s.f.	
Passenger Security Screening & TSA Offices	7,843 s.f.	6,380 s.f.		8,780 s.f.	
Passenger Holdrooms	8,843 s.f.	13,770 s.f.		22,490 s.f.	
Baggage Claim (retrieval/device/meeter&greeter)	5,359 s.f.	8,100 s.f.		8,390 s.f.	
Restrooms (pre/post security)	3,229 s.f.	5,160 s.f.		6,830 s.f.	
Other (Misc Tenant, information)	655 s.f.	650 s.f.		650 s.f.	
Airline Space					
Ticketing (counter, ATO)	4,735 s.f.	4,550 s.f.		6,150 s.f.	
Outbound Baggage Screening	585 s.f.	18,000 s.f.		18,000 s.f.	
Outbound Baggage Makeup	4,617 s.f.	6,960 s.f.		12,320 s.f.	
Airside Ops/Storage	744 s.f.	760 s.f.		990 s.f.	
Inbound Bag Claim Laydown	3,395 s.f.	3,900 s.f.		3,900 s.f.	
Inbound/Outbound Baggage Circulation	3,325 s.f.	1,630 s.f.		2,430 s.f.	
Baggage Service Offices (BSO)	0 s.f.	400 s.f.		400 s.f.	
Concessions					
Landside/Storage (includes Rental Cars)	5,639 s.f.	4,270 s.f.		5,370 s.f.	
Airside/Storage	1,882 s.f.	3,330 s.f.		4,980 s.f.	
Non-Public Space					
Airport Administration	2,474 s.f.	4,130 s.f.		4,130 s.f.	
Restrooms/Circulation	1,423 s.f.	2,570 s.f.		3,060 s.f.	
Airport Operations (Maintenance,Janitorial,Storage,Shops)	6,703 s.f.	2,490 s.f.		3,230 s.f.	
Building Systems (MEP,Communications/IT,Loading Docks,Structure)	14,676 s.f.	13,290 s.f.		17,370 s.f.	
TOTAL GROSS (sq ft)	**104,863 s.f.**	**140,050 s.f.**		**182,120 s.f.**	

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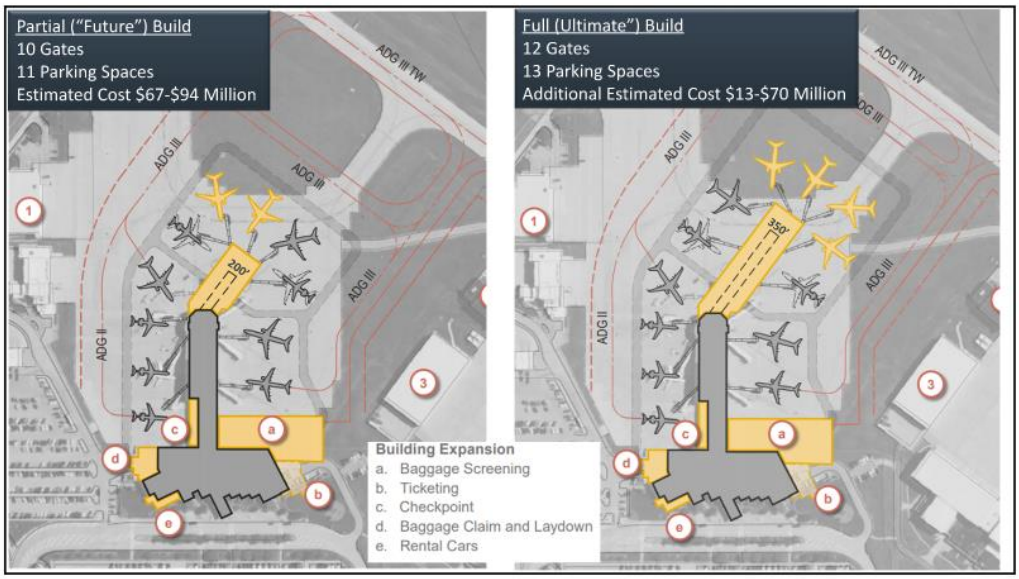

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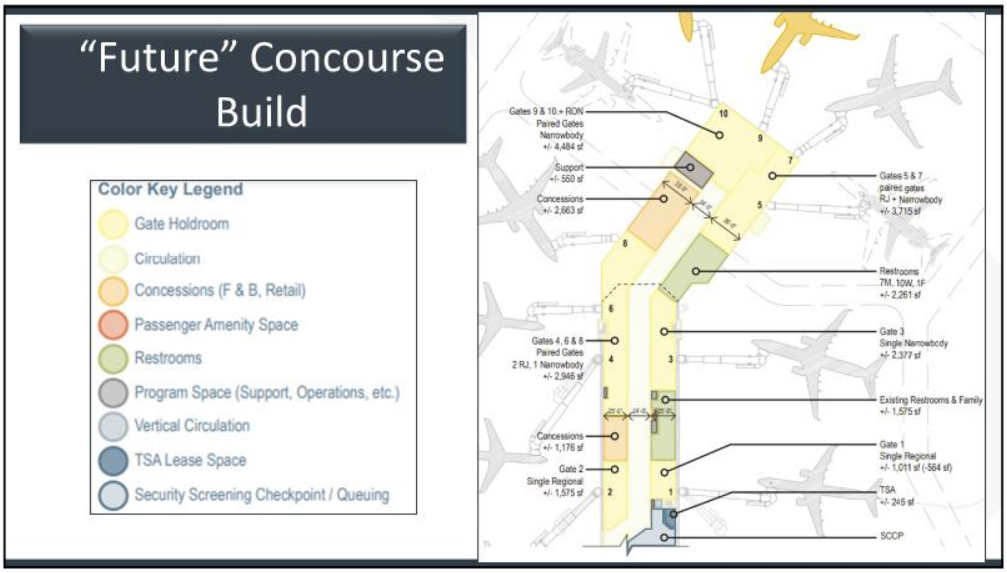

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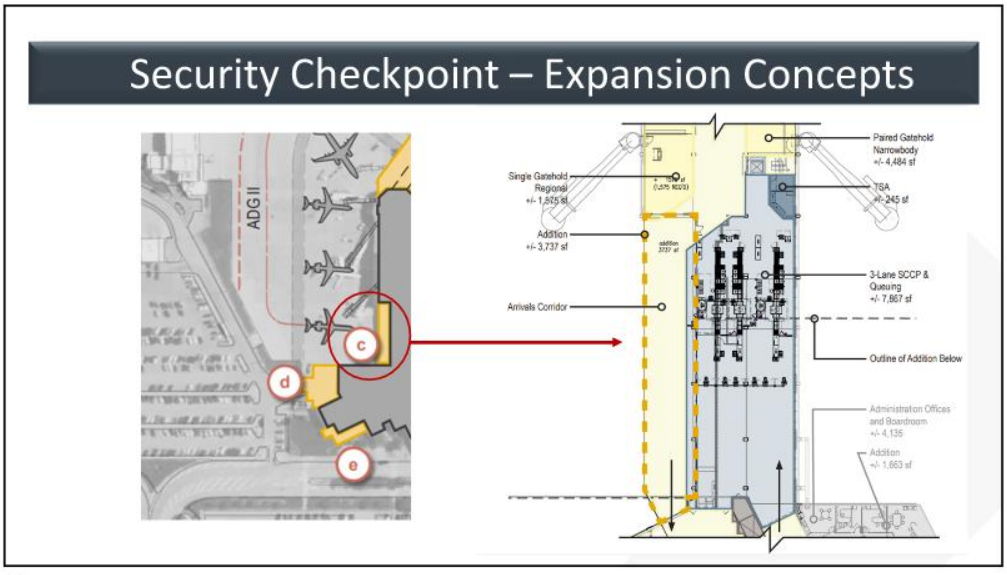

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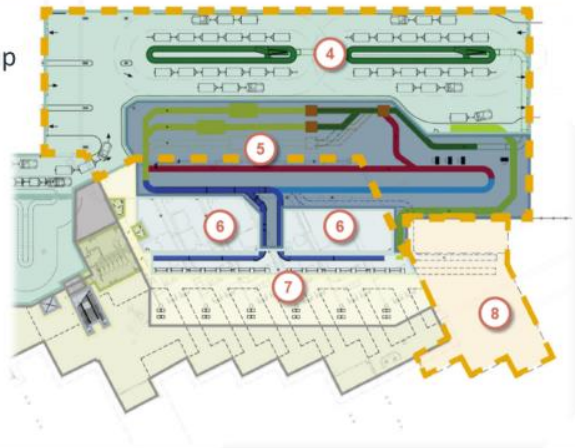
Departure Area Expansion Concepts

- Ticketing
- Baggage screening & makeup

4. Baggage Makeup Addition (+/- 20,000 sf)
- Two 160 LF Baggage Makeup carousels
- 24-cart capacity

5. Baggage Screening area (+/- 15,000 sf)
6. Airport Ticket Offices (ATOs)
7. New Ticket Counters & Scales: 28 positions
8. Future Ticketing Hall expansion (+/- 6,000 sf)



25

Rental Car Deficiencies

- Rental car staff must take time to transport cars to/from storage lot and ready/return parking lot
- A need for 300 storage spaces have been indicated
- Hail damage has been a significant issue

Category	Existing	Base	PAL 1	PAL 2	PAL 3	PAL 4
Ready/Return						
Peak Hour Transactions/Demand*	323	286	347	428	471	516
Capacity/(Deficiency)		**37**	**(24)**	**(105)**	**(148)**	**(193)**
Storage						
Rental Car Storage Demand	**133**	300+				
Capacity/(Deficiency)		**(167+)**				

*Source: KLJ Analysis; *Estimated*

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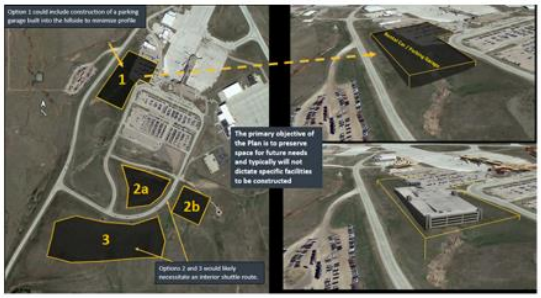
Rental Car Development



- Three areas were evaluated for future needs
- Area 1 was the best option with a parking garage built into the hillside
  - Offers needed parking spaces
  - Otherwise undevelopable space
  - Sits at a lower profile to preserve some views
  - Covered parking protects cars from the elements

27

Public Parking Deficiencies

- Public parking spaces needs are driven by passenger enplanements on the peak day of the peak month
- Projected using a ratio of 2.0 spaces per 1,000 annual enplanements

Category	Base	PAL 1	PAL 2	PAL 3	PAL 4
Enplanements	343,926	416,470	514,497	565,267	619,525
Public Parking Demand (with 10% daytime accumulation)	756	916	1,131	1,243	1,362
Effective Public Parking Supply	984	984	984	984	984
Capacity/(Deficiency)	228	68	-147	-259	-378

Source: KLJ Analysis; RED indicates a deficiency to existing facilities

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Public Parking Development

- Four areas were evaluated to develop and preserve for future needs
- Area 1 would best serve employee parking needs
- Ideal areas for public parking were determined to be area 2a and area 2b while the rest would be preserved for future development

29

Hotel Development

- Yellow options were explored for a small hotel like AeroStay Hotel at Sioux Falls Airport
- A development group looked at siting a hotel to the east of the parking area as shown in red
- The red option recommended by the development group was chosen

30

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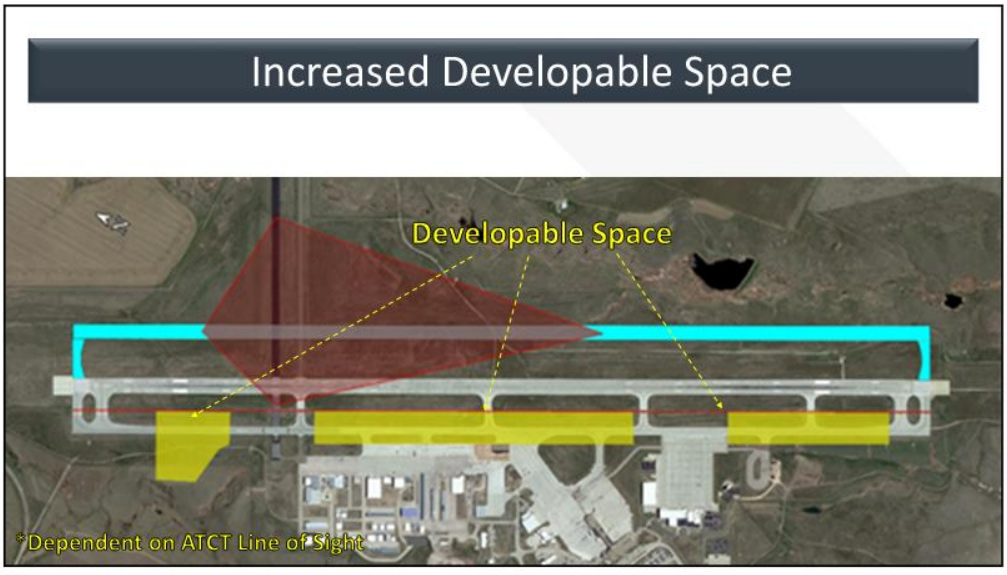
31



32

16

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33

34

17

North GA Development

- Area north of Lacroix Court
- The layout from the prior master plan is Option 1
- Two final options were considered but Option 1 was the final decision based on the following:
  - Most new box hangars revolving around current hangars
  - A 100' x 100' hangar with additional apron space
  - Preserving future apron frontage

35

Ultimate North GA Development

- More GA space will become available with the runway shift
- Three options were evaluated that offered additional apron space, hangar configuration and landside access
- Option 1 was decided because it provided the best access
- No detailed layout was developed but an idea of what can be done with the space is portrayed

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Ultimate North Aeronautical Development

- With the runway shift, earthwork and infrastructure, an additional development area could be used for Cargo or other aeronautical uses
- Two other areas (presented later) were more practical for future cargo development
- This area does offer easy road access for cargo to be loaded and unloaded or other Aeronautical Development

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Middle GA Development

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Large Hangar Development

- Two areas were considered for additional large hangar space
- Option 2 was eliminated due to lack of space, access and parking
- Option 1 was the most feasible area and was arranged to offer easy access to the apron, access road and parking

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Ops/Maintenance/SRE Development

- Currently there is a lack of storage for Snow Removal Equipment (SRE), the building is old and it is hard to maneuver in the area based on the current configuration
- RAP would like operations and maintenance in the same building
- Area 2 and 3 were decided to be better for future GA expansion and Area 4 was best for rental car needs
- Area 1 was the preferred alternative with expansion space and landside and airside access

40

Air Cargo Development

- Provide expansion areas for air cargo with airside/landside access and sufficient space for hangars and storage buildings.
- Option 3 was the near term alternative with Option 2 as a place holder for larger cargo development or other aeronautical development

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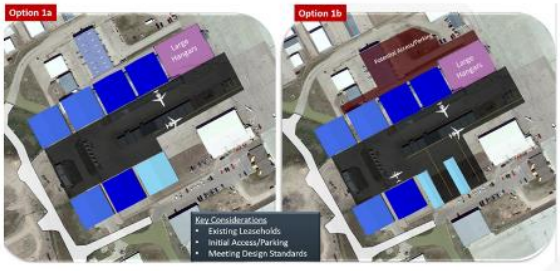
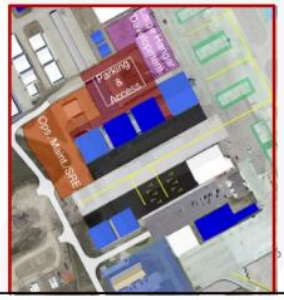
Middle GA Area Development

- Between Lacroix Ct. and Westjet Rd. considering large/corporate hangar development with maneuvering space not encroaching on the group II taxilane
- Two options were evaluated, and Option 1 was the preferred alternative
- Option 1 was updated for ops/maintenance/SRE area, reserved space for larger hangars, additional tiedown space and more customer parking for Westjet.





42

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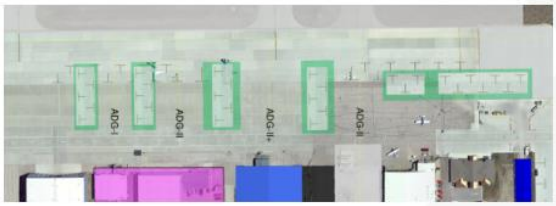
Tiedown Configuration

- Current alignment perpendicular to the runway is less-than-optimal due to prevailing winds
- The preferred configurations minimizes impacts to existing tenants while offering easy maneuvering for aircraft
- Accommodated for ADG I-II aircraft
- Shift of tiedowns east was done to provide manuevering clearance for ADG II aircraft



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Final GA Development

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44

22

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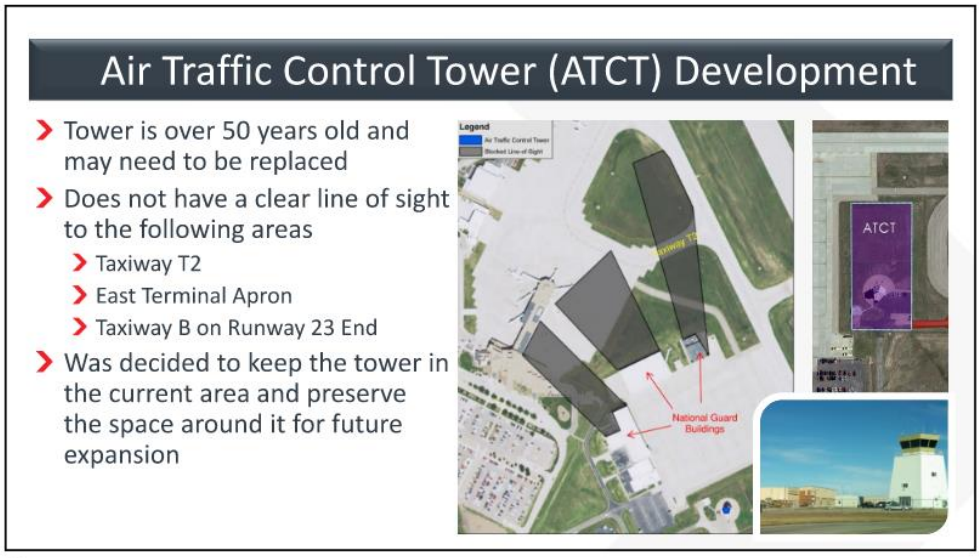
45



46

23

U.S. Forest Service (USFS) Development

- Can accommodate C-130 aircraft but can only enter one at a time due to inadequate taxilane separation
- The state is interested in funding expansion but unsure of the amount
- The Missoula aerial firefighting apron was used for guidance
- A concept was developed with the minimum footprint to handle most larger tankers and phasing out the existing. The fire-retardant loading facility would be maintained with a new access road. Extra apron would be included for possible cargo operations for larger aircraft

47

Deicing Apron Development

- After concourse configuration was determined, deicing operations were evaluated
- Plan to use the current area which offers two deicing positions and enough room for aircraft to taxi around
- Could also be shifted south with Fugro lease possibly moving west

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Fuel Farm Development

- A loop concept was developed in the same area as the current fuel farm
- This offers easy access to the new fueling system
- Adds another dispenser on the east side of Airport Rd. so operations and maintenance do not have to drive large SRE to the landside to refuel

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49

50

ATTENDANCE LIST

RAPID CITY REGIONAL AIRPORT
Public Open House
Wednesday October 20, 2021 at 6:00 p.m.
Rushmore Plaza Holiday Inn

Name:	Organization/Business:	Phone:	Email:
Mike Richardson	DT IVP	605-484-4572	dtivp@rushmore.com
Kyle McDorman	DATCF / Approach Control	316-299-3807	Kamd2027@gmail.com
Laurie Hawes	The Hawes Group	703 328 3487	lauriechawesmeetings.com
Rod Pethtel	Airport board	605-939-9948	
Jim Schroeder	GAAC	605 381 1121	jim7349@rapmicro.net
Kevin Wagner	Ainsworth - Banning	605-645-8780	Kevin.wagner@ainsworthbanning
Mike Kenton	VPS	605-484-2820	mikkentonc@gmail.com
Aaron Patton	West Jet	605-393-2800	aaron@westjetair.com
Sunny Stephens	SDDPA Dir. Distb	605-343-0706	Stephens@Rapidnet.com
JASON THORNTSON	PENNINGTON COUNTY PIO	605-394-2156-x1405	JASON.THORNTSON@PENNCO.ORG
Vanessa Flemos	Guest		vanessarlemos@live.com
JERRY DALE	DALE AVIATION	605-431-9900	KARYN@RUSHMORE.COM
Joshua Levine	Personal Visit	(370) 339-5239	yeshualevine@gmail.com
Edward Kluber	Personal	605-390-3072	Lonetree_r@msn.com

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ATTENDANCE LIST

RAPID CITY REGIONAL AIRPORT
Public Open House
Wednesday October 20, 2021 at 6:00 p.m.
Rushmore Plaza Holiday Inn

KLJ

Name:	Organization/Business:	Phone:	Email:
Allison Carson	Coalvestfet	605393	
Lukas Klucber	CMG	605 4312094	lklucber@cmgfi.com
Dale Peterson	City of Wall - NAAA	605 4232955	jolee@gwtc.net
Geoff Shugsby	self	605 716 8433	
Sarah Dubrall	&		
David Dubrall	Self		
Bob Morcon	Answorth Beanny	605-390-9403	bobmorcon@answorthbeanny.com
Bill Evans	RC Council		

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ATTENDANCE LIST

RAPID CITY REGIONAL AIRPORT
Public Open House
Wednesday October 20, 2021 at 6:00 p.m.
Rushmore Plaza Holiday Inn

Name:	Organization/Business:	Phone:	Email:
Buff Green	Personal	605-391-6543	buffhg27@gmail.com
Rod Senn	Mead & Hunt	605-545-8444	rod.senn@meadhunt.com
Stacie Granum	Visit Rapid City	605 718 8488	granum@visitrapidcity.com
Tim Johnson	Rushmore Destination	605-391-5132	timcjha@gmail.com

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RAPID CITY REGIONAL AIRPORT (RAP) AIRPORT MASTER PLAN UPDATE FEEDBACK SHEET

The goal of the Rapid City Regional Airport Master Plan Update is to determine a preferred development alternative that meets airport and community needs for the next 20 years and beyond. After reviewing the alternatives presented, please provide any comments and feedback you may have. Please hand sheet in at the end of the meeting, or email it to Kent Penney at kent.penney@kljeng.com (605-872-5005). Thank you for your time.

Runway Alternative

What you have planned is fine.

Terminal Area

Need a garage for travelers (talk to CHO) not just rental cars

Landside Area

General Aviation Areas

No comment.

Other Development

I was dropped off for an afternoon flight. I figured out that there were late flights - so because of that - there were cars sitting waiting for people coming in. There was no place to be dropped off. There needs to be place to pick people up, separate from dropping people off

Contact Information (Optional)

Name: Laurie Hawes Address: 710 Braelynn Lane RC, SD 57703

Email: lauriehawesmeetings.com Phone: 703-328-3487

Airport Master Plan Open House
October 2021

RAPID CITY REGIONAL AIRPORT

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RAPID CITY REGIONAL AIRPORT (RAP) AIRPORT MASTER PLAN UPDATE FEEDBACK SHEET

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Runway Alternative

Terminal Area

Landside Area

General Aviation Areas

Other Development

Hotel: Airport hotel is all about convenience. I believe it should be connected. With our elements along with rental car pick up & drop off with a hotel stay paired with flight.

Contact Information (Optional)

Name: Tim Johnson Address:

Email: timcjohn@gmail.com Phone: 391-5132

Airport Master Plan Open House
October 2021

RAPID CITY REGIONAL AIRPORT

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RAPID CITY REGIONAL AIRPORT (RAP) AIRPORT MASTER PLAN UPDATE FEEDBACK SHEET

The goal of the Rapid City Regional Airport Master Plan Update is to determine a preferred development alternative that meets airport and community needs for the next 20 years and beyond. After reviewing the alternatives presented, please provide any comments and feedback you may have. Please hand sheet in at the end of the meeting, or email it to Kent Penney at kent.penney@kljeng.com (605-872-5005). Thank you for your time.

Runway Alternative

What is the timeline for beginning work on the runway project? The current runway was only installed in the late 90's and was supposed to be a 40- 50 year runway. Is the intention to make the runway longer? If so, what is the need to extend it? It seems the money could be better spent addressing more immediate needs in the terminal area.

Terminal Area

There did not seem to be many plans for adding to the secured area of the terminal. While I understand they are adding separate lanes for arrivals, it does not seem that the current secured area is large enough to accommodate the amount of jet bridges being added. Also, do the new jet bridges put the current terminal secured area over fire capacity?

Landside Area

The new road to the fuel farm is concerning. Our fuel suppliers are worried, given the Airport's previous failures to plow the level 3 areas, that they could slide right off the edge of the new road while hauling B-train tankers. What is the weight capacity of the new road? What is the angle and width of the turn? Is there any kind of grade or slope to the road? Will there be any safety mechanisms in place to ensure the trucks do not go off the road if it is unplowed or icy? The average weight of a fully loaded B-train tanker is approximately 100,000 + lbs. Will the new road be able to accommodate this capacity?

General Aviation Areas

What is the necessity for current push to update the GA area? It does not seem that there is any desire from anyone to come into the GA area at this point. It seems the money could be better spent fixing some of the major deficits within the terminal area. It is unnecessary for the city and federal government to subsidize the housing of private planes when the owners those planes can certainly afford to pay for their own hangars. Why are some of the tie-downs facing east/west? Cargo is a major area of GA, rather than a "stepchild" as it was referred to at the open house. A taxilane is immediately needed for the cargo area. Does this master plan include any type of taxiway plan for the cargo area? The cargo operations are currently blocking some of the GA operations. Cargo operations need a solution before the airport should even consider a redevelopment of the GA area to allow more hangars and FBO's that nobody has shown any interest in building.

Other Development

Why is there nothing in the new Master Plan that covers fire safety or fire capacity within the secured area of the terminal? It seems as there is more of a focus on the GA section of the airport for some kind of future use when the terminal has major issues that need to be addressed immediately. What is the proposed timeline for updates to both the GA and the terminal?

Contact Information (Optional)

Name: Allison Corbin Address: 4190 Westjet Drive, Rapid City, SD 57703

Email: alcorbin@westjetair.com Phone: 605-393-2500

Airport Master Plan Open House
October 2021

RAPID CITY REGIONAL AIRPORT

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Rapid City Regional Airport

GA Committee – Preferred Development Alternative
October 23, 2021

This presentation includes planning level concepts and cost estimates. Further analysis and environmental clearance (including opportunities for public input) will occur prior to implementation.

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1

Runway Deficiencies

- Runway 14-32 pavement will likely require reconstruction in the next 10 years during the high traffic season of summer.
  - Impacts the flying public
  - Economic impacts
  - Impacts to RAP
- Challenges
  - Meeting FAA Runway Gradient Standards
  - Limited Phasing Options
  - Requires Runway/Airport Closure

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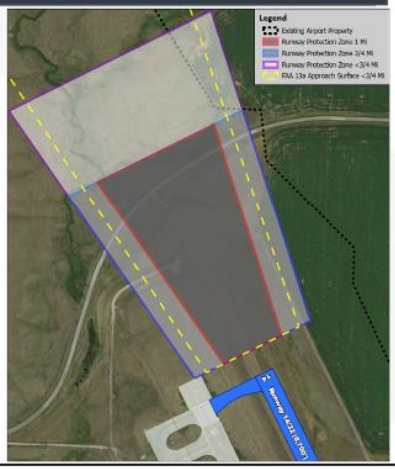
2

Design Standards & Instrument Approach Capability

- Runway Protection Zones
  - "The RPZ function is to enhance the protection of people and property on the ground".
  - Focus is on the type of use/activity within the RPZs
- Approach Surfaces
  - "Approach surfaces are designed to protect the use of the runway in both visual and instrument meteorological conditions near the airport.
  - Focus is on the height of objects within the approach surface



3

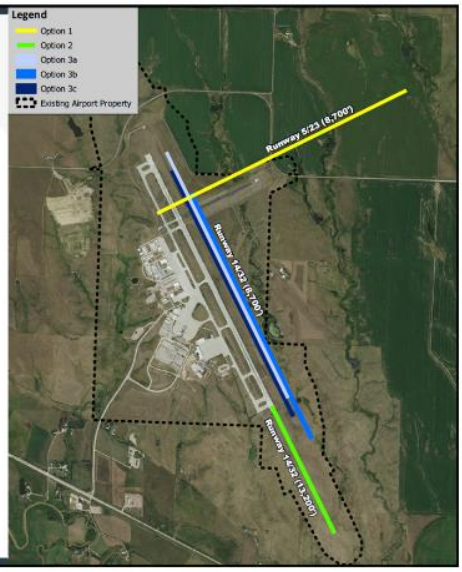
Project Phasing / Constructabiltiy

- Need to be able to tie into existing runway grade
- Smallest construction phase would likely be 2,500'
  - Approximately 5,100' is available for takeoff and landing in that scenario
  - Insufficient length to accommodate scheduled airline service and larger business jets

4

Runway Options

- Options Considered But Discarded
  - 1 Expand Crosswind Runway 5-23
  - 2 Extend Existing Runway 14-32
- Options Carried Forward For Further Analysis
  - 3a New Runway 14-32
    Offset 550' from existing & no shift
  - 3b New Runway 14-32
    Offset 550' from existing & 1,500' shift
  - 3c New Runway 14-32
    Offset 550' from existing & 600' shift



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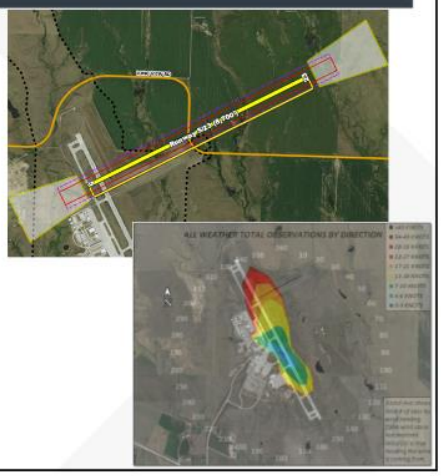
Options Considered but Discarded

- Option 1: Expand Crosswind Runway
  - Requires relocation or closure of Long View Road
  - Requires significant land acquisition
  - Provides poor wind coverage
    - 72.65% at 10.5 knots (Rwy 14-32 with 97.23%)



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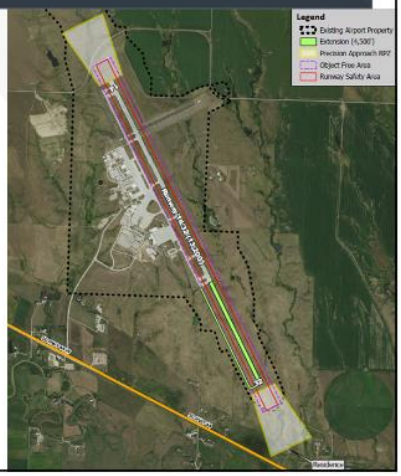
Options Considered but Discarded

- Option 2: Extend Runway 14-32
  - Extend 4,500' (8,700' → 13,200')
  - Allows for greater phasing flexibility
  - Requires significant land acquisition
  - High cost due to significant earthwork
    - Potentially $150M-$200M
    - Terrain drops to south faster than the runway is allowed to (.8% for last quarter)
    - 70'+ of fill would have to be brought in to build up a "plateau" for the runway and taxiway



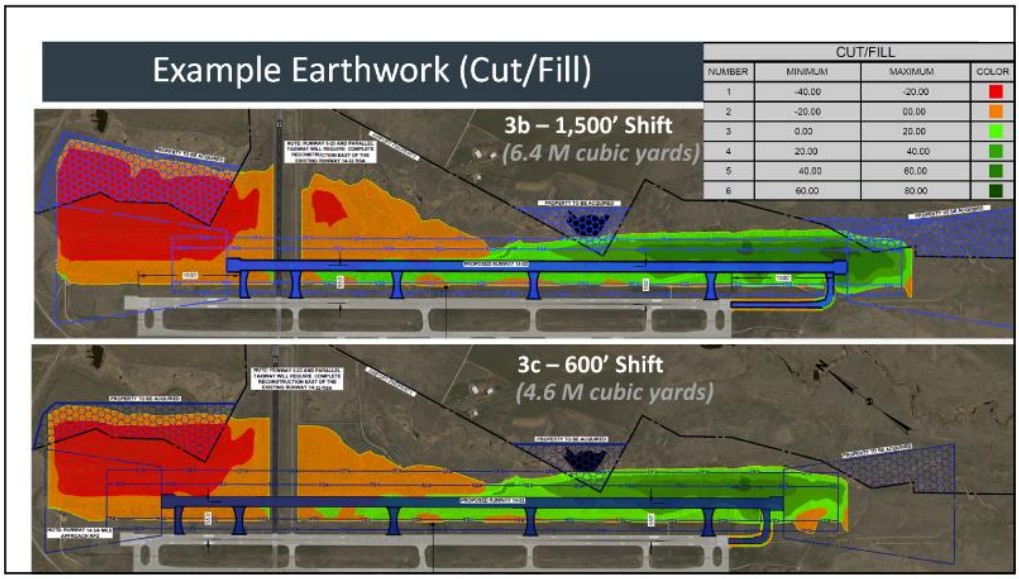
7

Constructing a New Runway

Options 3a, 3b and 3c

- Offset 550' from Existing Runway 14-32
- Convert existing runway to a taxiway
- Increase developable space
- Difference is the southerly shift
  - Degree a shift is necessary is primarily dependent on:
    - FAA Design Standard Policy
    - Desired Instrument Approach Capability
  - Greater shift results in more earthwork and higher costs

8



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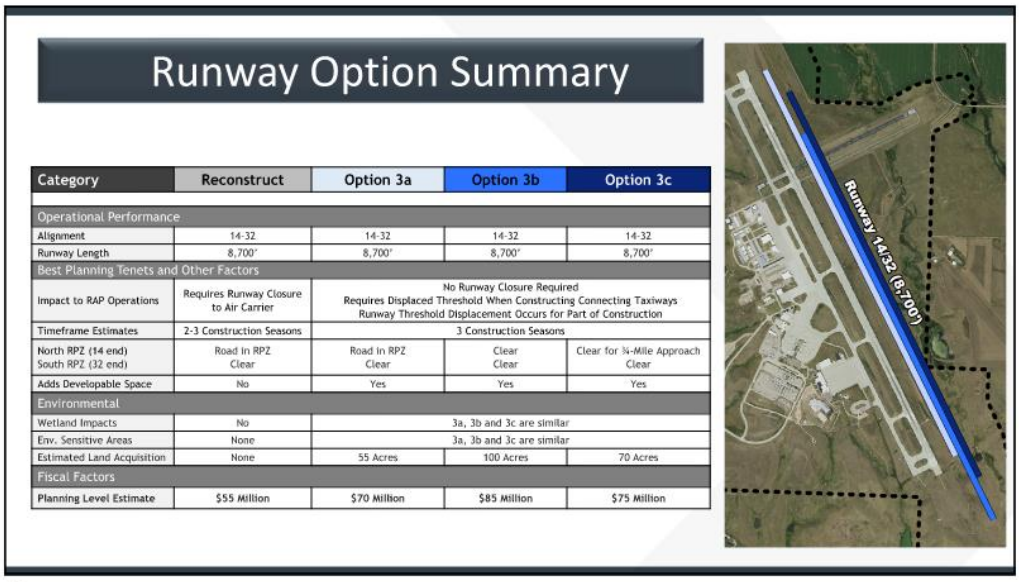

Category	Reconstruct	Option 3a	Option 3b	Option 3c
Operational Performance				
Alignment	14-32	14-32	14-32	14-32
Runway Length	8,700'	8,700'	8,700'	8,700'
Best Planning Tenets and Other Factors				
Impact to RAP Operations	Requires Runway Closure to Air Carrier	No Runway Closure Required Requires Displaced Threshold When Constructing Connecting Taxiways Runway Threshold Displacement Occurs for Part of Construction		
Timeframe Estimates	2-3 Construction Seasons	3 Construction Seasons		
North RPZ (14 end) South RPZ (32 end)	Road in RPZ Clear	Road in RPZ Clear	Clear Clear	Clear for ¾-Mile Approach Clear
Adds Developable Space	No	Yes	Yes	Yes
Environmental				
Wetland Impacts	No	3a, 3b and 3c are similar		
Env. Sensitive Areas	None	3a, 3b and 3c are similar		
Estimated Land Acquisition	None	55 Acres	100 Acres	70 Acres
Fiscal Factors				
Planning Level Estimate	$55 Million	$70 Million	$85 Million	$75 Million

10

Final Runway Decision

- A hybrid alternative of option 3a and 3c was chosen
- Precision instrument approach procedures on both ends
- Potential extension/shift of 600' to the southeast

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New Runway 14-32 Timeline

*Please note this is an aggressive schedule

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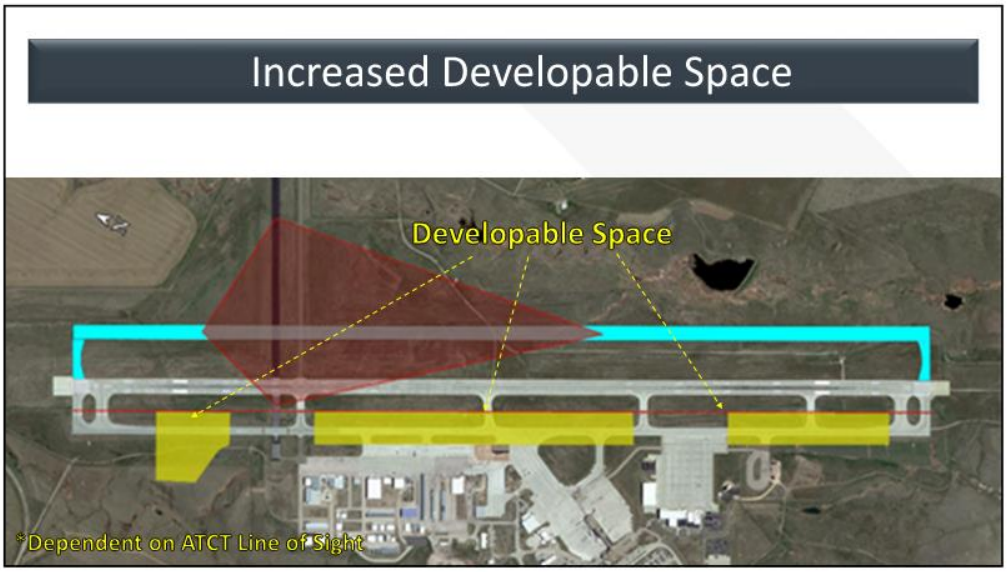

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North GA Development
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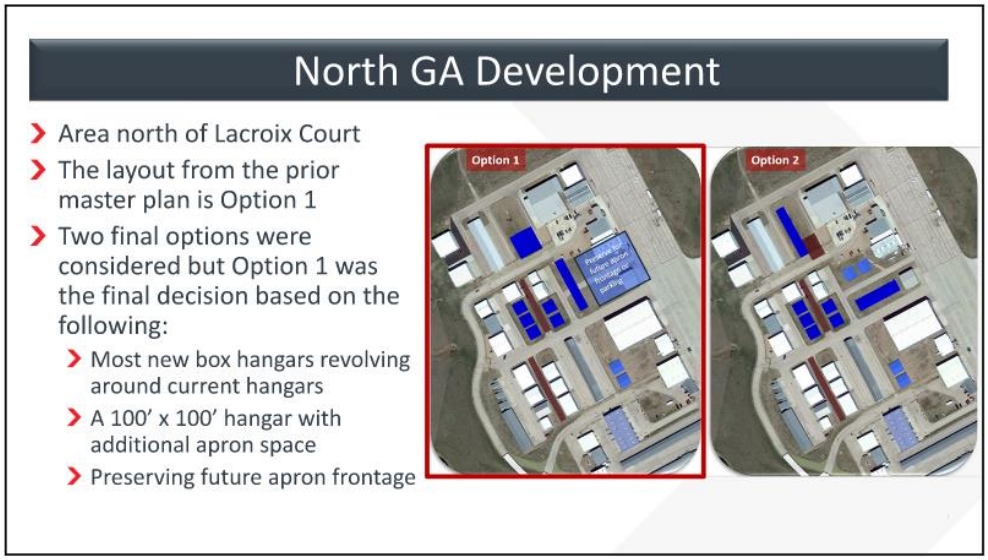
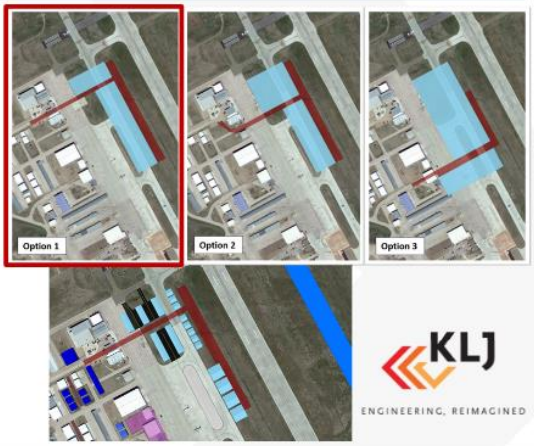

North GA Development
Area north of Lacroix Court
The layout from the prior master plan is Option 1
Two final options were considered but Option 1 was the final decision based on the following:
Most new box hangars revolving around current hangars
A 100' x 100' hangar with additional apron space
Preserving future apron frontage
Option 1
Option 2

16

Ultimate North GA Development

- More GA space will become available with the runway shift
- Three options were evaluated that offered additional apron space, hangar configuration and landside access
- Option 1 was decided because it provided the best access
- No detailed layout was developed but an idea of what can be done with the space is portrayed



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Ultimate North Aeronautical Development

- With the runway shift, earthwork and infrastructure, an additional development area could be used for Cargo or other aeronautical uses
- Two other areas (presented later) were more practical for future cargo development
- This area does offer easy road access for cargo to be loaded and unloaded or other Aeronautical Development

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Middle GA Development

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Large Hangar Development

- Two areas were considered for additional large hangar space
- Option 2 was eliminated due to lack of space, access and parking
- Option 1 was the most feasible area and was arranged to offer easy access to the apron, access road and parking

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Ops/Maintenance/SRE Development

- Currently there is a lack of storage for Snow Removal Equipment (SRE), the building is old and it is hard to maneuver in the area based on the current configuration
- RAP would like operations and maintenance in the same building
- Area 2 and 3 were decided to be better for future GA expansion and Area 4 was best for rental car needs
- Area 1 was the preferred alternative with expansion space and landside and airside access

21

Air Cargo Development

- Provide expansion areas for air cargo with airside/landside access and sufficient space for hangars and storage buildings.
- Option 3 was the near term alternative with Option 2 as a place holder for larger cargo development or other aeronautical development

22

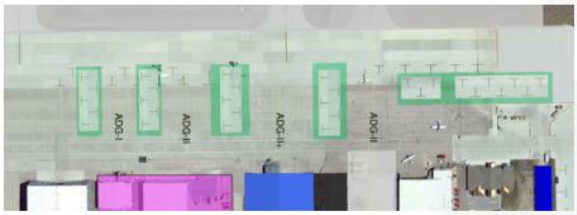
Middle GA Area Development

- Between Lacroix Ct. and Westjet Rd. considering large/corporate hangar development with maneuvering space not encroaching on the group II taxilane
- Two options were evaluated, and Option 1 was the preferred alternative
- Option 1 was updated for ops/maintenance/SRE area, reserved space for larger hangars, additional tiedown space and more customer parking for Westjet.

23

Tiedown Configuration

- Current alignment perpendicular to the runway is less-than-optimal due to prevailing winds
- The preferred configurations minimizes impacts to existing tenants while offering easy maneuvering for aircraft
- Accommodated for ADG I-II aircraft
- Shift of tiedowns east was done to provide manuevering clearance for ADG II aircraft



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24

10/23/2021

25

26

13

GA Committee Update – October 2021 (Continued)

ATTENDANCE LIST

RAPID CITY REGIONAL AIRPORT
GA Committee – Preferred Alternatives
Saturday October 23, 2021 at 10:00 a.m.
Rapid City Fire Station 8

KLJ

Name:	Organization/Business:	Phone:	Email:
Jim Schroeder	GAAC	605 381 1121	jim7349@rap.midco.net
Rod Pettigrew	Airport Board	939-5948	
JERRY DALE	DALE AVIATION	605-431-9900	
Allison Corbin	Westjet	605-393-3500	alcorbin@westjetair.com
MARC BOSSICKA		605 390-0900	
BERT C. COSWIN		605-431-4757	bc coswin@rapmidco.net
Arie LaCroix		605-381-9505	arie michael 2 @ Aol.com
Rick Beis AAC	General Av.	605 390 2352	braids 01@gmail
Geoff Slingsby		605 380 7174	jgslingsby@yourvision.com, net

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RAPID CITY REGIONAL AIRPORT (RAP)
AIRPORT MASTER PLAN UPDATE
FEEDBACK SHEET

The goal of the Rapid City Regional Airport Master Plan Update is to determine a preferred development alternative that meets airport and community needs for the next 20 years and beyond. After reviewing the alternatives presented, please provide any comments and feedback you may have. Please hand sheet in at the end of the meeting or email it to Kent Penney at kent.penney@kljeng.com. Thank you for your time.

1. There does not seem to be much planning or consideration for cargo. Currently, the lack of a taxiway in the cargo area is a major issue that needs immediate attention. Cargo is an important part of GA and it is concerning that the issue is not addressed. The money for redeveloping GA would be better spent on more immediate needs in the cargo area.
2. As noted in the managers meeting, there is no immediate need for the new hangars and taxiway in the GA area, as nobody has tried to build in GA for the last 6 years. The money would be better spent fixing more immediate airport needs such as sewage, cargo, TSA, fire safety, etc.
3. What is the timeline for the different portions of the GA project?
4. What does the airport intend to do with the current leaseholders that are already in these planned areas?
5. If the Airport is planning on this development within the current 15-30 year leases that are already present, where does the Airport intend to move the current GA leaseholds?
6. The tie-down areas on the Master Plan do not take into consideration, or leave any parking for, large, private jets. Where does the Airport intend to park these planes when they come in? Additionally, some of the tie-down spaces are oriented east/west, which the airport has already said is against regulation. Why are these spaces facing east/west?
7. There are multiple concerns with the new fuel farm road. (1) Based on the Airport's past performance, our delivery drivers do not believe the Airport will adequately plow this road in the winter; (2) What is the weight-bearing capacity of this road? (3) What is the turn radius of the road's entrance? (4) Is there any kind of grade/slope to this road? When delivering loaded B-trains, our delivery trucks average 100,000+ pounds. Will this road be able to accommodate that kind of weight year round? (5) Will there be any safety mechanisms in place to keep the tankers from sliding off the side of the road (i.e. guardrails, barriers, etc.)?
8. How old is the current runway and why is it being redeveloped before it has hit it's 40-50 year lifespan?
9. What is the purpose of adding the second ("front") row of GA development at this time when there has not been any interest from outside parties (except for Mr. Pettigrew) in operating a new business within GA?
10. There are immediate issues that the airport is ignoring in order to get this GA development done. The money would be better spent fixing cargo, fire safety and capacity, sewage lagoons and other major issues.

Contact Information (Optional) Did you happen to be in the terminal on a Saturday this summer?

Name: Allison Corbin Address: 4190 Westjet Drive, Rapid City, SD 57703

Email: alcorbin@westjetair.com Phone: 605-393-2500

APPENDIX D: RUNWAY LENGTH ANALYSIS

Purpose

A runway length analysis was completed to FAA standards identified in FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design* in this airport master plan study for the Rapid City Regional Airport. Due to the technical nature of this analysis, a separate appendix has been prepared to calculate recommended runway lengths for the design aircraft identified in the aviation forecasts.

Aircraft Up to 60,000 Pounds

A runway length analysis was performed using the FAA's current methodology found in FAA AC 150/5325-4B. The design approach identifies a recommended runway length based on a family grouping of design aircraft.

At RAP the current overall design aircraft is large aircraft greater than 60,000 pounds. Typical design aircraft fleet includes the Bombardier CRJ-900 operated by American Airlines and Delta. The complete design aircraft fleet mix is identified in **Chapter 4: Facility Requirements**. The length of the primary Runway 14-32 will be driven by the length needs of the critical design aircraft fleet mix as well as large aircraft greater than 12,500 pounds but less than 60,000 pounds.

Various other airfield surfaces at RAP are designed for smaller aircraft. This includes large aircraft greater than 12,500 pounds but less than 60,000 pounds, and small general aviation aircraft with approach speeds of 50 knots or greater and maximum certified takeoff weight of 12,500 pounds or less.

Small Airplanes Up to 12,500 Pounds

FAA Design Curves

The FAA design approach identified in Chapter 2 of FAA AC 150/5325-4B for most small aircraft less than 12,500 pounds requires several steps to be performed to determine runway length:

1. **Identify Number of Passenger Seats:** Classify design aircraft as one of two categories; "Less than 10 Passenger Seats" and "10 Passenger Seats or Greater"
2. **Select Percentage of Fleet:** Airplanes classified as "Less than 10 Passenger Seats" are grouped into two percentage categories based on the airport's location and the amount of existing or planned aviation activities. The categories include "95 Percent" and "100 Percent" of Fleet.
3. **Calculate Runway Length Based on Curves:** Utilize FAA runway length curves published in AC 150/5325-4B.

Table D-1 FAA AC 150/5345-4B Runway Length Requirements (≤ 12,500 lbs.)

Airport and Runway Data	
Airport Elevation	3203.5 feet
Mean Daily Maximum Temperature of Hottest Month	87.1°F
Aircraft Classification	**Recommended Runway Length**
Small Airplanes 12,500 Pounds or less	
10 or more passenger seats	4,930 feet
Less than 10 passenger seats at 100 percent of fleet	**4,930 feet**
Less than 10 passenger seats at 95 percent of fleet	**4,500 feet**

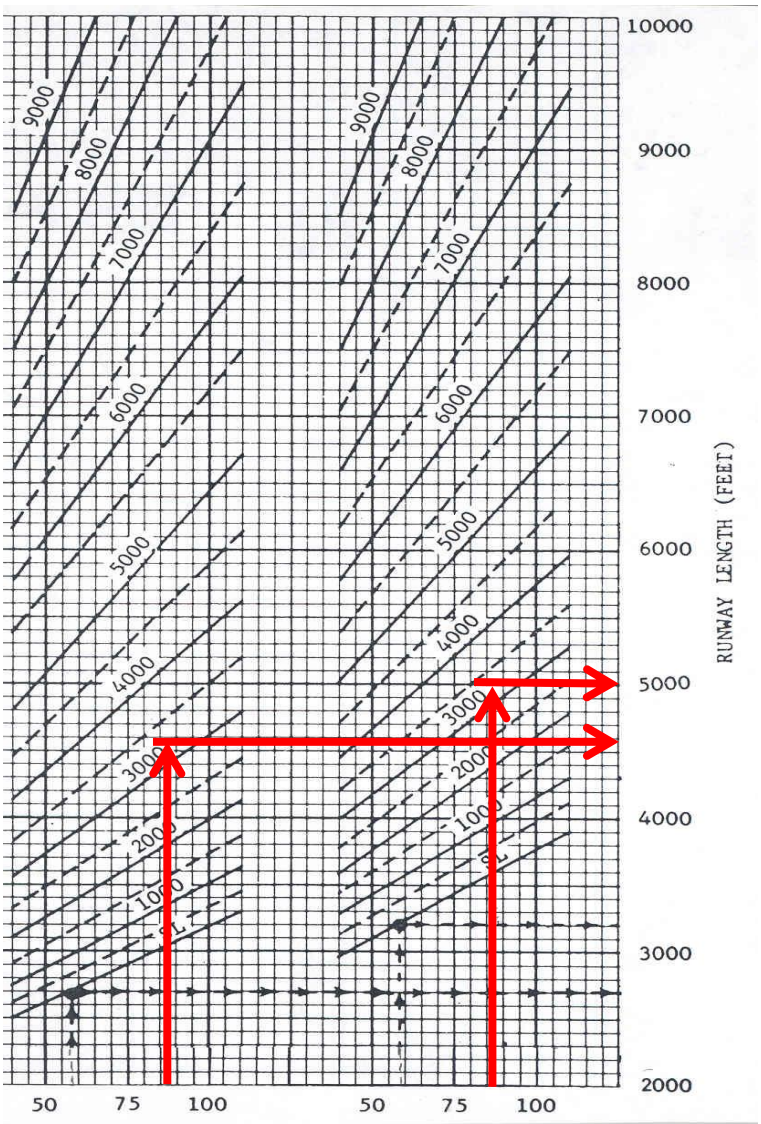
Source: FAA AC 150/5325-4B, KLJ Analysis

Figure D-1 - FAA Figure 2-1: Small Airplanes with Fewer than 10 Passenger Seats (Excludes Pilot and Co-pilot)

Rapid City Regional Airport
Temperature: 87.1°F / 30.6°C - Airport Elevation: 3203.5' MSL

Airport Elevation (feet)

95 Percent of Fleet 100 Percent of Fleet

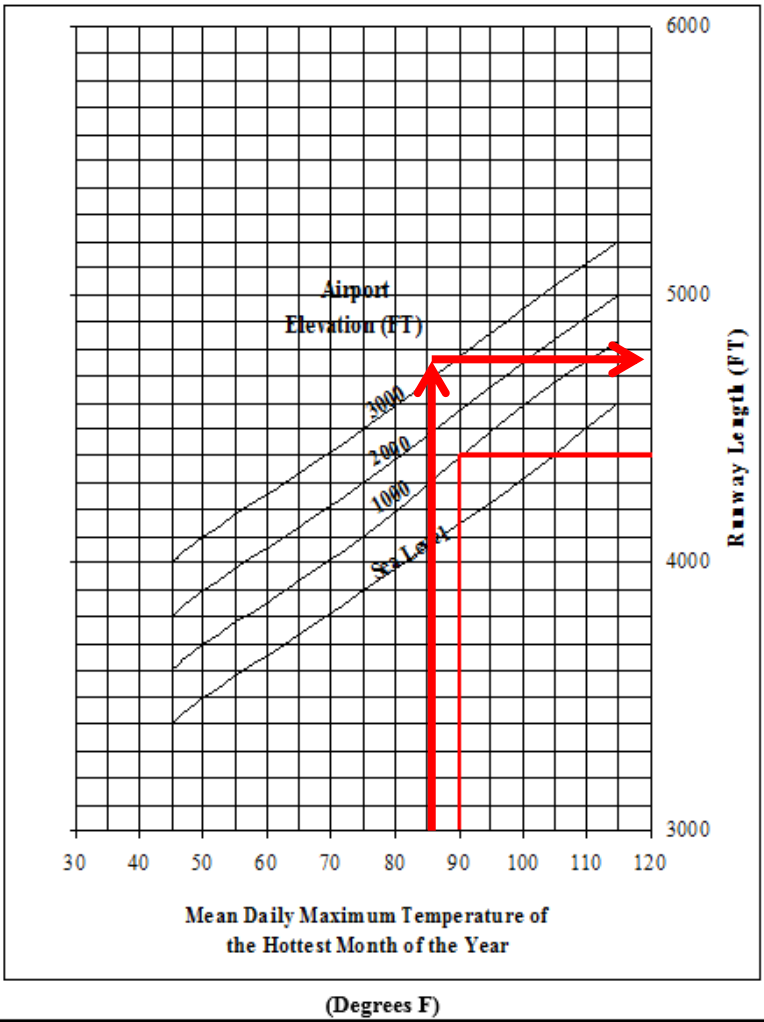


Runway Length @ 95 Percent of Fleet: **4,575 feet**
Runway Length @ 100 Percent of Fleet: **5,000 feet**

Figure D-2 - FAA Figure 2-2: Small Airplanes Having 10 or More Passenger Seats (Excludes Pilot and Co-pilot)

Rapid City Regional Airport
Temperature: 87.1°F / 30.6°C - Airport Elevation: 3203.5' MSL

Representative Airplanes	Runway Length Curves
Raytheon B80 Queen Air **Raytheon** E90 King Air **Raytheon** B99 Airliner **Raytheon** A100 King Air (Raytheon formerly Beech Aircraft) **Britten-Norman** Mark III-I Trilander **Mitsubishi** MU-2L **Swearigen** Merlin III-A **Swearigen** Merlin IV-A **Swearigen** Metro II	**Example:** Temperature (mean day max hot month) 90° F (32° C) Airport Elevation (msl) 1,000 feet (328 m) Recommended Runway Length 4,400 feet (1,341 m) **Note:** For airport elevations above 3,000 feet (915 m), use the 100 percent of fleet grouping in figure 2-1.



Recommended Runway Length: **4,775 feet**

Large Airplanes Up to 60,000 Pounds

FAA Design Curves

The FAA design approach identified in Chapter 3 of FAA AC 150/5325-4B for aircraft greater than 12,500 pounds and less than 60,000 pounds requires the following steps to be performed to determine runway length.

1. **Select Percentage of Fleet:** Group the design airplane into one of two percentage categories based on performance. The categories include "75 Percent of Fleet" and "100 Percent of Fleet".
2. **Identify Useful Load Factor:** Determine the useful load factor for the design aircraft based on the difference in maximum gross weight and the basic operating weight. Useful load consists of passengers, cargo, and usable fuel. The categories include "60 percent useful load" and "90 percent useful load".
3. **Determine Airport Data:** Evaluate the airport elevation, mean daily temperature in hottest month and runway condition to adjust runway length.
4. **Calculate Runway Length:** Utilize FAA runway length curves published in AC 150/5325-4B.
5. **Apply Adjustments:** The effective runway gradient affects the aircraft's takeoff length. Wet and slippery runways for turbojet airplanes allow for runway length curves to be increased by 15 percent up to 5,500 feet for "60 percent useful load" and 7,000 feet for "90 percent useful load".

The recommended runway length calculations at RAP for large aircraft up to 60,000 pounds are summarized in the following table.

Table D-2 – FAA AC 150/5345-4B Runway Length Requirements (>12,500 but < 60,000 lbs.)

Airport and Runway Data	
Airport Elevation	3203.5 feet
Mean Daily Maximum Temperature of Hottest Month	87.1°F
Maximum Difference in Runway Centerline Elevation	49 feet
Runway Condition	Wet and Slippery Runways
Aircraft Classification	**Recommended Runway Length**
Large Airplanes more than 12,500 Pounds but less than 60,000 Pounds	
100 percent of fleet at 90 percent useful load	9,700 feet
100 percent of fleet at 60 percent useful load	7,600 feet
75 percent of fleet at 90 percent useful load	8,600 feet
75 percent of fleet at 60 percent useful load	5,700 feet

Source: FAA AC 150/5325-4B, KLJ Analysis
Note: Runway length requirements estimated based on charts for airport planning purposes only.

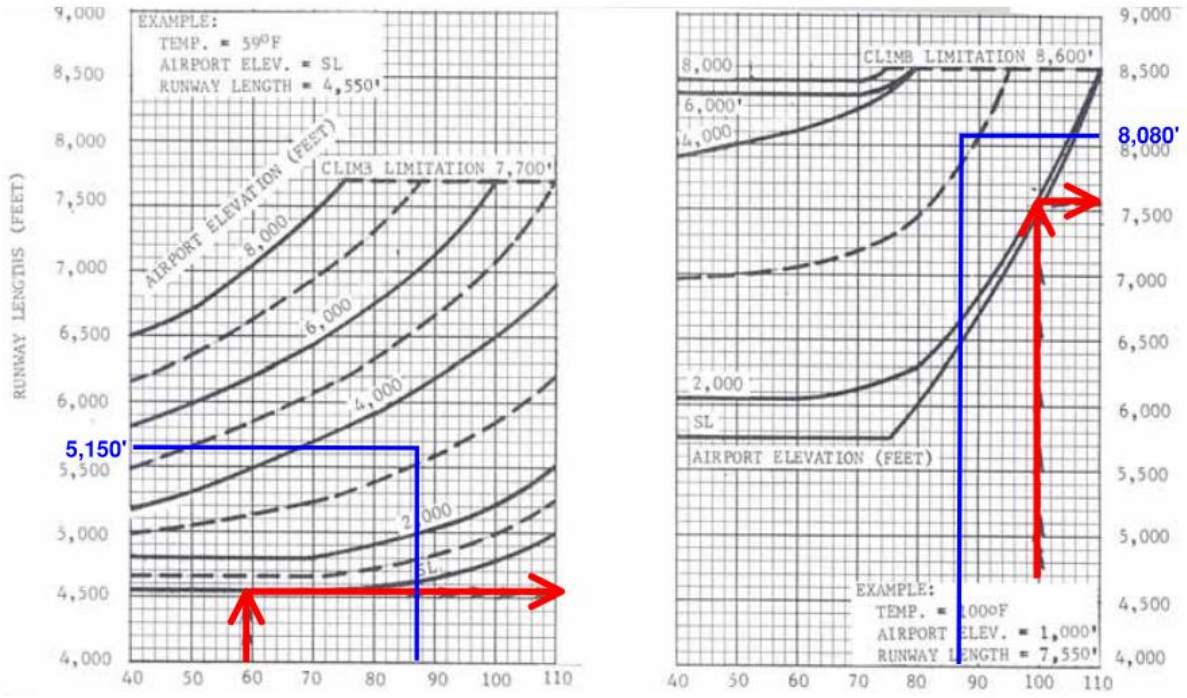
Figure D-3 - FAA Figure 3-1: 75 Percent of Fleet at 60 or 90 Percent Useful Load

AC 150/5325-4B

Rapid City Regional Airport (RAP)
87.1° F (July)
3,203' Airport Elevation
49' Runway Elev Difference for Effective Gradient

7/1/2005

Figure 3-1. 75 Percent of Fleet at 60 or 90 Percent Useful Load



Mean Daily Maximum Temperature of Hottest Month of the Year in Degrees Fahrenheit

75 percent of feet at 60 percent useful load

5,150'
+490' Effective Gradient
5,640' TO Runway Length
Rounded to 5,700'

75 percent of feet at 90 percent useful load

8,080'
+490' Effective Gradient
8,570' TO Runway Length
Rounded to 8,600'

Figure D-4 - FAA Table 3-1: Airplanes that Make Up 75 Percent of Fleet

Table 3-1. Airplanes that Make Up 75 Percent of the Fleet

Manufacturer	Model	Manufacturer	Model
Aerospatiale	Sn-601 Corvette	Dassault	Falcon 10
Bae	125-700	Dassault	Falcon 20
Beech Jet	400A	Dassault	Falcon 50/50 EX
Beech Jet	Premier I	Dassault	Falcon 900/900B
Beech Jet	2000 Starship	Israel Aircraft Industries (IAI)	Jet Commander 1121
Bombardier	Challenger 300	IAI	Westwind 1123/1124
Cessna	500 Citation/501Citation Sp	Learjet	20 Series
Cessna	Citation I/II/III	Learjet	31/31A/31A ER
Cessna	525A Citation II (CJ-2)	Learjet	35/35A/36/36A
Cessna	550 Citation Bravo	Learjet	40/45
Cessna	550 Citation II	Mitsubishi	Mu-300 Diamond
Cessna	551 Citation II/Special	Raytheon	390 Premier
Cessna	552 Citation	Raytheon Hawker	400/400 XP
Cessna	560 Citation Encore	Raytheon Hawker	600
Cessna	560/560 XL Citation Excel	Sabreliner	40/60
Cessna	560 Citation V Ultra	Sabreliner	75A
Cessna	650 Citation VII	Sabreliner	80
Cessna	680 Citation Sovereign	Sabreliner	T-39

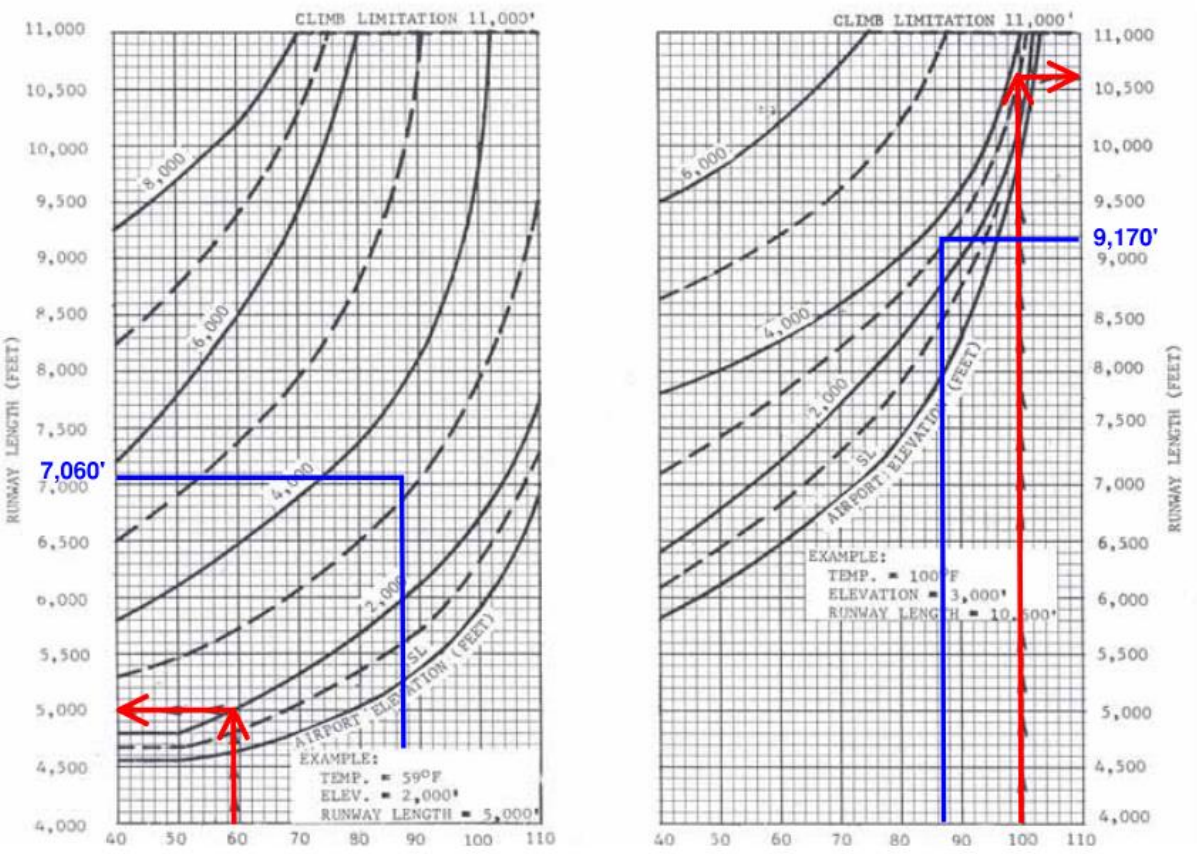
Figure D-5 - FAA Figure 3-2: 100 Percent of Fleet at 60 or 90 Percent Useful Load

7/1/2005

Rapid City Regional Airport (RAP)
87.1° F (July)
3,203' Airport Elevation
49' Runway Elev Difference for Effective Gradient

AC 150/5325-4B

Figure 3-2. 100 Percent of Fleet at 60 or 90 Percent Useful Load



Mean Daily Maximum Temperature of Hottest Month of the Year in Degrees Fahrenheit

100 percent of feet at 60 percent useful load
7,060'
+490' Effective Gradient
7,550' TO Runway Length
Rounded to 7,600'

100 percent of feet at 90 percent useful load
9,170'
+490' Effective Gradient
9,660' TO Runway Length
Rounded to 9,700'

Figure D-6 - FAA Table 3-1: Remaining 25 Percent of Airplanes that Make Up 100 Percent of Fleet

Table 3-2. Remaining 25 Percent of Airplanes that Make Up 100 Percent of Fleet

Manufacturer	Model
Bae	Corporate 800/1000
Bombardier	600 Challenger
Bombardier	601/601-3A/3ER Challenger
Bombardier	604 Challenger
Bombardier	BD-100 Continental
Cessna	S550 Citation S/II
Cessna	650 Citation III/IV
Cessna	750 Citation X
Dassault	Falcon 900C/900EX
Dassault	Falcon 2000/2000EX
Israel Aircraft Industries (IAI)	Astra 1125
IAI	Galaxy 1126
Learjet	45 XR
Learjet	55/55B/55C
Learjet	60
Raytheon/Hawker	Horizon
Raytheon/Hawker	800/800 XP
Raytheon/Hawker	1000
Sabreliner	65/75

Note: Airplanes in tables 3-1 and 3-2 combine to comprise 100% of the fleet.

Aircraft Greater Than 60,000 Pounds

Background

The FAA design approach identified in Chapter 4 of FAA AC 150/5325-4B for aircraft greater than 60,000 pounds requires reviewing the performance charts published by airplane manufacturers based on how the aircraft actually operates at the airport.

In addition, the airlines operating out of RAP were contacted to provide runway length requirements for their existing operations. Their response included typical operating weights and lengths needed based on average high temperature conditions or the charts closest to this average high temperature. **Table D-x** provides a summary of the runway length requirements for greater than 60,000-pound aircraft and a listing of the associated figures calculating these lengths.

Requirements

The recommended runway length for the RAP air carrier runway is currently **8,700 feet** based on the following aircraft fleet mix operating over 500 annual operations combined at RAP in 2021:

- CRJ-900 operated by American Airlines (7,940 to 8,680 feet)
- A319-100 operated by Allegiant Airlines (7,050 to 8,500 feet)
- Embraer 175 operated by United Airlines (7,870 to 8,590 feet)
- 100% of Business Jet Fleet at 90% Useful Load (9,660 feet)

See **Figure D-7 Rapid City Summer Destinations for 2021**. Individual operations and forecast breakdowns are identified in **Chapter 3: Aviation Activity Forecasts** and **Chapter 4: Facility Requirements** of the Master Plan narrative report.

Figure D-7 Rapid City Summer Destinations for 2021

2021 Rapid City Regional Airport Destinations - As of May 1, 2021

1	Appleton	Rally	Allegiant	Aug 7 & 14	Saturday Only	
2	Atlanta	Seasonal	Delta	May 29 - September 6	Daily	101 Days/202 ops
3	Charlotte	Seasonal	American	May 9 - Sept 25	Daily	140 Days/280 ops
4	Chicago	Seasonal	American	Mar/April - Fall Season	Daily	
5	Chicago	Seasonal	United	Mar/April - Fall Season	Daily	
6	Dallas	Year Round	American	Year Round	Daily	
7	Denver	Year Round	United	Year Round (1-5X Daily)	Daily	
8	Detroit	Seasonal	Delta	May 29 - Summer	Saturday Only	
9	Grand Rapids	Rally	Allegiant	Aug 7 & 14	Saturday Only	
10	Houston	Seasonal	United	June 5 - August 28	Saturday Only	
11	Indianapolis	Rally	Allegiant	Aug 7 & 14	Saturday Only	
12	Knoxville	Rally	Allegiant	Aug 7 & 14	Saturday Only	
13	LaGuardia-New York	Seasonal	American	June 5 - Sept 4	Saturday Only	14 Days/28 ops
14	Las Vegas	Year Round	Allegiant	Year Round (1-4X Weekly)	Weekly	
15	Los Angeles	Seasonal	Allegiant	June 4 - Aug 16	Monday & Friday	
16	Mesa-Phoenix	Year Round	Allegiant	Year Round (1-4X Weekly)	Weekly	
17	Minneapolis	Year Round	Delta	Year Round (1-5X Daily)	Daily	
18	Nashville	Rally	Allegiant	Aug 7 & 14	Saturday Only	
19	Newark	Seasonal	United	June 5 - September 4	Saturday & Sunday	27 Days / 54 ops
20	Peoria	Rally	Allegiant	Aug 7 & 14	Saturday Only	
21	Phoenix	Seasonal	American	June 3 - Fall Season	Daily	
22	Pittsburgh	Rally	Allegiant	Aug 7 & 14	Saturday Only	
23	Punta Gorda	Seasonal	Allegiant	June 4 - Aug 16	Monday & Friday	22 Days / 44 ops
24	Salt Lake City	Year Round	Delta	Year Round (1-3X Daily)	Daily	
25	Sanford-Orlando	Rally	Allegiant	Aug 7 & 14	Saturday Only	

Year Round Service
2021 Sturgis Rally
2021 Summer Season

Note: Flight schedules subject to change by the air carrier.

A tabulation of the runway length requirements for aircraft greater than 60,000 pounds is identified in **Table D-3**. These aircraft types currently or have the potential to operate regularly at RAP.

Table D-3 – Runway Length Requirements (> 60,000 lbs.)

Aircraft	Airline	Dest	Range (NM)	Temp	Takeoff Length (FT)	Landing Length (FT)	Figure(s)
A319-100	Allegiant	IWA	800	87° F	7,050	5,500	D-8
		PGD	1,500	87° F	8,500	5,500	
A320-200	Allegiant	IWA	800	87° F	6,400	5,500	
		PGD	1,500	87° F	7,250	5,500	
B717-200	Delta	MSP	450	ISA +15 (74.6° F)	5,600	5,810	D-9 to D-11
B737-700	United	ORD	700	ISA +22.2 (87.6° F)	6,490	5,930	D-12 to D-13
CRJ-200	Delta	MSP/SLC	450	ISA +20 (83.6° F)	6,510	5,500	D-14 to D-15
	United	ORD	700	ISA +20 (83.6° F)	7,890	5,500	
CRJ-700	Delta	MSP	450	ISA +25 (92.6° F)	6,870	5,500	D-16 to D-17
	United	ORD	700	ISA +25 (92.6° F)	7,640	5,500	
CRJ-900	American	DFW	750	ISA +25 (92.6° F)	7,940	5,930	D-18
		CLT	1,300	ISA +25 (92.6° F)	8,680	5,930	
ERJ-145	United	DEN	300	ISA +15 (74.6° F)	6,190	5,500	D-19 to D-20
		ORD	700	ISA +15 (74.6° F)	7,830	5,500	
ERJ-145 XR	United	DEN	300	ISA +15 (74.6° F)	6,240	5,500	D-21 to D-22
		ORD	700	ISA +15 (74.6° F)	6,860	5,500	
E175-LW	United	ORD	700	ISA +15 (74.6° F)	7,870	5,500	D-23 to D-24
		EWR	1,300	ISA +15 (74.6° F)	8,590	5,500	

Source: Airbus, Boeing, Bombardier, Embraer, Allegiant Airlines, American Airlines, Delta Air Lines, United Airlines, KLJ Analysis

Figures D-8 through D-24 depict the individual aircraft manufacturer's performance charts for airport planning. Runway length is calculated based on estimated load factors to serve each noted destination. Most of the charts depict the takeoff length requirements. No contaminated runway length information is available for landing, which may drive longer landing runway lengths than takeoff.

Figure D-8 Allegiant Runway Length (Email)

Andrew Zielike

From: Gordon Bell <Gordon.Bell@allegiantair.com>
Sent: Thursday, June 3, 2021 11:35 AM
To: Matt Nisbet
Cc: Andrew Zielike
Subject: RE: [EXTERNAL] Runway Length Needs - Rapid City Regional Airport

Matt,

Sorry it took a while. It has been quite busy with summer flying. Below is what I received from our Flight Ops Engineer.

Hi Gordy, see attached length requirements at RAP. These numbers are ***very*** conservative in terms of payload, for these sorts of flights we would probably not plan by all adults. So there is a little margin in these numbers.

Runway Length Requirements: Airbus A319				
	Air Temperature (°F)			
RAP to:	48°	75°	87°	93°
Punta Gorda (PGD)	7900	8400	8500	8600
Phoenix-Mesa (AZA)	6500	6900	7050	7100

Runway Length Requirements: Airbus A320				
	Air Temperature (°F)			
RAP to:	48°	75°	87°	93°
Punta Gorda (PGD)	6750	7050	7250	7350
Phoenix-Mesa (AZA)	6000	6400	6400	6450

Assumptions:

120-27F weights, max pax all adults w/ 60% checked bags ratio (conservative)

Historical enroute winds

Takeoff on wet Runway

Calm winds

Regards,

Michael Panettieri | Flight Operations Performance Engineer
Allegiant Air | 1201 N. Town Center Dr, Las Vegas, NV 89144
Desk: (702)-830-8966 | Michael.Panettieri@AllegiantAir.com
Cell: (630)-715-2113

1

Figure D-8 Allegiant Runway Length (Email) – continued

From: Matt Nisbet <matt.nisbet@kljeng.com>
Sent: Tuesday, May 18, 2021 7:07 AM
To: Gordon Bell <Gordon.Bell@allegiantair.com>
Cc: Andrew Zielike <Andrew.Zielike@kljeng.com>
Subject: [EXTERNAL] Runway Length Needs - Rapid City Regional Airport

Mr. Bell,

Kailey Dwyer had passed on your contact information as a resource for evaluating runway length needs of Allegiant's A319 and A320 aircraft.

We are currently working with the Rapid City Regional Airport (RAP) on an airport master plan update and are in the process of analyzing existing and future runway length needed at the airport. To help achieve this, we are reaching out to see if you would be able to provide the runway length requirements for a few of Allegiant's flights operating out of RAP. We are most interested in the Punta Gorda route as it is the longest, but if it's not too much additional work, it'd be great to have analysis for the Phoenix-Mesa route as well.

According to FAA guidance, when evaluating the runway length needed at an airport facility the average high temperature of the hottest month should be used. For RAP, this is approximately 87°F. However, to gauge seasonal runway length demands, analysis at 48°, 75°, and 93° would help us estimate general needs for ISA, ISA +15 and ISA +25 conditions.

Assumptions for the analysis should include:

- Assume full passengers (and corresponding bags)
- Assume Calm Wind
- Utilize existing 8,700' Runway 14-32 (if needs are different depending on departure runway, please use more restrictive/demanding)

Below is a table summarizing what we're looking for, but I understand there a lot of factors and assumptions beyond what is listed above that go into the analysis. Our main objective as it relates to the master plan is determining what runway length is necessary to support operations out of RAP without limitations/impacts to operators.

I want to be mindful of you and your staff's time. If the request is too broad, the highest priority information is RAP to PGD analysis for 87 and 93 degrees.

Runway Length Requirements: Airbus A319				
	Air Temperature (°F)			
RAP to:	48°	75°	87°	93°
Punta Gorda (PGD)				
Phoenix-Mesa (AZA)				

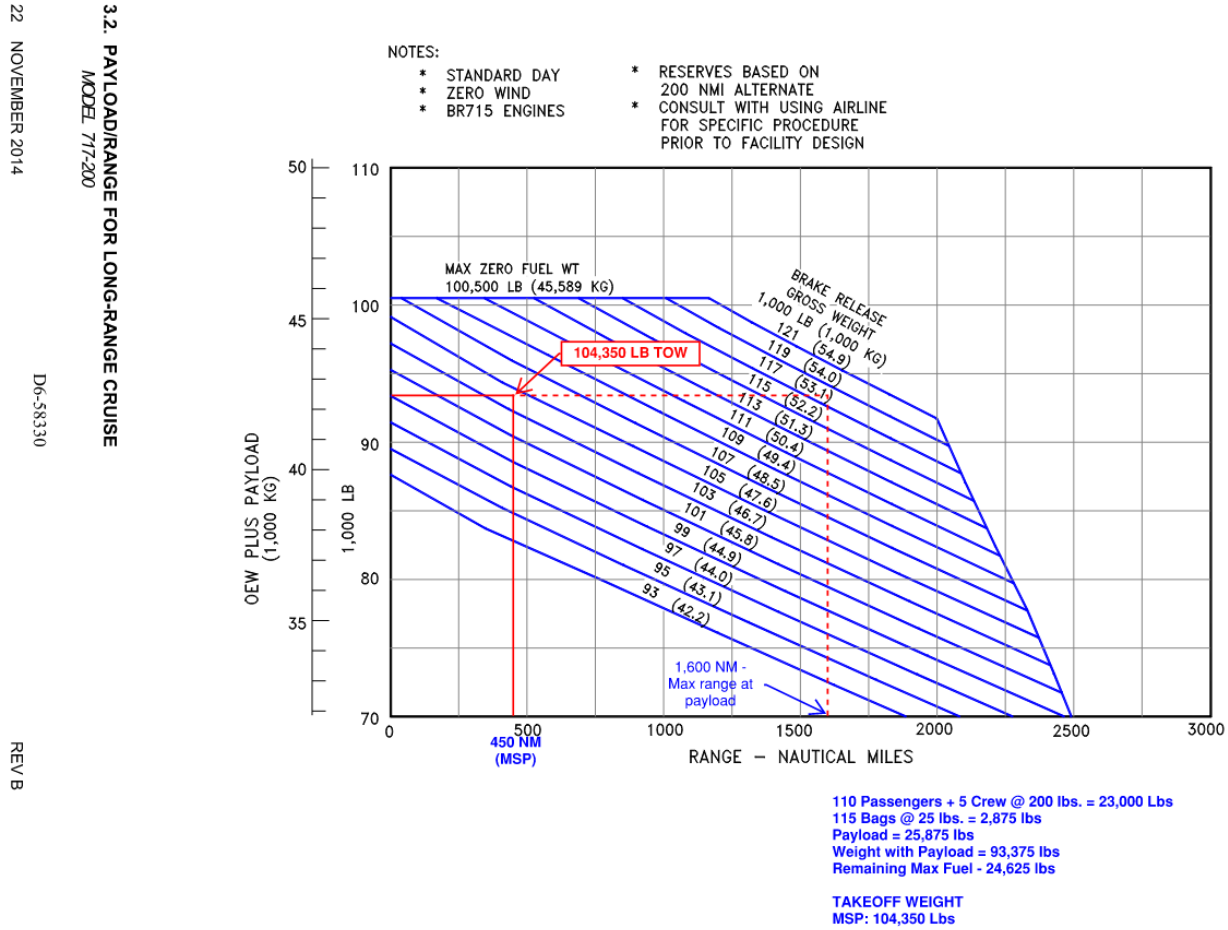
Runway Length Requirements: Airbus A320				
	Air Temperature (°F)			
RAP to:	48°	75°	87°	93°
Punta Gorda (PGD)				
Phoenix-Mesa (AZA)				

Thanks again for the help. Please feel free to reach out if you have any questions.

Matt Nisbet
KLJ
701-355-8449 Direct
4585 Coleman Street
Bismarck, ND 58501-3310
kljeng.com

Figure D-9 Boeing 717-200 – Payload/Range

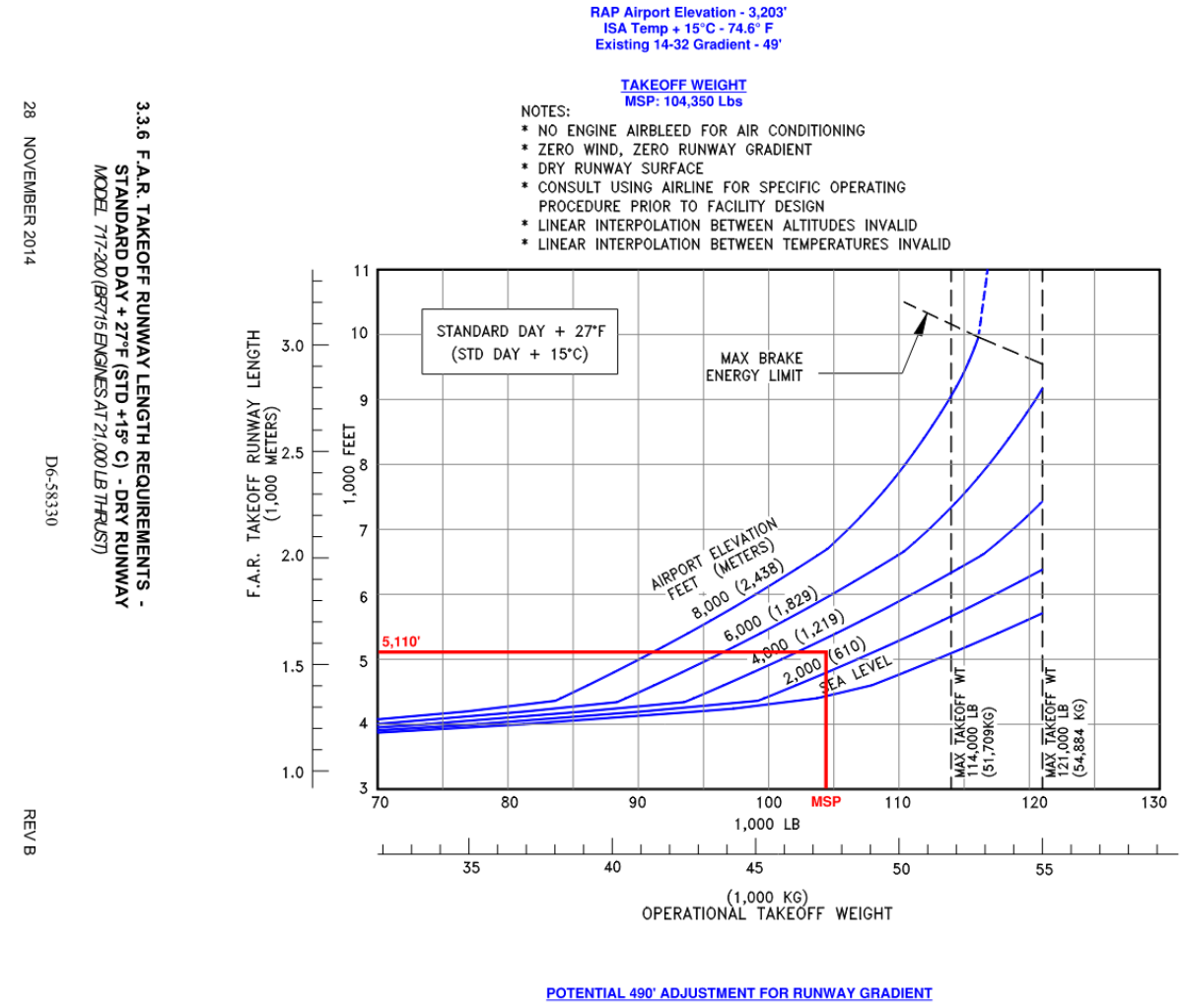
Used Basic Airplane - 118,000 MTOW and 67,500 OEW (B717 APM)



110 Passengers + 5 Crew @ 200 lbs. = 23,000 Lbs
115 Bags @ 25 lbs. = 2,875 lbs
Payload = 25,875 lbs
Weight with Payload = 93,375 lbs
Remaining Max Fuel - 24,625 lbs

TAKEOFF WEIGHT
MSP: 104,350 Lbs

Figure D-10 Boeing 717-200 – Takeoff Runway Length



3.3.6 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS - STANDARD DAY + 27°F (STD +15° C) - DRY RUNWAY

MODEL 717-200 (BR715 ENGINES AT 21,000 LB THRUST)

28 NOVEMBER 2014

D6-58330

REV B

Figure D-11 Boeing 717-200 – Landing Length

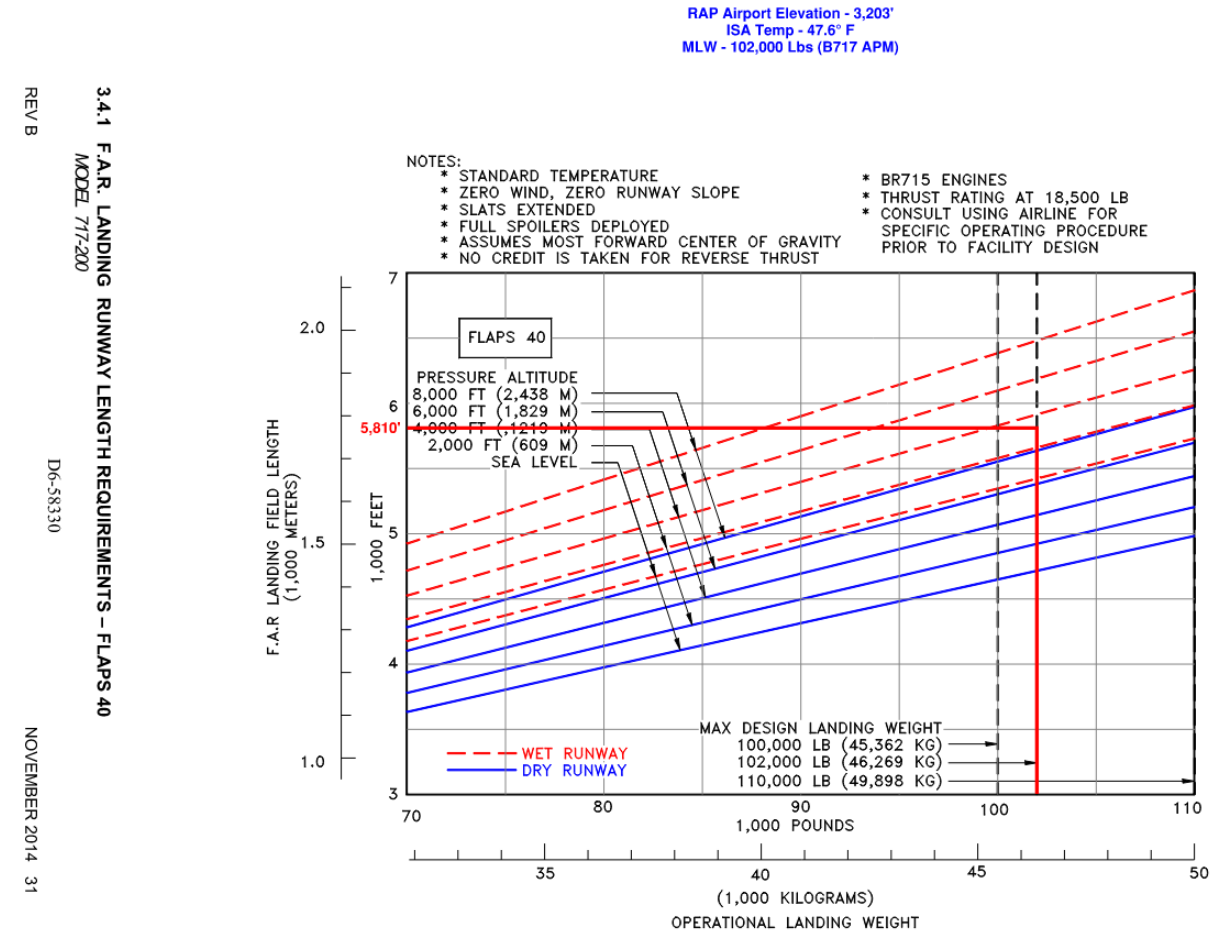


Figure D-12 Boeing 737-700 – Payload/Range

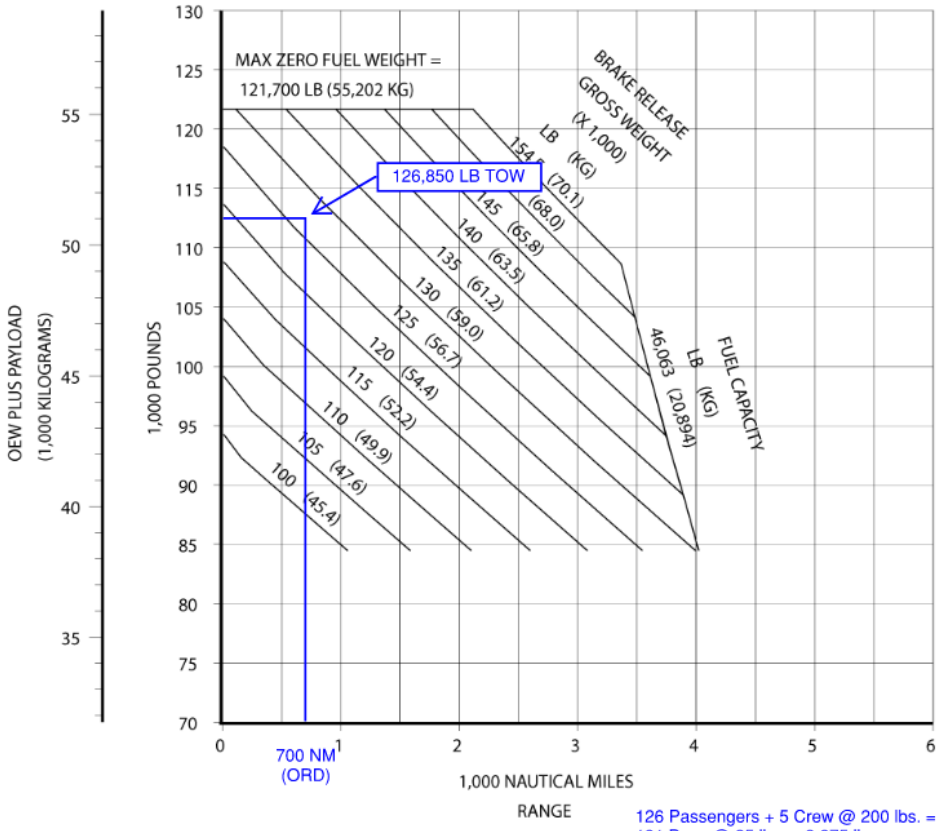
154,500 lbs MTOW and 83,000 lbs OEW (United Fleet)

3.2.10 Payload/Range for Long Range Cruise: Model 737-700

DO NOT USE FOR DISPATCH

Payload/Range
737-700/-700W (CFM56-7B Series)

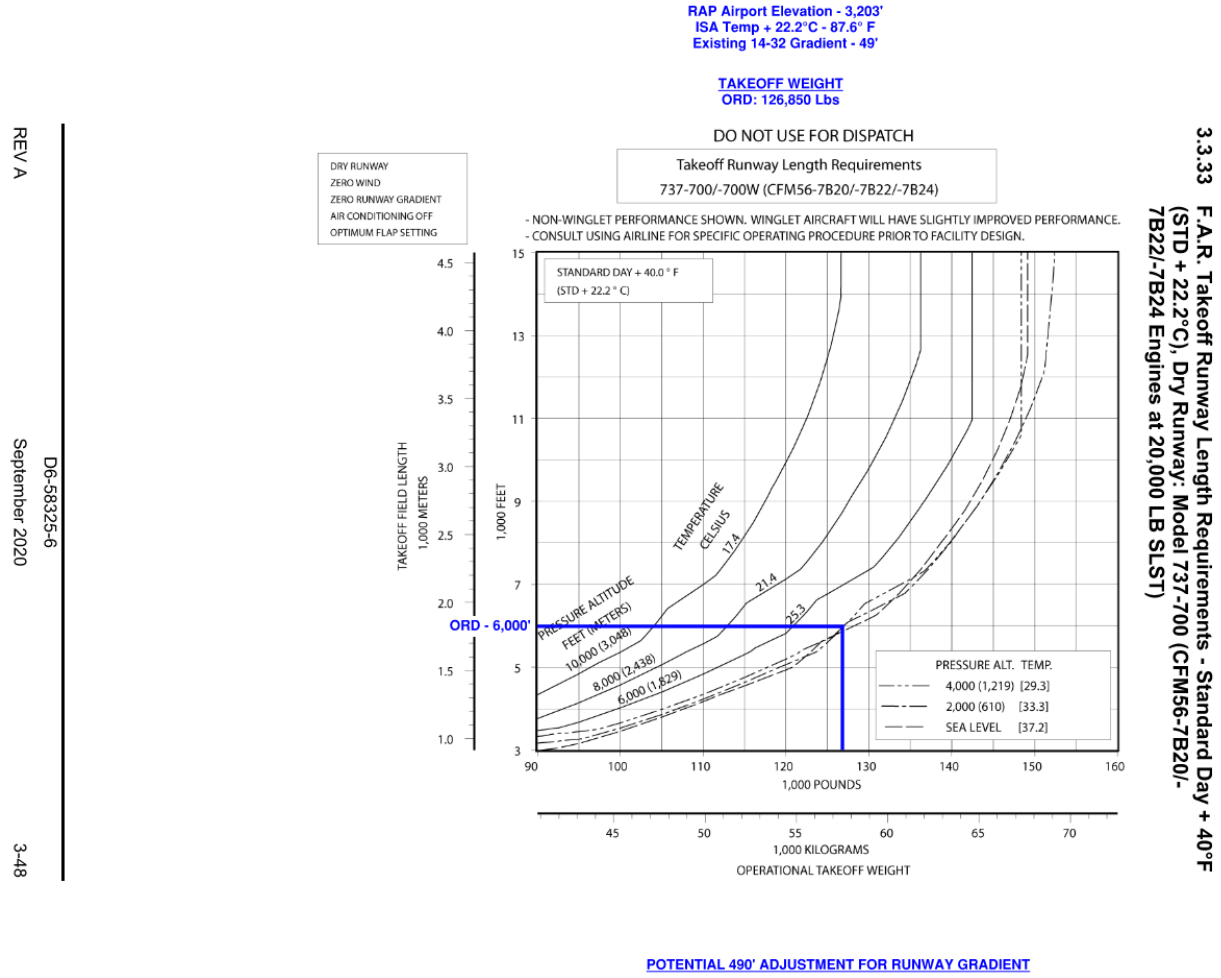
- STANDARD DAY, ZERO WIND
- CRUISE MACH = LRC
- NORMAL POWER EXTRACTION AND AIR CONDITIONING BLEEDS
- TYPICAL MISSION RULES
- NON-WINGLET PERFORMANCE SHOWN. WINGLET AIRCRAFT WILL HAVE SLIGHTLY GREATER RANGE.
- CONSULT USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE AND OEW PRIOR TO FACILITY DESIGN.



126 Passengers + 5 Crew @ 200 lbs. = 26,200 Lbs
131 Bags @ 25 lbs. = 3,275 lbs
Payload = 29,475 lbs
Weight with Payload = 112,475 lbs
Remaining Max Fuel - 42,025 lbs

TAKEOFF WEIGHT
ORD: 126,850 Lbs

Figure D-13 Boeing 737-700 – Takeoff Runway Length



3.3.33 F.A.R. Takeoff Runway Length Requirements - Standard Day + 40°F (STD + 22.2°C), Dry Runway: Model 737-700 (CFM56-7B20/-7B22/-7B24 Engines at 20,000 LB SLST)

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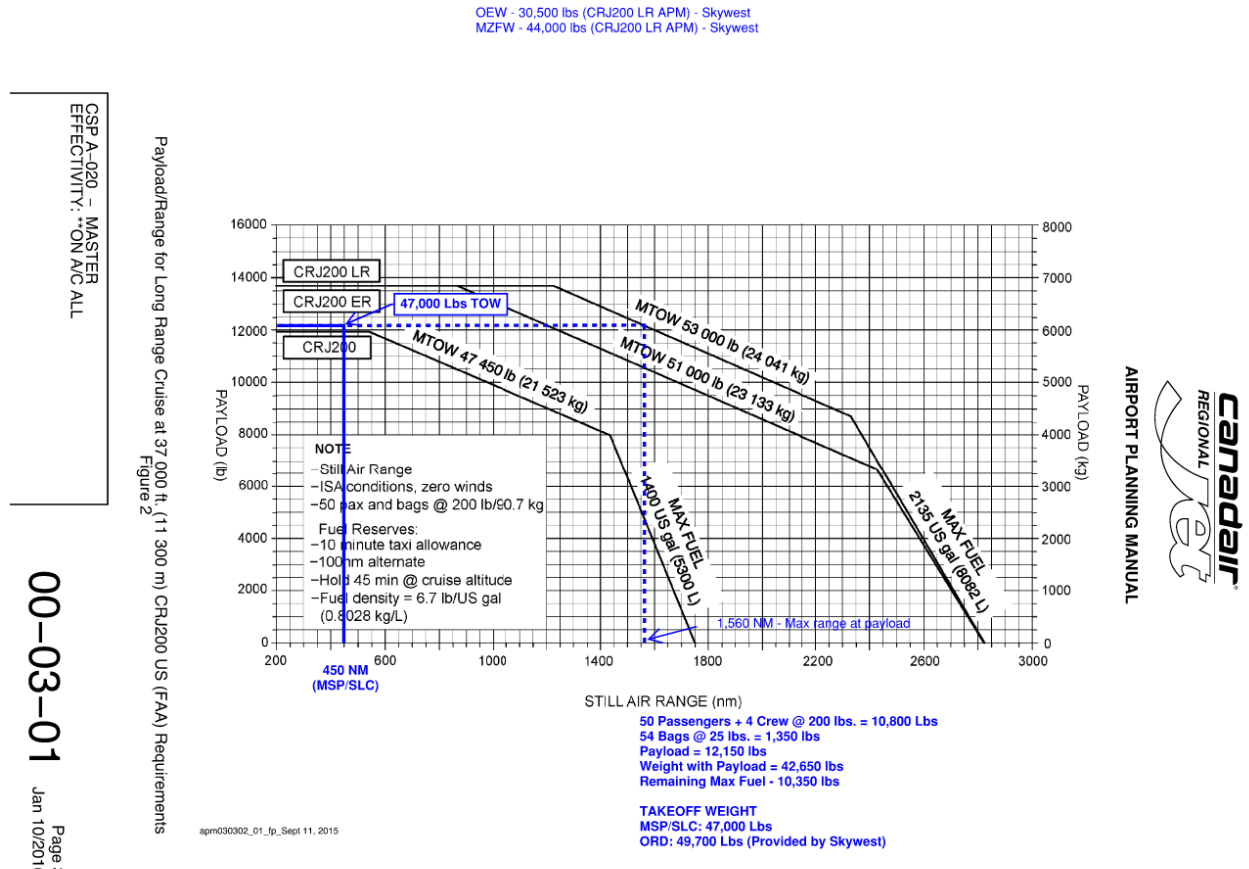
D6-58325-6

September 2020

3-48

Figure D-14 Bombardier CRJ-200 – Payload/Range



Payload/Range for Long Range Cruise at 37 000 ft (11 300 m) CRJ200 US (FAA) Requirements
Figure 2

CSP A-020 – MASTER
EFFECTIVITY: *ON A/C ALL

00–03–01

Page 3
Jan 10/2016

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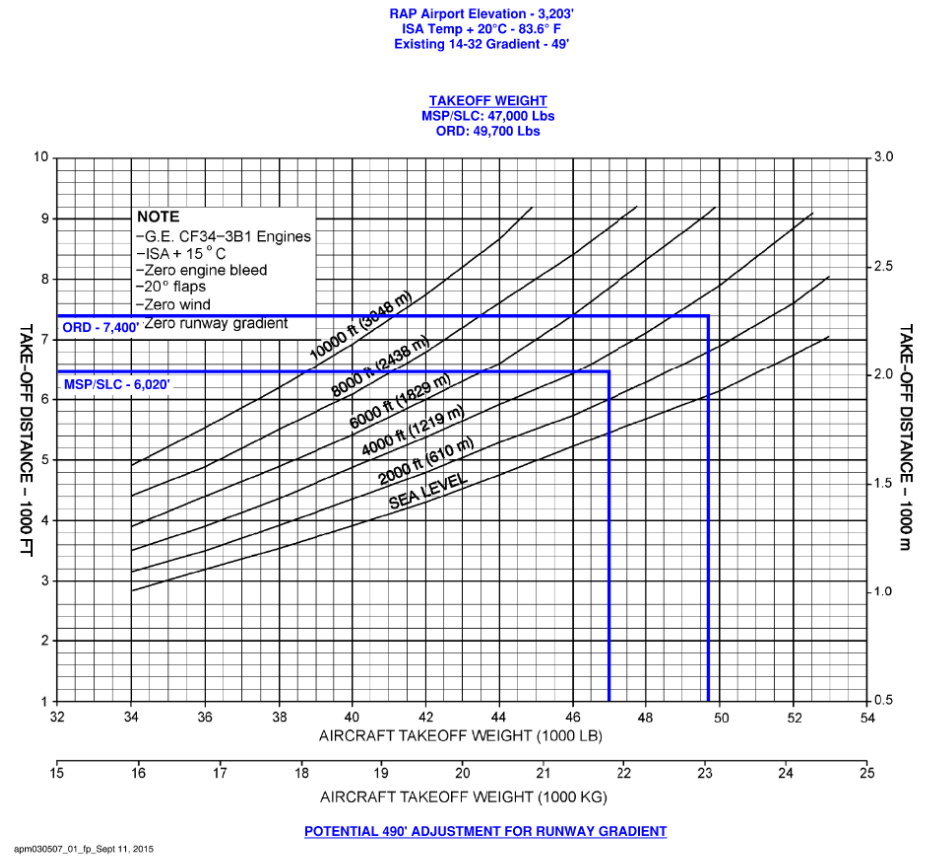
AIRPORT PLANNING MANUAL

Figure D-15 Bombardier CRJ-200 – Takeoff Runway Length



FAR Takeoff Runway Length Requirements – ISA + 20 C – CRJ200
Figure 16

CSP A-020 – MASTER
EFFECTIVITY: *ON A/C ALL

00–03–01

Page 17
Jan 10/2016

AIRPORT PLANNING MANUAL

Figure D-16 Bombardier CRJ-700 – Payload/Range

OEW - 45,215 lbs - Skywest
MZFW - 62,300 lbs (CRJ700 APM)

Fuel weight is % of stage length
to max range at payload

MSP - 3,900 Lbs Fuel

70 Passengers + 4 Crew @ 200 lbs. = 14,800 Lbs
74 Bags @ 25 lbs. = 1,850 lbs
Payload = 16,650 lbs
Weight with Payload = 61,865 lbs
Remaining Max Fuel - 10,885 lbs

TAKEOFF WEIGHT
MSP: 65,750 Lbs
ORD: 68,350 Lbs (Provided by Skywest)

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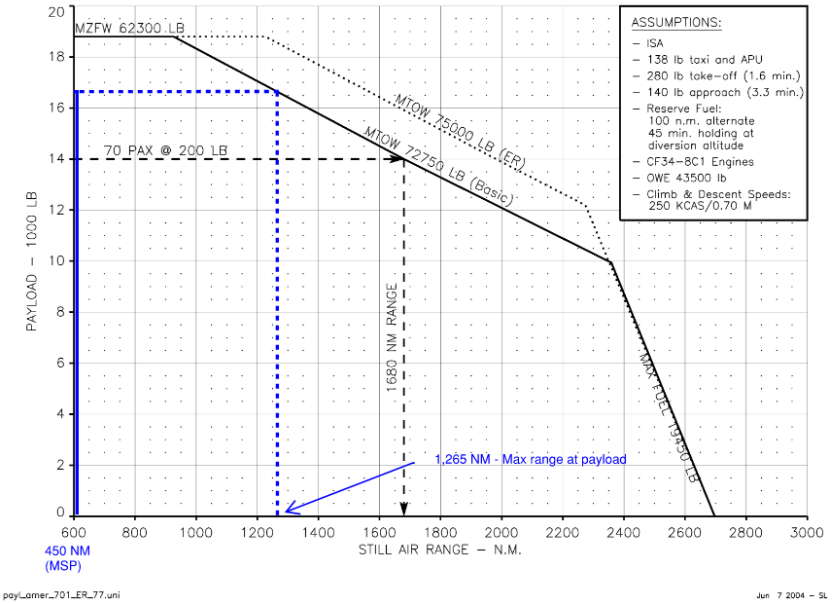

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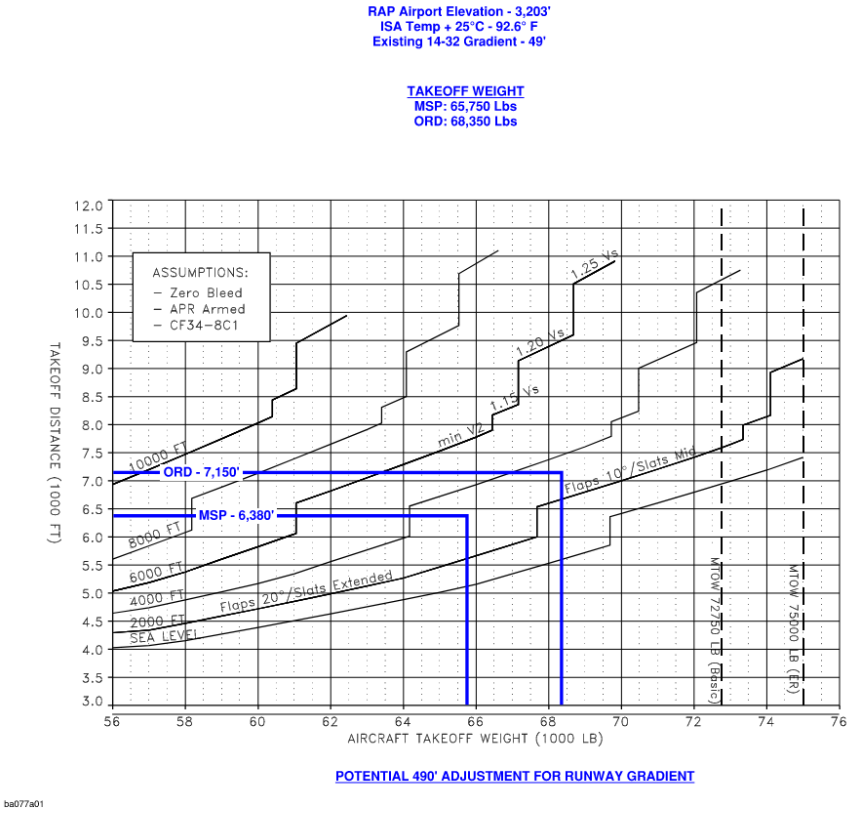
Payload/Range – US
Figure 1

00–03–01 Page 2 May 20/2010

CSP B–020 – MASTER
EFFECTIVITY: **ON A/C ALL

Figure D-17 Bombardier CRJ-700 – Takeoff Runway Length



Take–Off Field Length – ISA + 25 Degrees C
Figure 4

CSP B–020 – MASTER
EFFECTIVITY: *ON A/C ALL

00–03–02

Page 5
May 20/2010

AIRPORT PLANNING MANUAL

Figure D-18 Bombardier CRJ-900 – Takeoff Runway Length

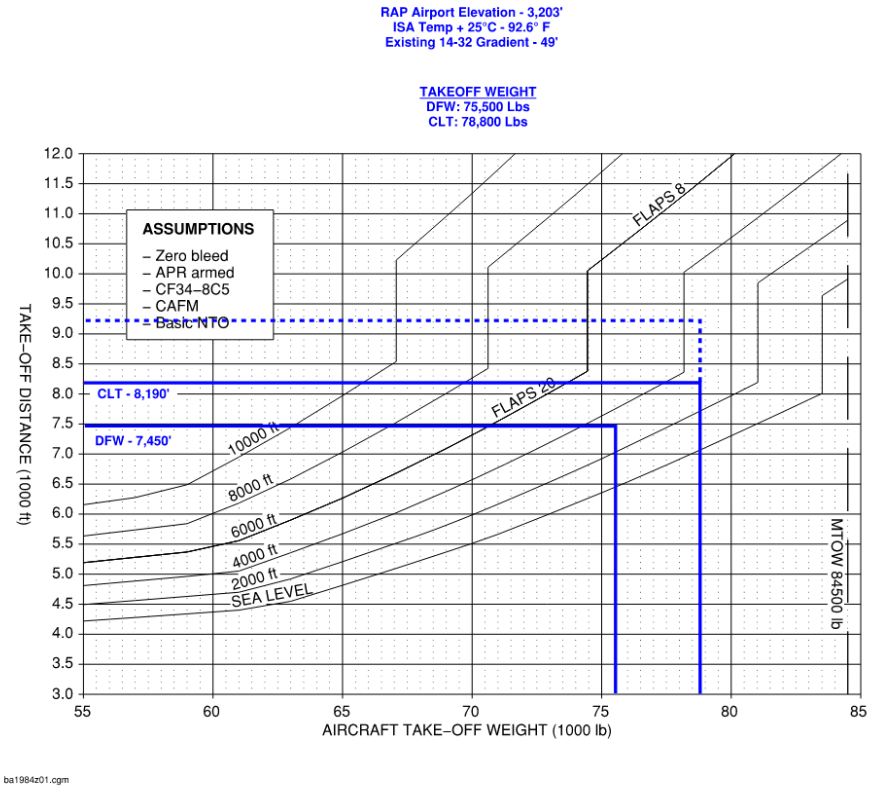


Figure D-19 Embraer 145 – Payload/Range

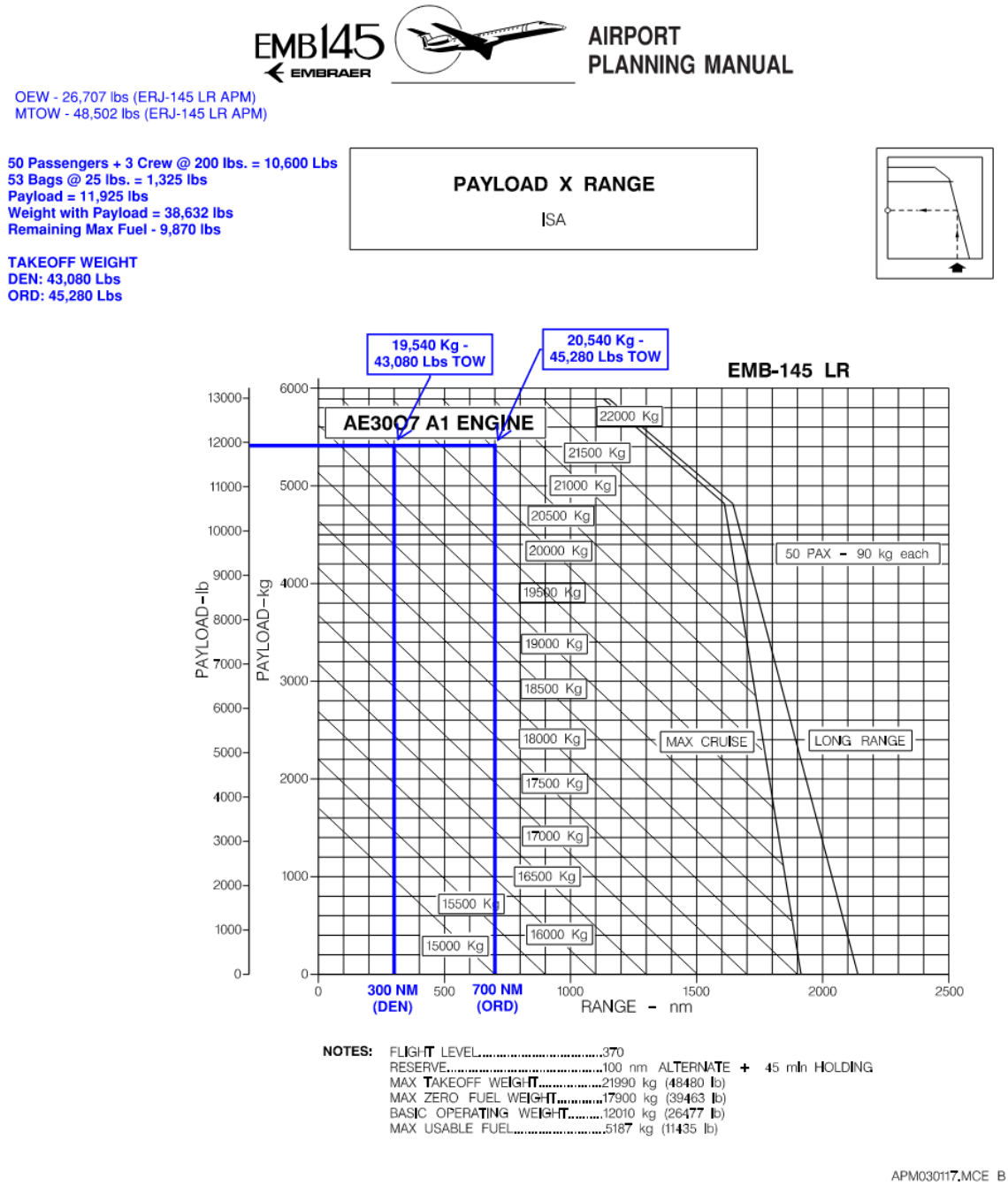


Figure 3.2.1 - Payload x Range for Long Range Cruise at 37,000 ft, Engine with Thrust Reverser
Sheet 2

wipapm1100

Page 3-3
Sep 23/19

Figure D-20 Embraer 145 – Takeoff Runway Length

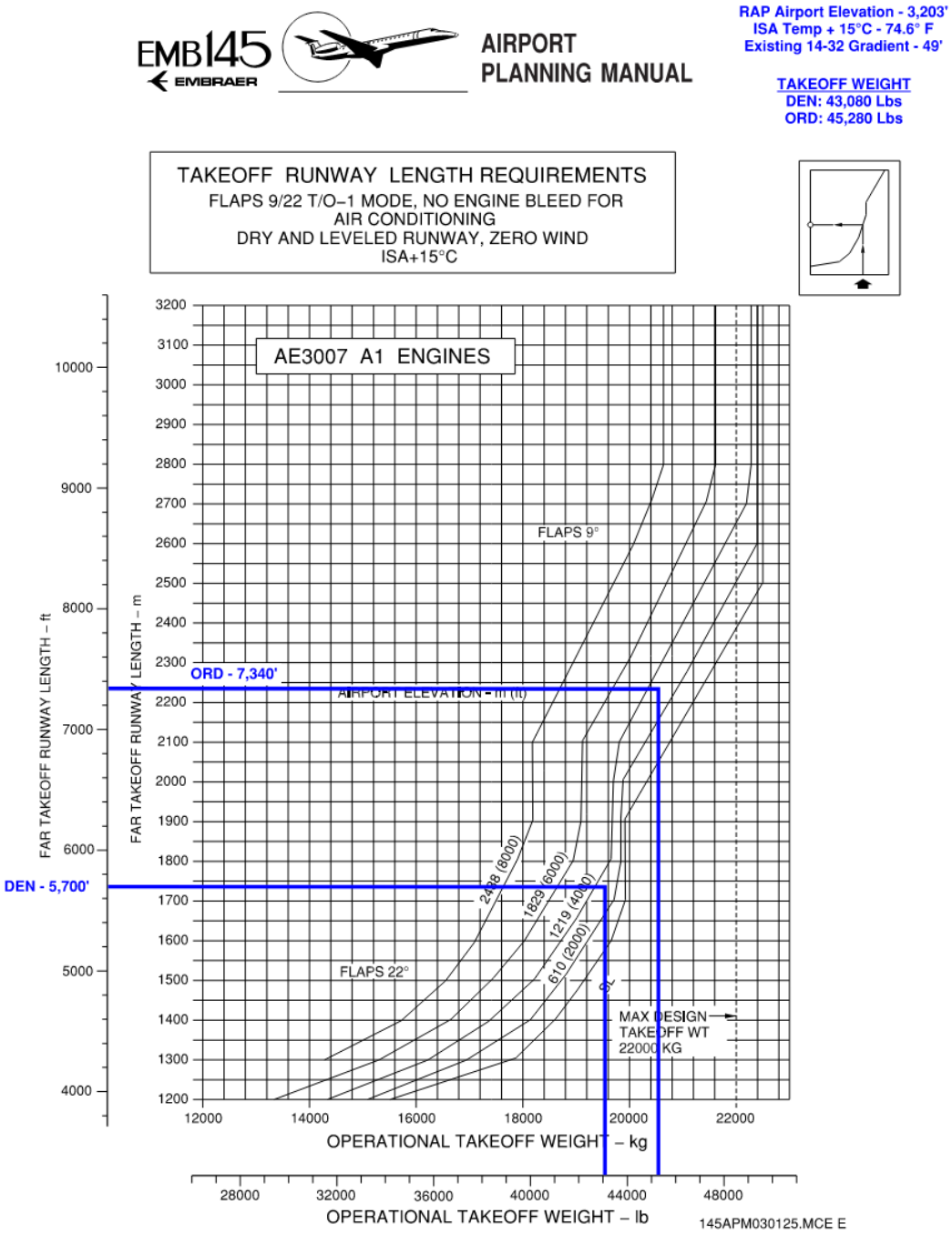


Figure 3.3.2 - FAR Takeoff Runway Length Requirements - ISA + 15°C Conditions
Sheet 1

POTENTIAL 490' ADJUSTMENT FOR RUNWAY GRADIENT

wipapm1100

Figure D-21 Embraer 145 XR – Payload/Range

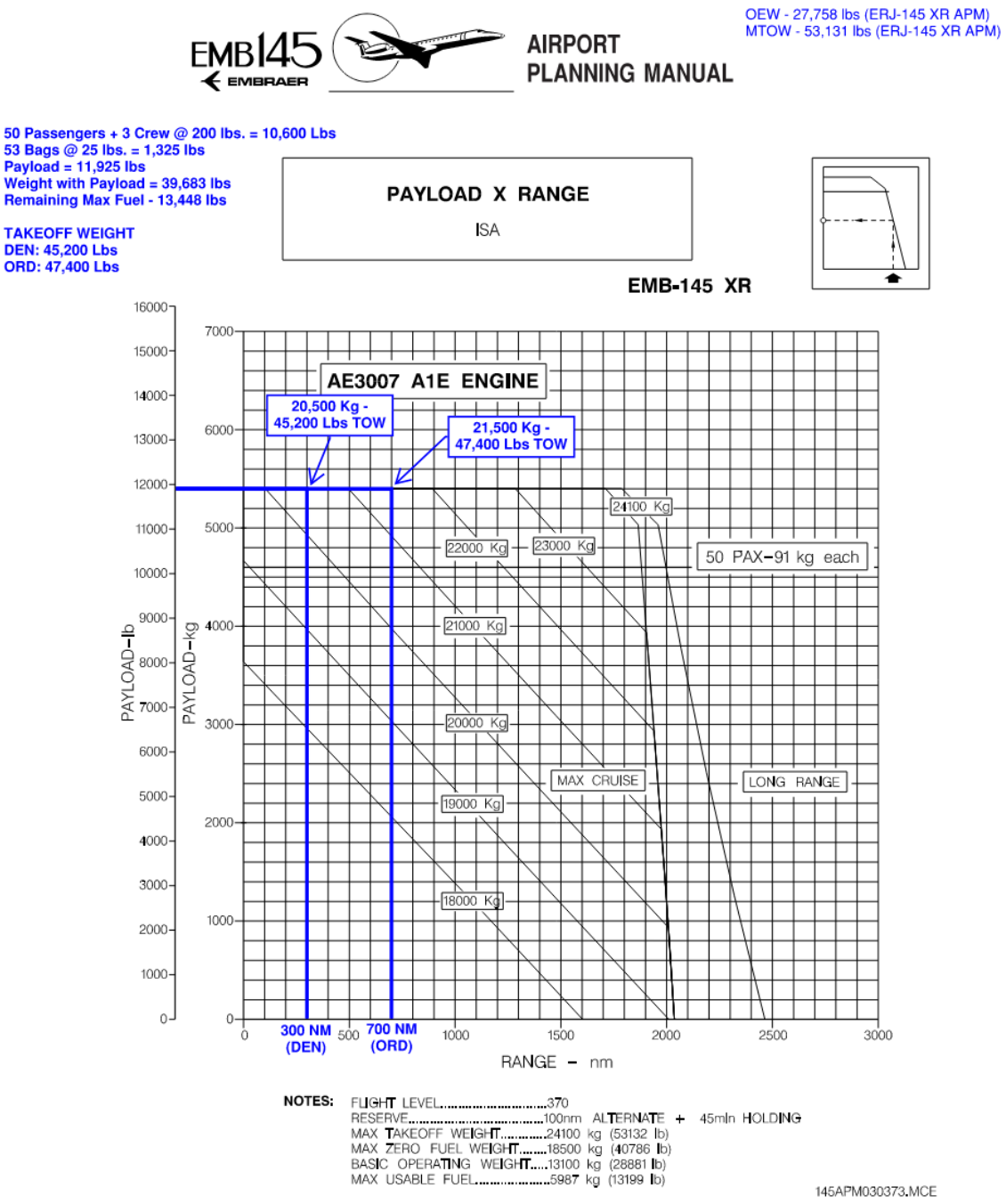


Figure 3.2.1 - Payload x Range for Long Range Cruise at 37,000 ft, Engine with Thrust Reverser
Sheet 9

Page 3-10
Sep 23/19

wipapm1100

Figure D-22 Embraer 145 XR – Takeoff Runway Length

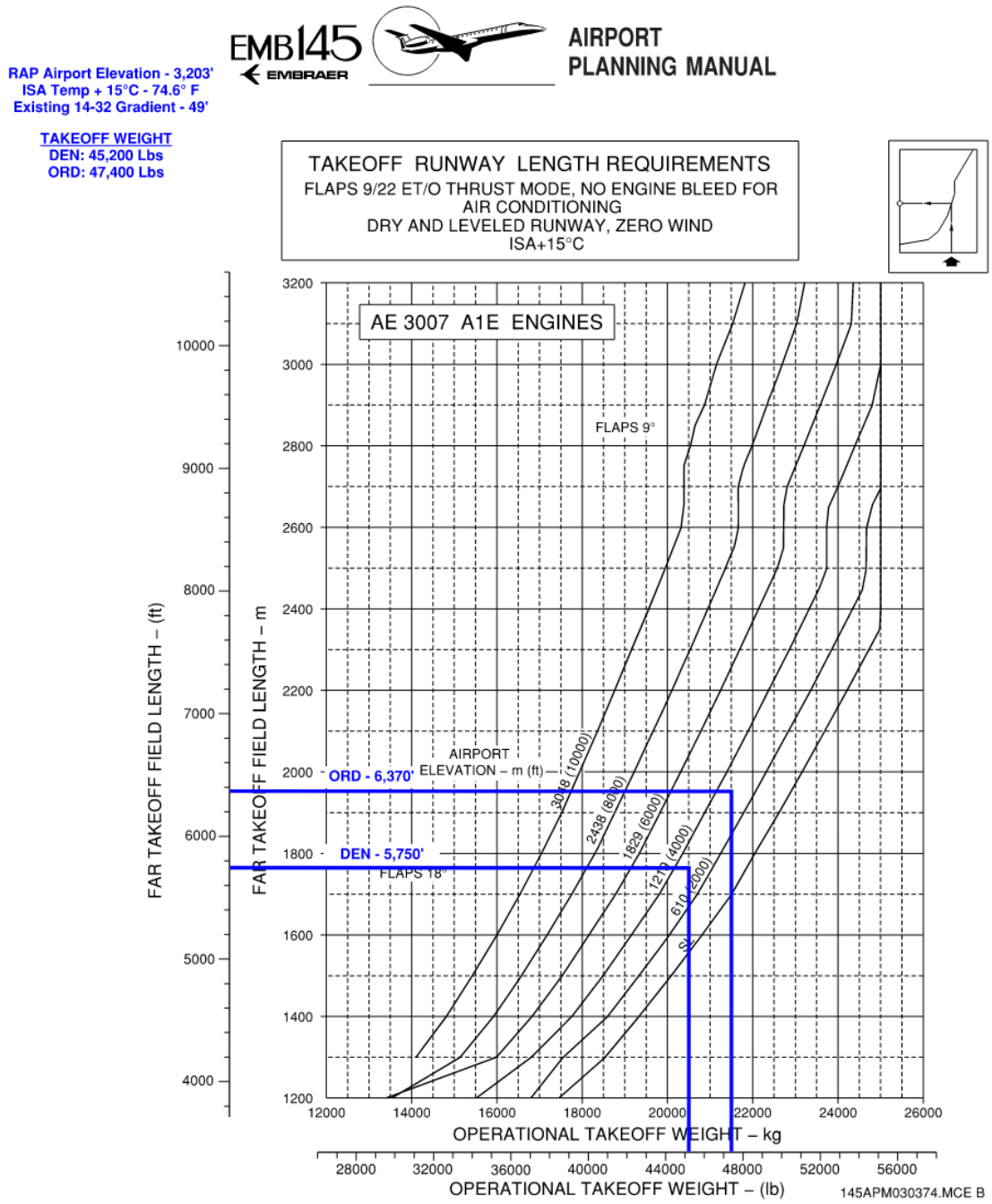


Figure 3.3.2 - FAR Takeoff Runway Length Requirements - ISA + 15°C Conditions Sheet 3

POTENTIAL 490' ADJUSTMENT FOR RUNWAY GRADIENT

wipapm1100

Page 3-17
Sep 23/19

Figure D-23 Embraer 175 LW – Payload/Range

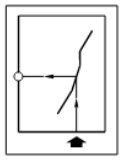
OEW - 48,347 lbs (Skywest)
MTOW - 85,517 lbs (E175 LR APM)
MZFW - 69,886 lbs (CRJ700 APM)

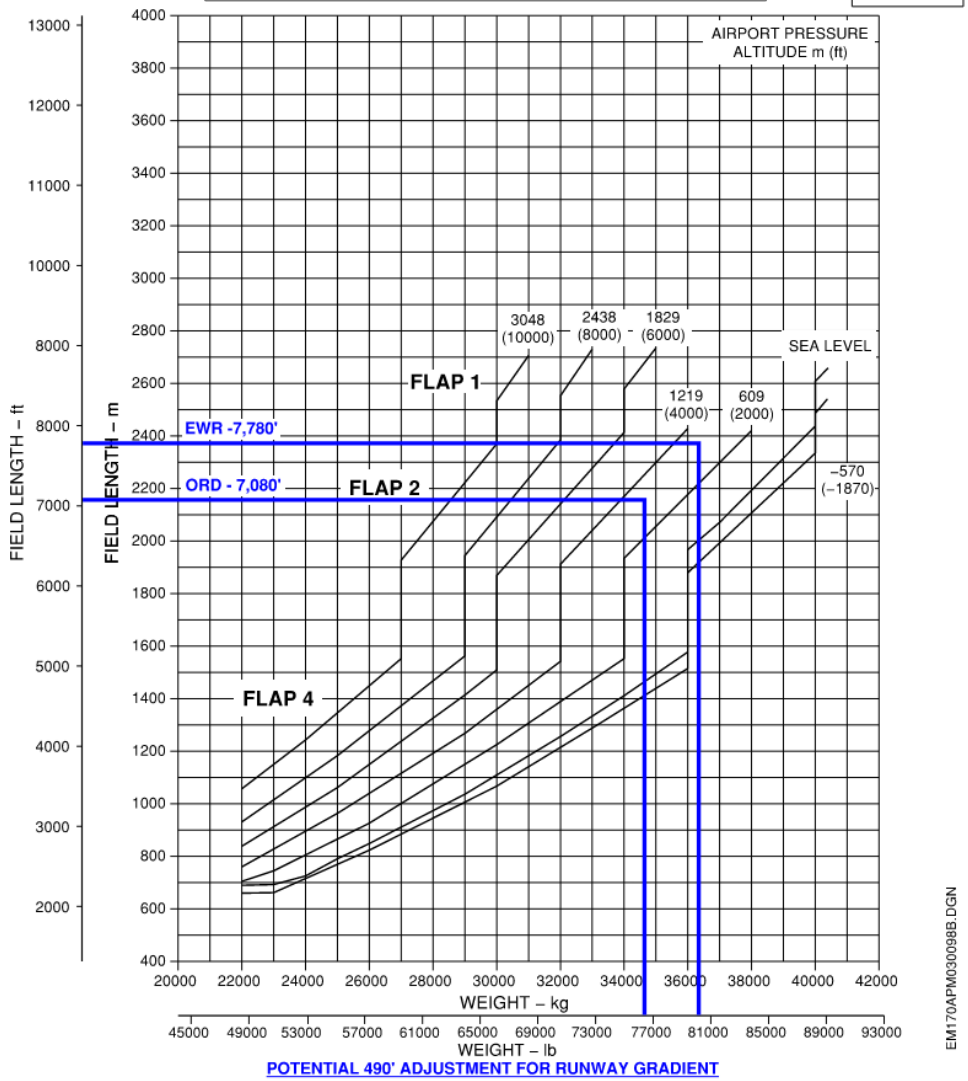
EMBRAER 175 AIRPORT PLANNING MANUAL

RAP Airport Elevation - 3,203'
ISA Temp - 47.6° F
Existing 14-32 Gradient - 49'

TAKEOFF WEIGHT
EWR: 80,166 Lbs (Provided by Skywest)
ORD: 76,395 Lbs (Provided by Skywest)

TAKEOFF FIELD LENGTH
CF 34–8E5 ENGINE@T/O–1 MODE
ATTCS: OFF / ECS: OFF
DRY, SMOOTH, HARD PAVED AND LEVEL RUNWAY
ISA





POTENTIAL 490' ADJUSTMENT FOR RUNWAY GRADIENT

Takeoff Field Lengths - ISA Conditions
Figure 3.7

76 Passengers + 4 Crew @ 200 lbs. = 16,000 Lbs
80 Bags @ 25 lbs. = 2,000 lbs
Payload = 18,000 lbs
Weight with Payload = 66,347 lbs
Remaining Max Fuel - 19,170 lbs

EFFECTIVITY: ALL

Section 3
Page 3-10
Oct 07/14

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Figure D-24 Embraer 175 LW – Takeoff Runway Length

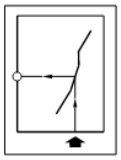
OEW - 48,347 lbs (Skywest)
MTOW - 85,517 lbs (E175 LR APM)
MZFW - 69,886 lbs (CRJ700 APM)

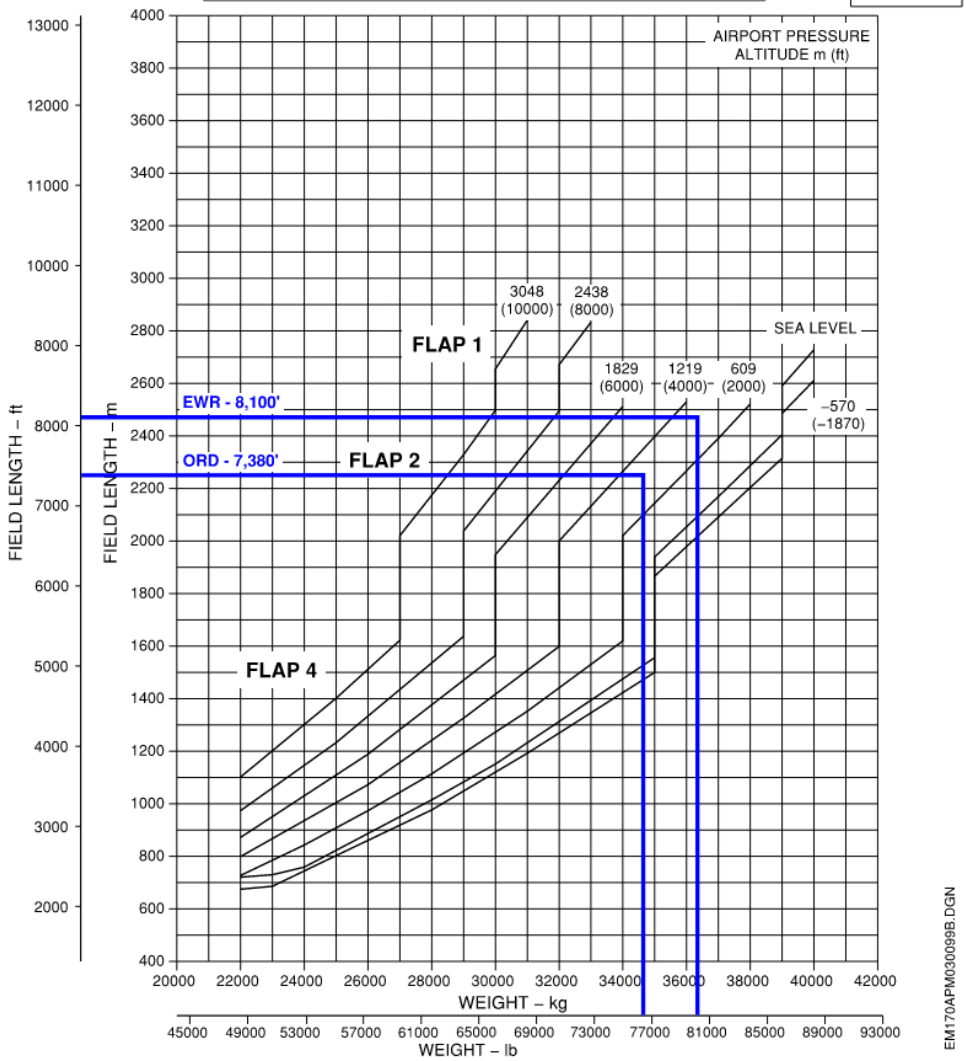
EMBRAER 175 AIRPORT PLANNING MANUAL

RAP Airport Elevation - 3,203'
ISA Temp + 15°C - 74.6° F
Existing 14-32 Gradient - 49'

TAKEOFF WEIGHT
EWR: 80,166 Lbs (Provided by Skywest)
ORD: 76,395 Lbs (Provided by Skywest)

TAKEOFF FIELD LENGTH
CF 34–8E5 ENGINE@T/O–1 MODE
ATTCS: OFF / ECS: OFF
DRY, SMOOTH, HARD PAVED AND LEVEL RUNWAY
ISA+15°C





Takeoff Field Lengths - ISA + 15 °C Conditions
Figure 3.8

POTENTIAL 490' ADJUSTMENT FOR RUNWAY GRADIENT

EFFECTIVITY: ALL

Section 3
Page 3-11
Oct 07/14

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ALLiiANCE

in association with KLJ

PLANNING STUDY FINAL REPORT

16 APRIL 2021

TERMINAL PLANNING STUDY

RAPID CITY REGIONAL AIRPORT, RAPID CITY, SOUTH DAKOTA

Alliiance Commission No.: 2021010

Alliiance | 400 Clifton Avenue Minneapolis, Minnesota 55403 USA | 612.874.4100 | www.alliiance.us

This Planning Study Report has been prepared for the **Rapid City Regional Airport** by the following team members

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TABLE OF CONTENTS

ISSUE HISTORY

Rev	Date	Description
1	04.16.2021	Issued to Owner

ABBREVIATIONS, ACRONYMS, AND INITIALISMS

AC	Advisory Circular (FAA)
ACRP	Airport Cooperative Research Program
ADG	Aircraft Design Group
ADRM	Airport Development Reference Manual (IATA)
ASL	Automated Screening Lanes
ATCT	Air Traffic Control Tower
ATO	Airline Ticket Office
BHS	Baggage Handling System
BPH	Bags per Hour
BPM	Bags per Minute
BSO	Baggage Service Offices
CBIS	Checked Baggage Inspection System
CBRA	Checked Baggage Resolution Area
CFR	Code of Federal Regulations
CRPG	Checkpoint Requirements and Planning Guide (TSA)
CT	Computed Tomography
DDFS	Design Day Flight Schedule
EDS	Explosive Detection System
FAA	Federal Aviation Administration
F&B	Food and Beverage
GSE	Ground Service Equipment
HVAC	Heating, Ventilation, and Air Conditioning
IATA	International Air Transport Association
LF	Linear Foot or Linear Feet
LoS	Level of Service (IATA)
LOS	Line-of-Sight
OE/AAA	Obstruction Evaluation / Airport Airspace Analysis (FAA)
PBB	Passenger Boarding Bridge
PGDS	Planning Guidelines and Design Standards (TSA)
PHP	Peak Hour Passenger
PMAD	Peak Month Average Day
RAP	Rapid City Regional Airport
RON	Remain Overnight
SF	Square Foot or Square Feet
TRB	Transportation Research Board
TSA	Transportation Security Administration
VSR	Vehicle Service Road

01 PROJECT OVERVIEW

01 PROJECT OVERVIEW

INTRODUCTION

PROJECT INTRODUCTION

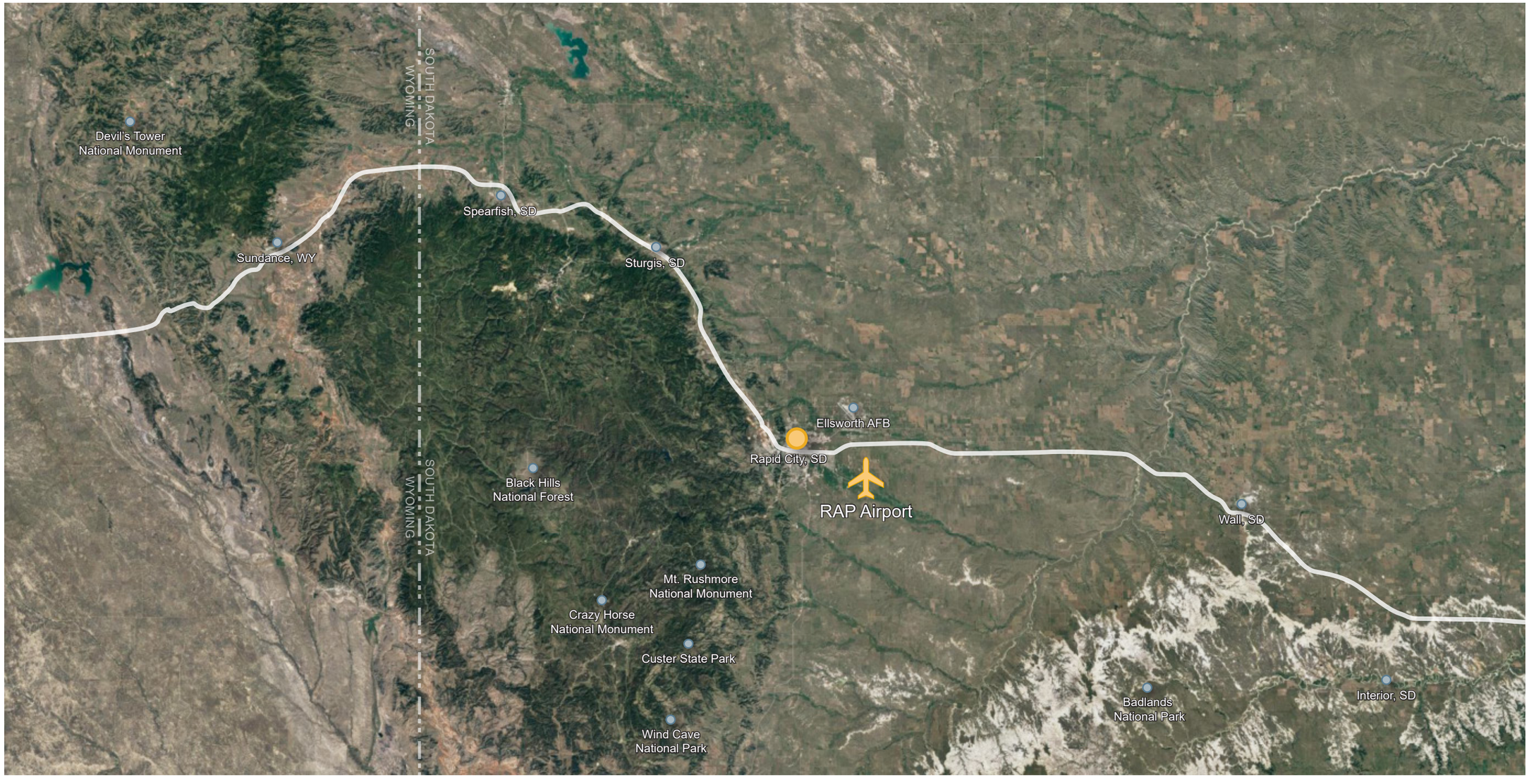
Due to recent air service and industry changes, Alliiance was retained by KLJ, the prime consultant, to reassess conceptual alternatives previously developed as the basis of design for the Outbound Baggage Expansion and Check-in Reconfiguration. Together with BNP Associates, Alliiance provided refinements and developed new options to serve as the revised basis of design. In addition, Alliiance assessed high-level conceptual concourse and gate expansion options based on the results from the Terminal Facilities Demand/Capacity analysis. This study included taking an inventory and tabulating the existing facilities' terminal spaces including both public and non-public areas in order to compare demand associated with future facility requirements using a provided 20-Year Air Demand Forecast. Additional studies included alternative layouts for administration offices, pre-security concessions, inbound baggage claim expansion, and relocation of rental car facilities.

PROJECT LOCATION

Rapid City Regional Airport (RAP) serves as a gateway into Rapid City, the surrounding region, and the Black Hills National Forest with its numerous attractions and adventures. RAP is located roughly four miles southeast of downtown Rapid City, South Dakota. RAP is a portal for passengers from near and far, and the airport serves as the entry point to downtown businesses, cultural events, or shopping; National Parks and Monuments; and caves, badlands, canyons, and forests.

01 PROJECT OVERVIEW

INTRODUCTION



PROJECT CONTEXT

02 DEMAND/CAPACITY AND FACILITY REQUIREMENTS

OVERALL PROJECT DEMAND

The overall terminal facility requirements were developed through the application of a variety of industry-accepted planning standards and guidelines including: ACRP Report 25, Airport Passenger Terminal Planning and Design; FAA AC 150/5360-13A, Airport Terminal Planning; FAA AC 150/5300-13A, Airport Planning; the Transportation Security Administration (TSA) Checkpoint Requirements and Planning Guide (CRPG); the TSA Planning Guidelines and Design Standards (PGDS) for Checked Baggage Inspection Systems Version 7.0; ACRP Report 130, Guidebook for Airport Terminal Restroom Planning and Design; and the International Air Transport Association (IATA) Airport Development Reference Manual (ADRM), 11th Edition. Additionally, planning factors from comparable airports around the U.S. as well as those unique to RAP, input from Airport and local TSA staff, and knowledge of industry trends informed the development of facility requirements for RAP.

IATA's Level of Service (LoS) standards are typically utilized by airport planners to qualitatively or quantitatively provide LoS planning factors at various processing functions within the terminal building. An "Optimum" LoS, often referred to as LoS "C", was utilized when validating the functional passenger spaces; this classification is defined by IATA as providing "Good LoS; condition of stable flow; acceptable brief delays; good level of comfort." Current utilization ratios were determined using the existing terminal lease CAD plans provided by the airport and the 2019 Design Day Flight Schedule (DDFS), which serves to establish a baseline condition of demand compared to current facility capacities.

Airport terminal facilities are typically programmed using demand associated with future projections of annual and peak hour passengers and operations. Although annual activity is a good indicator of overall airport size, peak hour volumes more accurately reflect demand for specific passenger processing functions within the terminal facilities. These peak hours are typically calculated from the peak month's average day (PMAD) and are commonly referred to as Design Hour passengers. A ten-year 2029 DDFS was utilized for future calculations and represents the demand requirements to which all conceptual options were developed to meet.

This analysis used two types of peak passenger levels based on Preferential Use and Common Use. Preferential Use passenger levels refer to the peak activity for each carrier that occurs over a "rolling" 60-minute period based on that airline's flight schedule. As a result, these Preferential Use peaks may happen at different times of the day and therefore do not typically coincide in the same clock hour. The assumption is that this peak demand is appropriate to use when determining the facility requirements for individual airlines that are operating under a Preferential Use agreement with the Airport. These areas include individual airline's ticket counters, gates/holdrooms, and the baggage claim facilities. Common use peak passenger levels refer to the cumulative peak passenger volume in a given "rolling" hour for all airlines at the Airport. These common use peak demand levels are typically used for calculating non-airline specific functions such as passenger security screening, baggage screening, and public areas including general seating and meeter-greeter lobbies.

Results from the 2029 DDFS indicated a need for ten contact gates with associated passenger boarding bridges (PBB). Upon discussions with the airport, two additional gates were provided in the concourse expansion options for a total of twelve gates. This included a total of six large regional and six narrowbody size gates. The airport terminal includes a total of nearly 105,000 gross square feet. The ten-year forecast requires a total programmed area of approximately 182,000 square feet which exceeds current capacity by approximately 77,000 square feet. A majority of this additional area is allocated to areas such as outbound baggage screening and makeup, passenger gate holdrooms, and baggage claim and laydown areas. The results of the baggage space and unit requirements are described in greater detail in the following sections.

RAP Demand Comparison	2019 Existing	2019 Recommended	2019 Capacity Threshold	Forecast 2029	Forecast Capacity Threshold
General					
Annual Enplanements	343,926			514,497	
Aircraft Gates/PBB	7	8		10	
Aircraft Positions	9	8		10 +2	
Public Space					
Circulation (public seating, ticketing, concourse, bag claim, general circ)	26,090 s.f.	36,340 s.f.	✗	48,120 s.f.	✗
Ticket Lobby Queue	2,735 s.f.	3,370 s.f.	✗	4,530 s.f.	✗
Passenger Security Screening & TSA Offices	7,843 s.f.	6,380 s.f.	✓	8,780 s.f.	✗
Passenger Holdrooms	8,843 s.f.	13,770 s.f.	✗	22,490 s.f.	✗
Baggage Claim (retrieval/device/meeter&greeter)	5,359 s.f.	8,100 s.f.	✗	8,390 s.f.	✗
Restrooms (pre/post security)	3,229 s.f.	5,160 s.f.	✗	6,830 s.f.	✗
Other (Misc Tenant, information)	656 s.f.	650 s.f.	✓	650 s.f.	✓
Airline Space					
Ticketing (counter, ATO)	4,735 s.f.	4,550 s.f.	!	6,150 s.f.	✗
Outbound Baggage Screening	595 s.f.	18,000 s.f.	✗	18,000 s.f.	✗
Outbound Baggage Makeup	4,617 s.f.	6,960 s.f.	✗	12,320 s.f.	✗
Airside Ops/Storage	744 s.f.	760 s.f.	✗	990 s.f.	✗
Inbound Bag Claim Laydown	3,395 s.f.	3,900 s.f.	✗	3,900 s.f.	✗
Inbound/Outbound Baggage Circulation	3,325 s.f.	1,630 s.f.	✓	2,430 s.f.	✓
Baggage Service Offices (BSO)	0 s.f.	400 s.f.	!	400 s.f.	!
Concessions					
Landside/Storage (includes Rental Cars)	5,639 s.f.	4,270 s.f.	✓	5,370 s.f.	!
Airside/Storage	1,882 s.f.	3,330 s.f.	✗	4,980 s.f.	✗
Non-Public Space					
Airport Administration	2,474 s.f.	4,130 s.f.	✗	4,130 s.f.	✗
Restrooms/Circulation	1,423 s.f.	2,570 s.f.	✗	3,060 s.f.	✗
Airport Operations (Maintenance,Janitorial,Storage,Shops)	6,703 s.f.	2,490 s.f.	✓	3,230 s.f.	✓
Building Systems (MEP,Communications/IT,Loading Docks,Structure)	14,676 s.f.	13,290 s.f.	!	17,370 s.f.	✗
TOTAL GROSS (sq ft)	**104,963 s.f.**	**140,050 s.f.**	✗	**182,120 s.f.**	✗

Legend

✓ Programmed area is less than existing

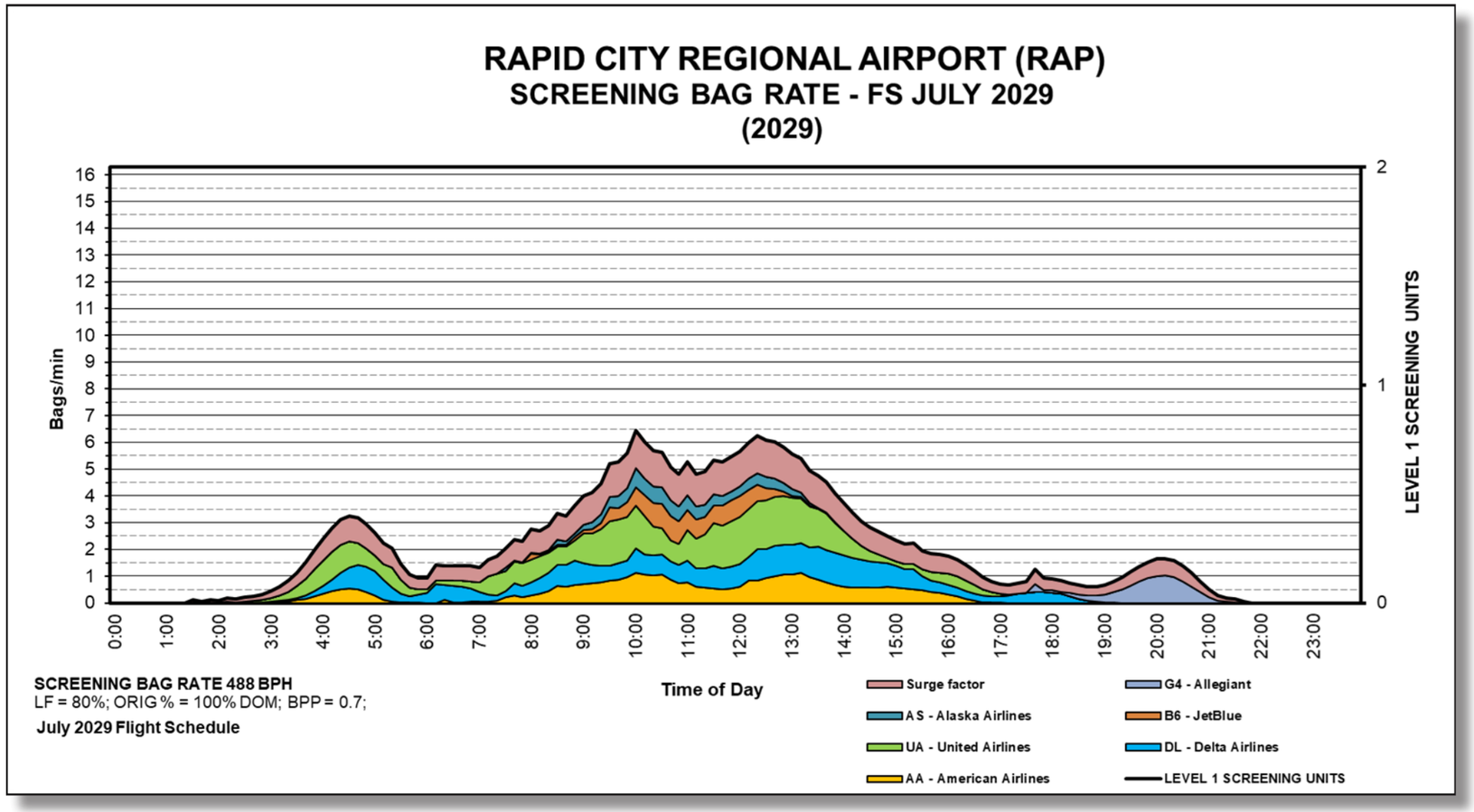
! Programmed area is at or over 85% of capacity

✗ Programmed area is greater than existing

OUTBOUND BAGGAGE: EDS SCREENING

The flight schedule provided for a flight analysis was from 2019 and contains a total of 41 departure and 41 arrival flights. Following the TSA Planning Guidelines and Design Standards (PGDS) V7 guidelines in determining Explosive Detection System (EDS) equipment requirements, the surge-adjusted 10-minute demand of the design day in the design year (Date of Beneficial Use + 5) shall be used. On-screen resolution station and baggage inspection station requirements were based on the capacity of the EDS equipment. The passenger arrival profile used in the flight analysis was per PGDS V7. The design year for the new BHS in RAP is considered to be 2029.

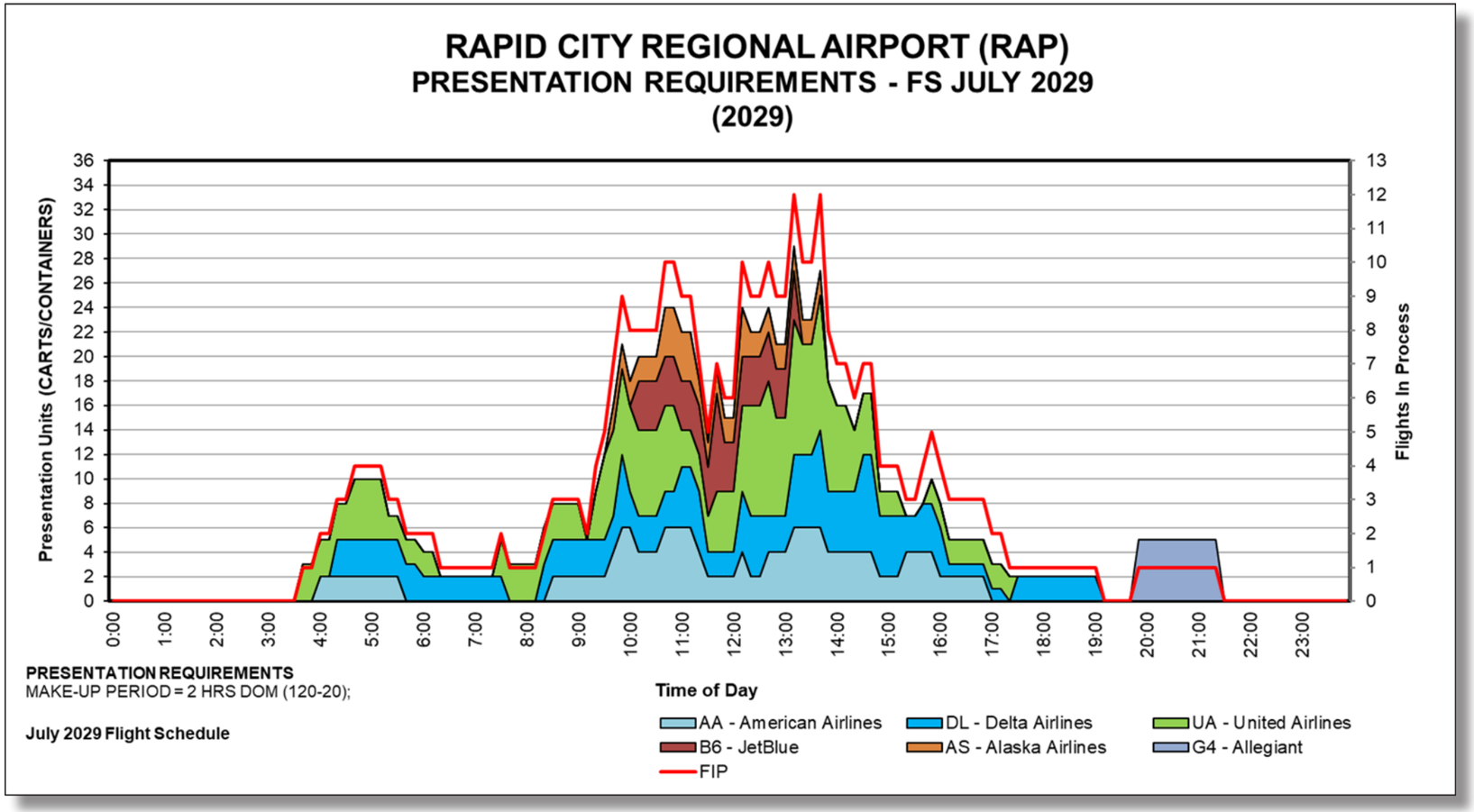
Flight analysis shows a bag demand of 6.4 BPM or 384 BPH at the 10-min peak. This demand requires a Type I EDS for bag screening as the demand exceeds the capacity of Type II EDS device. Checked Baggage Inspection System (CBIS) and Checked Baggage Resolution Area (CBRA) are designed with Type I EDS device in an Inline configuration. One non-redundant and one redundant EDS of Type I, L3-6700 with 505 BPH capacity, will be adequate for the bag screening demand until 2042. Then two non-redundant and one redundant EDS will be required. The outbound inline system requires an estimated minimum combined area for CBIS and CBRA of 16,000 square feet. This area has space allocated for a third EDS shunt line which can be added in the future to meet the anticipated bag screening demand in 2042. Graph 1 to the left presents the bag screening demand calculated for design year 2029.



GRAPH 1: EDS REQUIREMENTS

OUTBOUND BAGGAGE: MAKEUP

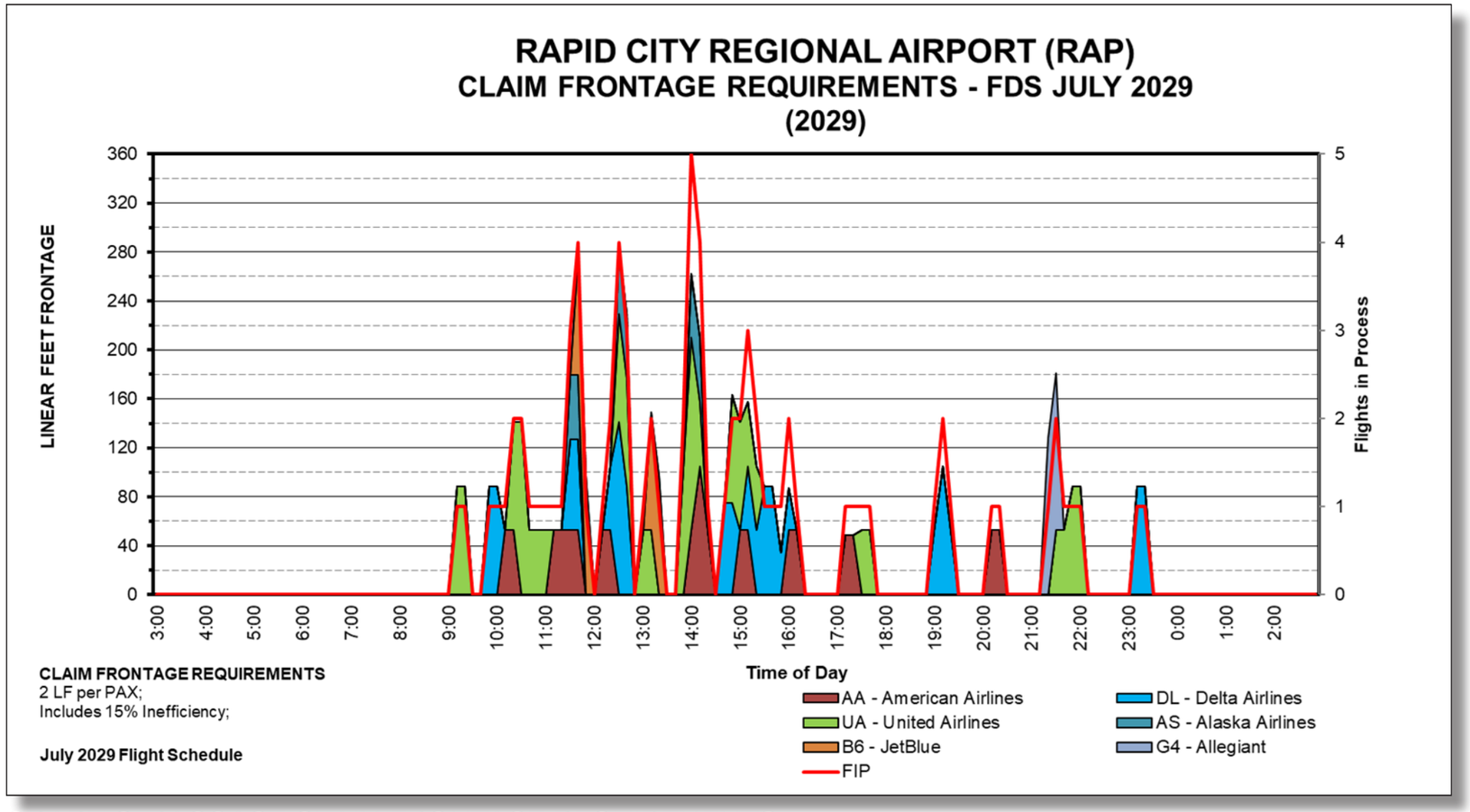
It is assumed that the make-up devices are opened for a flight starting 120 minutes before and ending 20 minutes prior to standard time departure. The total number of flights in process at the peak is 12 and the total number of cart presentation required is 29. Since the cart presentation peak is only for a short period of time, ten minutes, the following peaks were considered for sizing the make-up devices. Graph 2 at right shows that most of the peaks require a maximum of 24 cart presentation, therefore a total of two make-up devices will be adequate for the projected demand in design year 2029, each with a capacity of 12 cart presentation.



GRAPH 2: BAGGAGE MAKEUP REQUIREMENTS

INBOUND BAGGAGE: CLAIM FRONTAGE

The results of the flight analysis for the inbound portion are illustrated in Graph 3 at right. A total of 282 linear feet of claim presentation is required and five concurrent flight arrivals will be processed at the peak. There are two claim devices currently in operation in RAP, each with a claim presentation of 84 linear feet for a total of 164 linear feet of frontage. Two additional new claim devices, with the same size as existing, will be adequate for the projected demand in design year 2029.



GRAPH 3: BAGGAGE CLAIM FRONTAGE REQUIREMENTS

03 SITE PLANNING OPTIONS

SITE LAYOUT: PREFERRED OPTION — FULL BUILD

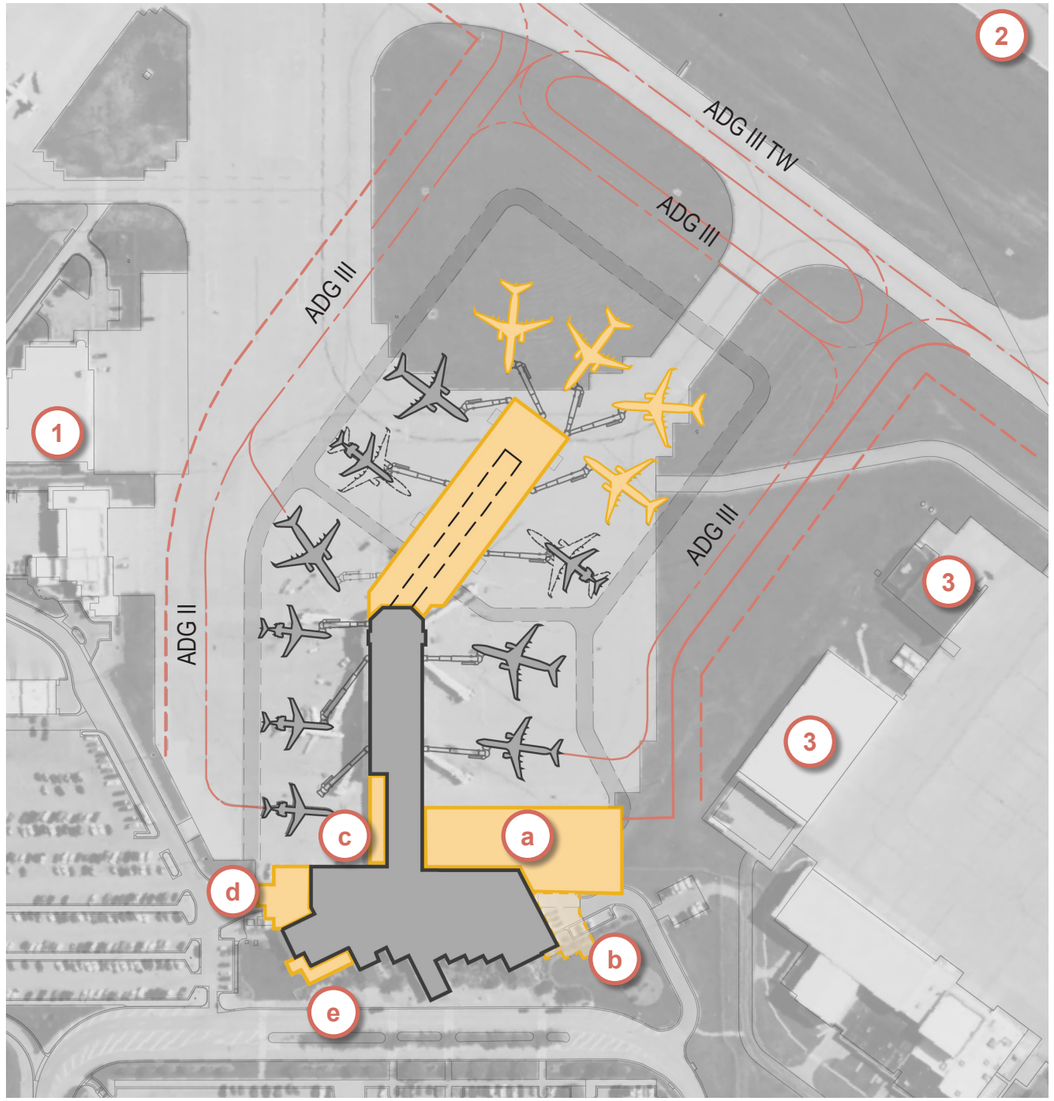
The preferred option provides a total of twelve bridged gates plus an additional remain overnight (RON) parking position which shares a passenger boarding bridge (PBB) with the adjacent gate. This increases existing parking capacity by four positions and PBB gates by five. These gates consist of six Large Regional (CR7/9, E75) and seven Narrowbody (739, A320) type aircraft including the RON position. In order to provide the greatest apron parking flexibility, nine of the thirteen parking positions allow for Narrowbody aircraft (739). Due to existing site constraints, the three existing gates on the southwest (Gates 2, 4, and 6) and existing Gate 1 to the southeast are restricted to Regional aircraft. Due to the existing ARFF building and tenant (Fugro) to the northwest, the preferred option "dog-legs" the concourse to the northeast a length of approximately 362 feet. This allows Narrowbody aircraft parking capability along the north face of the new expanded concourse. Apron access to the gates is from existing Taxiway A and is facilitated by the use of Aircraft Design Group (ADG) III taxilanes along all sides of the concourse, with the exception of Gates 2, 4, and 6 where the taxilane narrows to a ADG II. A new vehicle service road (VSR), located at the tails of the aircraft, runs the entire perimeter of the concourse. The VSR has a cross-over running under the departure level occurring just after the "elbow" of the new expansion. The double-loaded expanded concourse provides a width of nearly 100 feet allowing for increased gate holdroom depths.

An expansion of the building to the east of the existing terminal (a) allows for a new consolidated EDS baggage screening matrix and makeup area. A two-bay ticketing expansion (b) to the southeast is also provided to meet the 10-year demand requirements. The increased footprint for the checkpoint will be accomodated by an expansion to the west (c) at the existing checkpoint. An additional flat plate "T" baggage claim device and increased baggage laydown and circulation is also provided in a building expansion (d) to the northwest face of the existing terminal. Additionally, rental car counters and offices are relocated to a curbside building expansion (e) opening space for additional baggage claim retrieval and circulation.

DIAGRAM KEY NOTES

Site Context
1. Fugro
2. Runway 14/32
3. Army National Guard

Building Expansion
a. Baggage Screening
b. Ticketing
c. Checkpoint
d. Baggage Claim and Laydown
e. Rental Cars



N

SITE CONCEPT: PREFERRED OPTION FULL BUILD
Not to Scale

SITE LAYOUT: PREFERRED OPTION — REDUCED BUILD

Should funding capacity become a constraint, a reduced ten gate option was developed in order to meet the gate capacity need derived from the 2029 DDFS. This option provides six bridged regional gates and four bridged narrowbody gates, plus an additional narrowbody RON parking position. This position shares a PBB with the adjacent gate located at the end of the concourse. The expansion requires a build-out of approximately 207 feet in length, a reduction of 155 feet from the Full Build option. All other characteristics of the terminal and concourse expansion follow that of the Full Build.

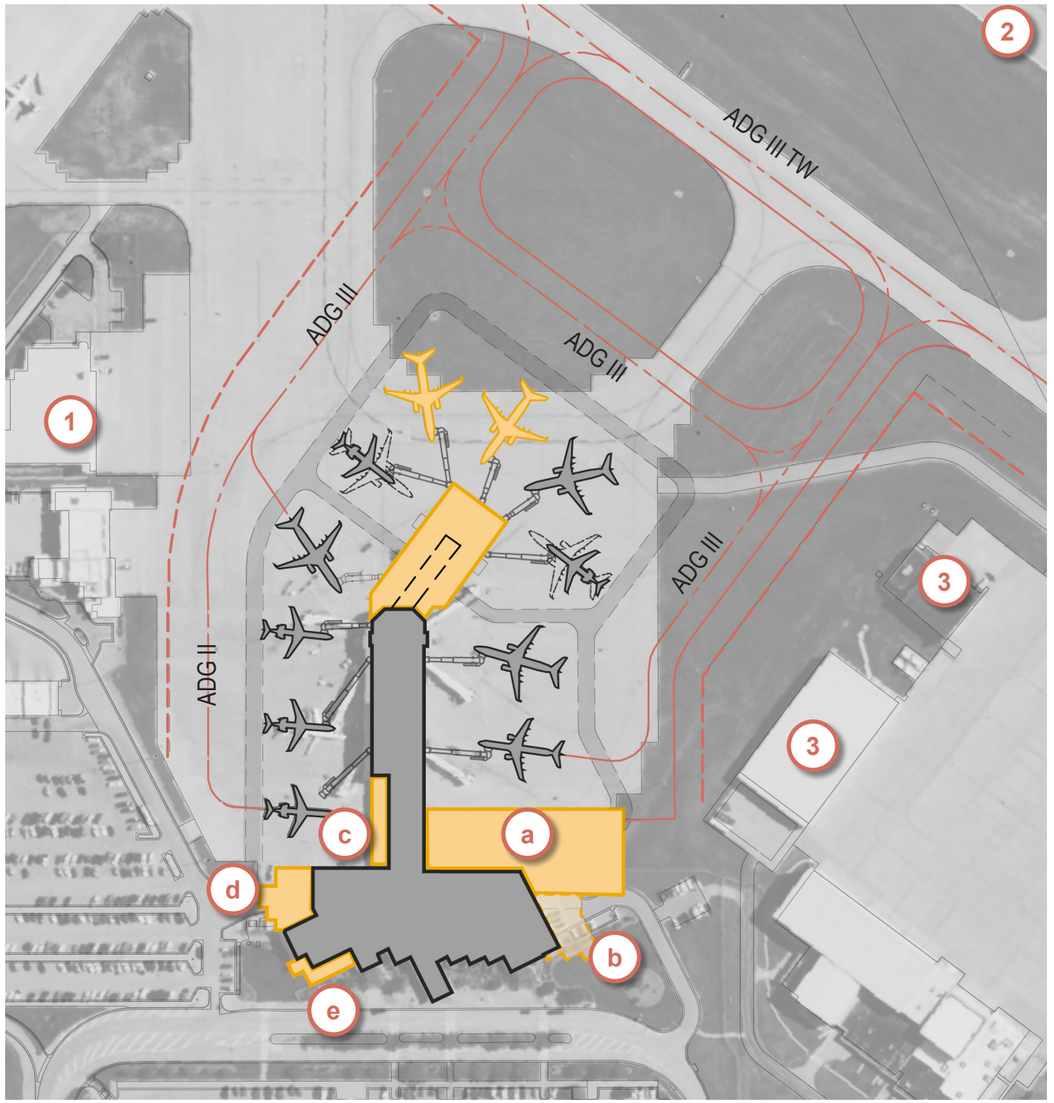
DIAGRAM KEY NOTES

Site Context

1. Fugro
2. Runway 14/32
3. Army National Guard

Building Expansion

a. Baggage Screening
b. Ticketing
c. Checkpoint
d. Baggage Claim and Laydown
e. Rental Cars



N

SITE CONCEPT: PREFERRED OPTION FULL BUILD

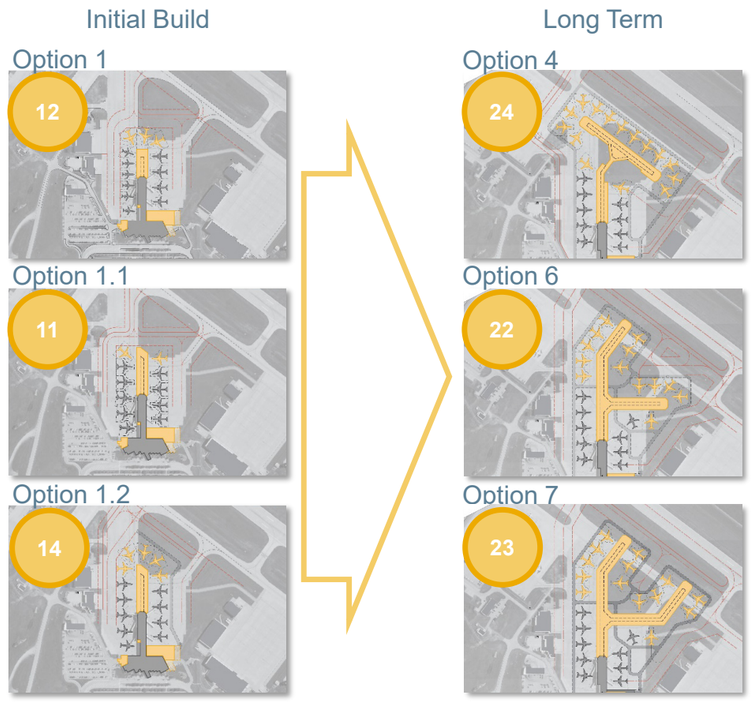
Not to Scale

03 PLANNING OPTIONS

OTHER OPTIONS

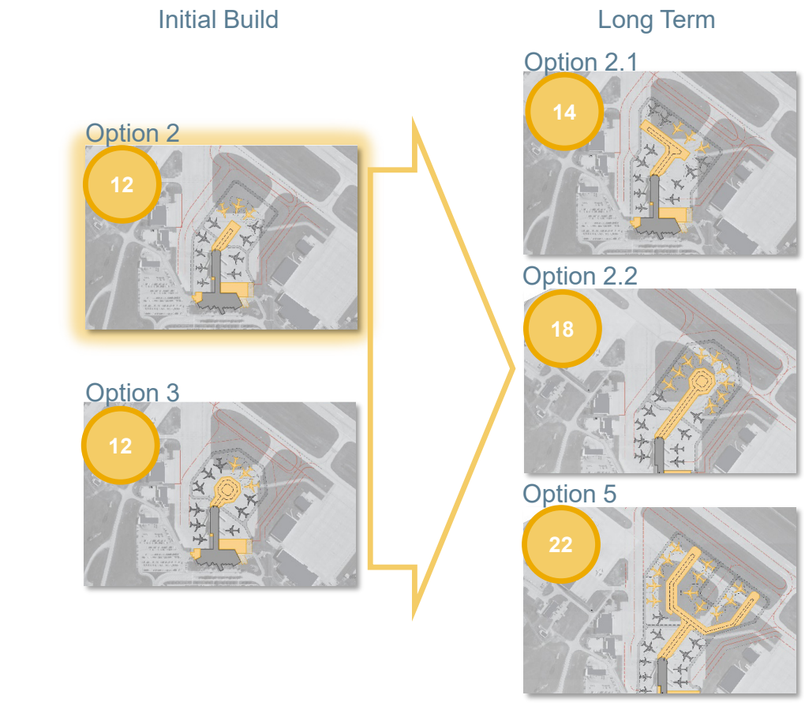
SITE LAYOUT: INITIAL OPTIONS

Several site expansion layout options were studied based on existing site constraints that include Runway 14/32 to the north, the Army National Guard to the east, and Fugro to the west. The development of each site option utilized industry-accepted planning parameters such as those identified in FAA AC 150/5300-13A and ACRP Report 25 relative to taxiway and taxilane dimensional criteria, aircraft parking depth and wingtip spacing, concourse width, and associated gate planning. A total of eleven options were developed and grouped according to two major site expansion orientations (“Linear” and “Dog-Leg”) and subgrouped by the initial 10-year demand and future long-term potential. These options were developed to evaluate the extents of the site in regards to providing the most effective layout in terms of initial ten-year and future long-term gate capacity and apron aircraft parking and maneuvering efficiency. Refer to the appendix for additional content regarding the other options studied.



SITE CONCEPT: INITIAL OPTIONS — LINEAR

Not to Scale



SITE CONCEPT: INITIAL OPTIONS — DOG-LEG

Not to Scale

AIR TRAFFIC CONTROL TOWER — LINE OF SIGHT (LOS)

As stated in the FAA Advisory Circular on Terminal Planning (AC 150/5360-13A):

"It is critical to ensure the terminal building, related structures, and aircraft parked at gates will not compromise visibility from the ATCT. An unobstructed view of all controlled movement areas is required. This includes all runways, taxiways, any other landing areas, and air traffic in the vicinity of the airport."

Full Build and Reduced Build concourse options were reviewed for potential line-of-sight (LOS) issues as shown below.

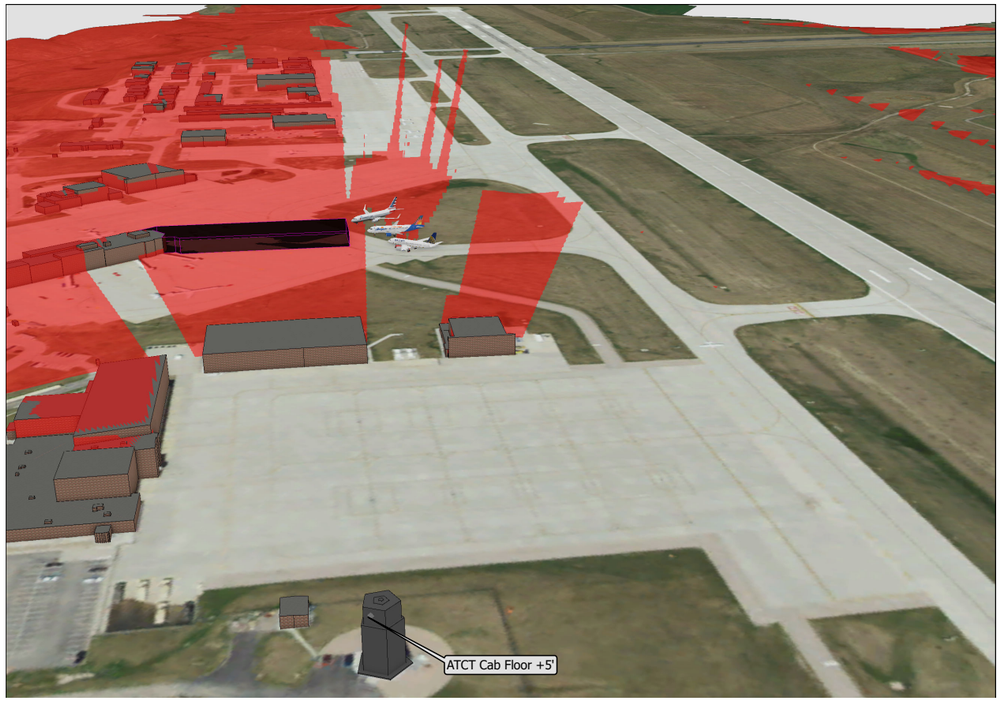


FIGURE 1:
LINE-OF-SIGHT SHADOWS: PREFERRED OPTION FULL BUILD — ESTIMATED

FULL BUILD

The Full Build concourse expansion stops close to, but short of the LOS from the ATCT to the end of Runway 5. Aircraft parked on on the east end of the concourse may obstruct LOS depending on aircraft tail height. While further analysis would be required to determine potential limitations on aircraft parked on the end of the concourse, Figure 1 provides a general idea of shadowing from "taller" aircraft operating out of RAP like the Airbus A-320 and Boeing 737-800 for the Full Build. Refer to the Appendix (pg. 41) for a general idea of shadowing from "shorter" aircraft operating out of RAP like the CRJ-900.

REDUCED BUILD

The Reduced Build concourse expansion and parked aircraft associated with this option are not expected to obstruct LOS from the ATCT as shown in Figure 2.

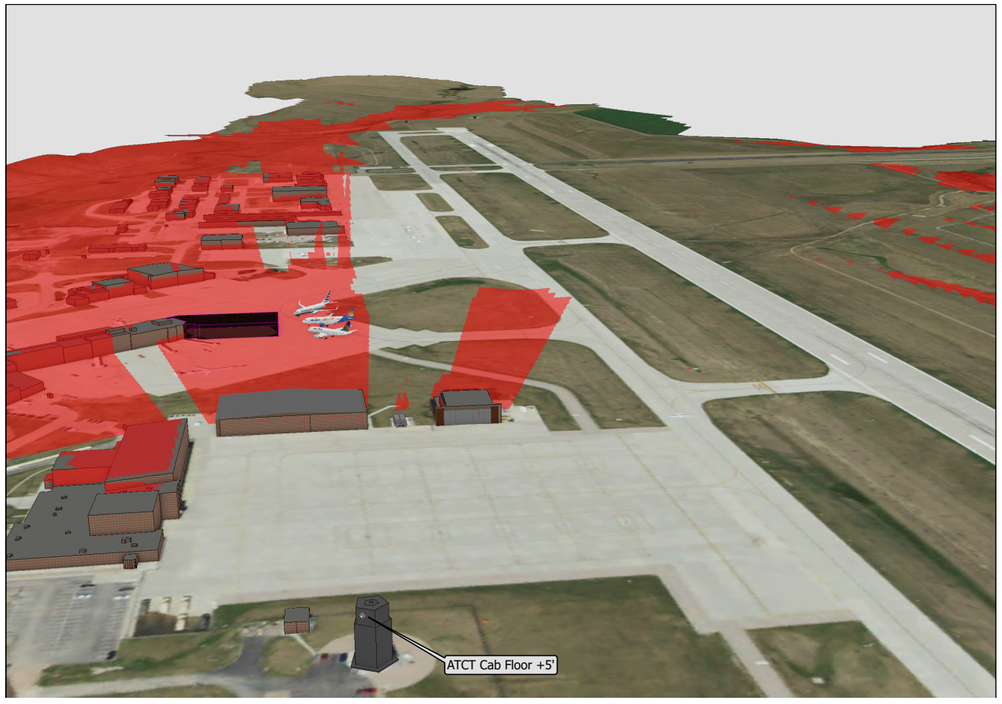


FIGURE 2:
LINE-OF-SIGHT SHADOWS: PREFERRED OPTION REDUCED BUILD — ESTIMATED

03 PLANNING OPTIONS

PREFERRED OPTION — PART 77 ANALYSIS

AIRSPACE — 14 CFR PART 77 ANALYSIS

The FAA Advisory Circular on Terminal Planning (AC 150/5360-13A) states:

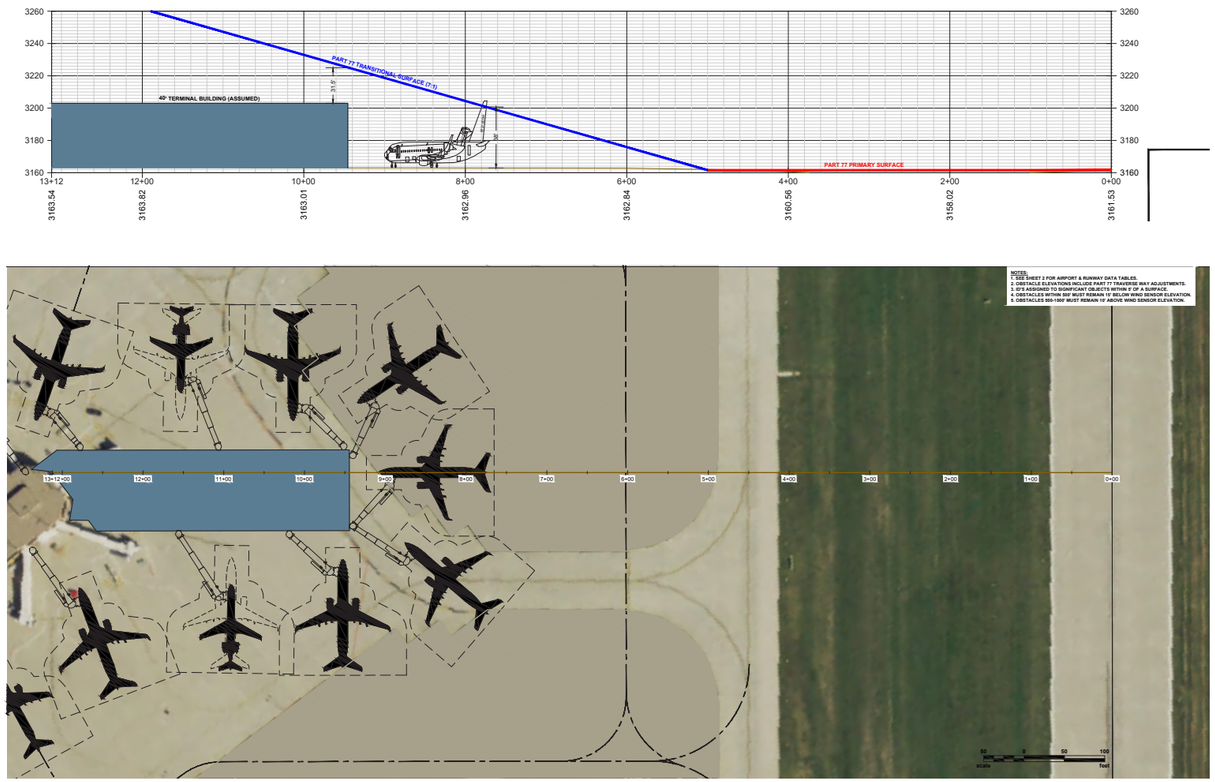
“Airport owner/operators must site passenger terminal facilities and associated vehicles (e.g., aircraft at gate positions) in compliance with airport imaginary surfaces and airspace.”

FULL BUILD

The “full build” concourse expansion building footprint would be below Part 77 Imaginary Surfaces as shown at right. Aircraft with tail heights greater than 38 feet may penetrate the Transitional Surface for parking positions on the east end of the concourse. The FAA Obstruction Evaluation / Airport Airspace Analysis (OE/AAA) process may result in a “Determination of No Hazard to Air Navigation” if analysis finds aircraft tail penetrations to the Transitional Surface will not have a “substantial aeronautical impact to air navigation” as detailed in 14 CFR Part 77.31.

REDUCED BUILD

The Reduced Build concourse and parked aircraft associated with this option would not penetrate Part 77 Imaginary Surfaces.



PART 77 TRANSITIONAL SURFACE: PREFERRED OPTION — FULL BUILD

04 CONCEPTUAL DESIGN

04 CONCEPTUAL DESIGN

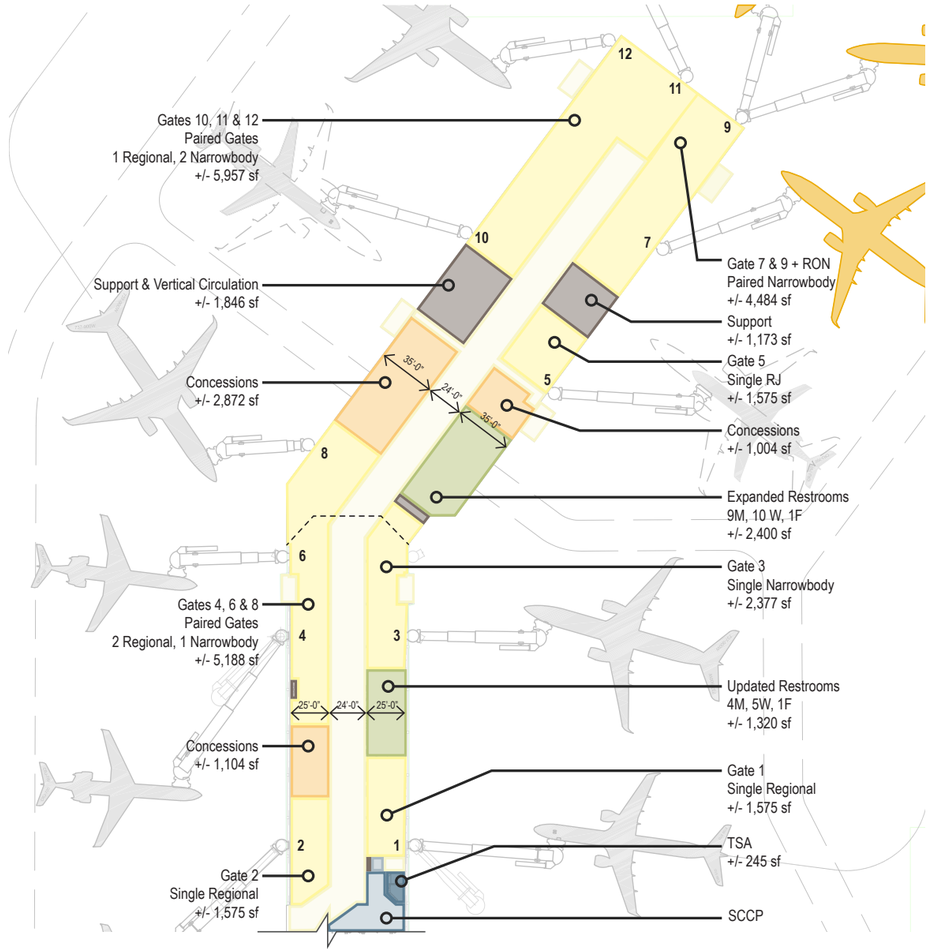
PREFERRED OPTION

CONCOURSE EXPANSION PLAN — FULL BUILD

The design approach for the interior planning of the Full Build concourse expansion concept focused on providing appropriately-sized gate holdrooms for all gates, in line with their scheduled aircraft. Gate holdroom spaces within the modernized existing portion of the concourse were sized to work within the existing 75-foot width of the concourse, while still maintaining adequate central circulation space. The 25-foot depth of these gate holdrooms is less than the recommended 35 feet, but the overall gate holdroom areas meet the recommended size guidelines. The width at the concourse expansion increases to 95 feet to provide the recommended 35-foot clear depth at all gate holdroom spaces.

The existing concessions and restroom spaces within the existing concourse are modernized with a somewhat reduced footprint to serve the initial gates. Additional concessions and restroom spaces are identified in the expansion providing the required overall areas for each, while placing them at a convenient location for the remaining larger gates. Additional support spaces including vertical circulation, mechanical and service spaces are also allotted space within the concourse; the position of these spaces will adjust in later phases based on the requirements of the systems selected as the design progresses.

While not shown, twenty percent additional apron level tempered space would be provided for areas such as mechanical, electrical, and operations space.



CONCEPT PLAN: FULL CONCOURSE EXPANSION

Not to Scale

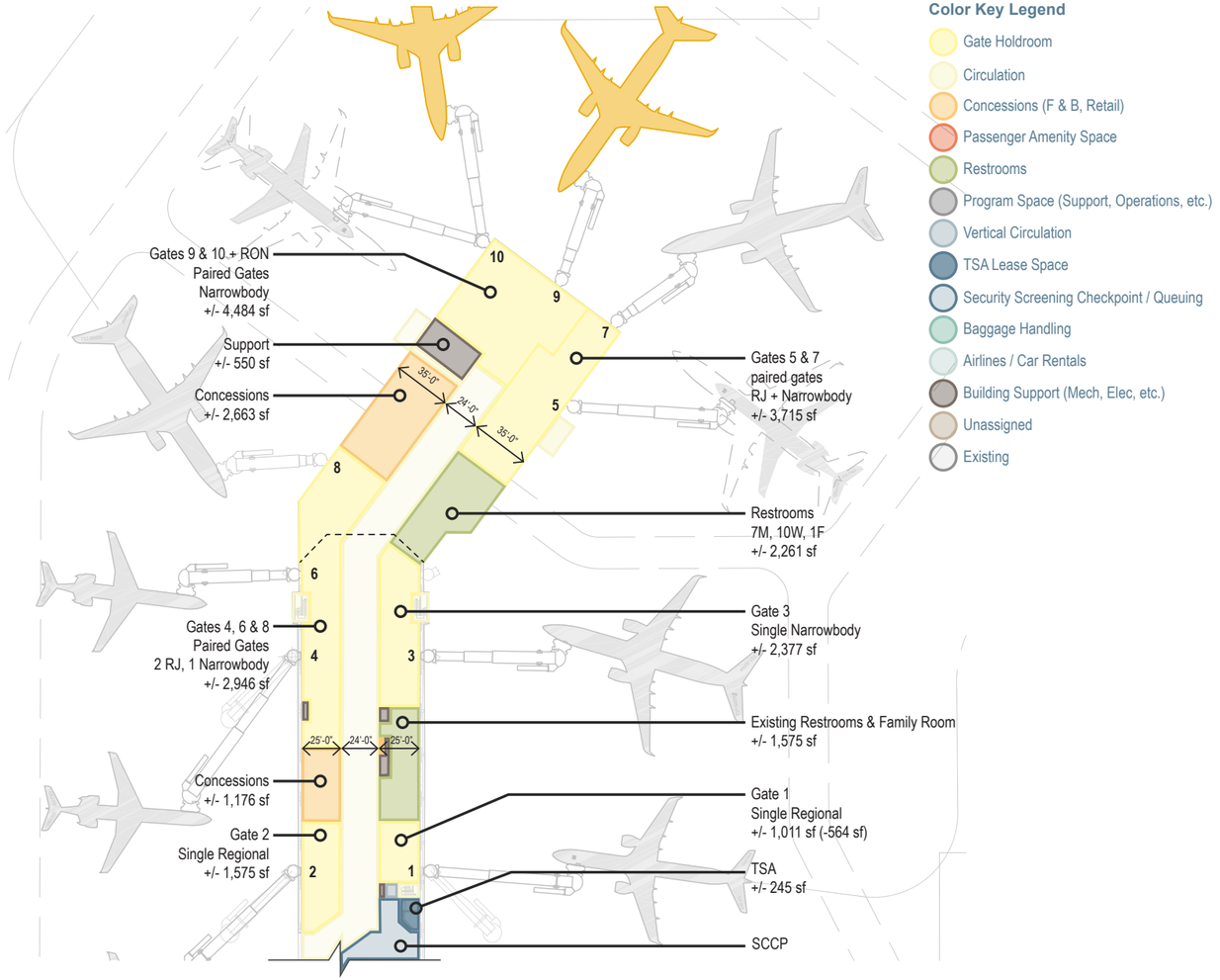
04 CONCEPTUAL DESIGN

PREFERRED OPTION

CONCOURSE EXPANSION PLAN — REDUCED BUILD

The design approach for the interior planning for the ten-gate reduced build concourse expansion concept focused on providing appropriately-sized gate holdrooms for all gates with the exception of Gate 1. This Reduced Build option looked at minimizing the impact to operations within the existing spaces while modernizing all areas of the existing concourse. All gate holdroom spaces within the modernized existing portion of the concourse were sized to work within the existing 75-foot width of the concourse, while still maintaining adequate central circulation space. The 25-foot depth of these gate holdrooms is less than the recommended 35 feet, but the overall gate holdroom areas meet the recommended size guidelines. The width at the concourse expansion increases to 95 feet to provide the recommended 35-foot clear depth at all gate holdroom spaces.

In this lower impact option, the existing restroom is modernized but not relocated. This results in a slightly undersized area available for Gate 1. The existing concessions are modernized although the footprint is reduced somewhat to provide additional area for Gate 2. This layout works to preserve the existing back of house / kitchen zone to maintain existing services and pathways. Additional concessions and restroom spaces are identified in the expansion to provide the required overall areas for each, while placing them at a convenient location for the remaining larger gates. Additional support spaces including vertical circulation, mechanical, and service spaces are also allotted space within the concourse. The position of these spaces will adjust in later design phases based on the requirements of the systems selected as the design progresses.



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CONCEPT PLAN: REDUCED CONCOURSE EXPANSION

Not to Scale

04 CONCEPTUAL DESIGN

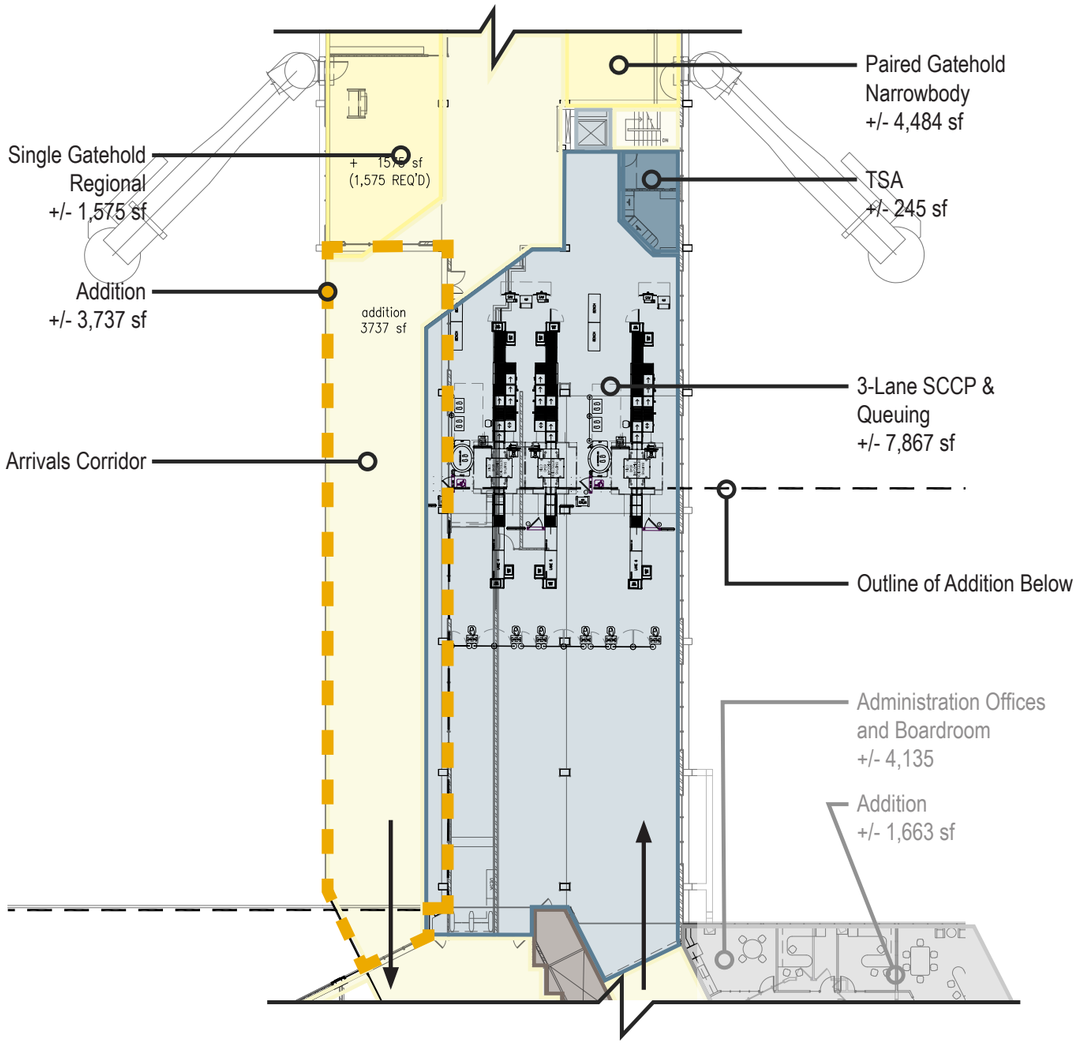
PREFERRED OPTION

CHECKPOINT EXPANSION — FUTURE

Results from the Facility Requirements analysis indicate the potential that a third security screening lane would be required by the 2029 demand year. Future planning requirements and layouts are based on the TSA Checkpoint Requirements and Planning Guide (CRPG) published in May 2020. Demand calculations were based on the common use peak hour since all airlines utilize a single consolidated checkpoint for passenger screening. Requirements were also based on the following planning guidelines and communication from local TSA:

- A peak 30-minute demand of approximately 36 percent of the departing peak hour calculated from the 2029 DDFS
- A passenger split of approximately 30% PreCheck versus 70% Standard passengers
- Average throughput of 225 and 150 passengers per lane per hour for PreCheck and Standard passengers, respectively
- An additional 10% of the daily enplanement activity added for capacity for employee and crew screening
- Industry acceptable maximum waiting time of ten minutes in the queue
- TSA planning recommendation of 600 square feet queuing area per lane

While the total overall length of the existing checkpoint appears to be adequate, additional width would be required for the installation of a new, third screening lane meeting current and future TSA equipment spacing and space required guidelines. The additional width would also allow the implementation of Computed Tomography (CT) X-ray equipment, part of TSA's Checkpoint Property Screening Systems (CPSS) program, as well as the potential use of a variety of Automated Security Lane (ASL) systems.



CONCEPT PLAN: CHECKPOINT EXPANSION

Not to Scale

Color Key Legend

- Gate Holdroom
- Circulation
- Concessions (F & B, Retail)
- Passenger Amenity Space
- Restrooms
- Program Space (Support, Operations, etc.)
- Vertical Circulation
- TSA Lease Space
- Security Screening Checkpoint / Queuing
- Baggage Handling
- Airlines / Car Rentals
- Building Support (Mech, Elec, etc.)
- Unassigned
- Existing

04 CONCEPTUAL DESIGN

PREFERRED OPTION

PRE-SECURITY CONCESSIONS AND ADMINISTRATION OFFICES

PREFERRED OPTION

The concourse level Commons area, just outside of the security screening checkpoint (SSCP), provides a great opportunity to maximize views to the Black Hills for passengers and meeters-greeters alike. The Preferred Option focuses on right-sizing the pre-security concessions zone while maintaining the existing back-of-house zone, in addition to providing a greater range of seating options and locations, including both lounge seating and tables and chairs. The updated Concessions space is envisioned to offer both table and bar service as well as grab-and-go options, supporting meeters-greeters wishing to wait in the soft seating lounge or along the updated observation deck with its views to the Black Hills.

The addition of the new Arrivals Corridor at the SSCP would allow the Administration Suite to expand out into the space previously required as an entrance into the screening area. The new expanded Administration Suite is reconfigured to provide a clearly organized office area, including an expanded reception area, six offices, conference and support spaces, as well as a large Board Room.

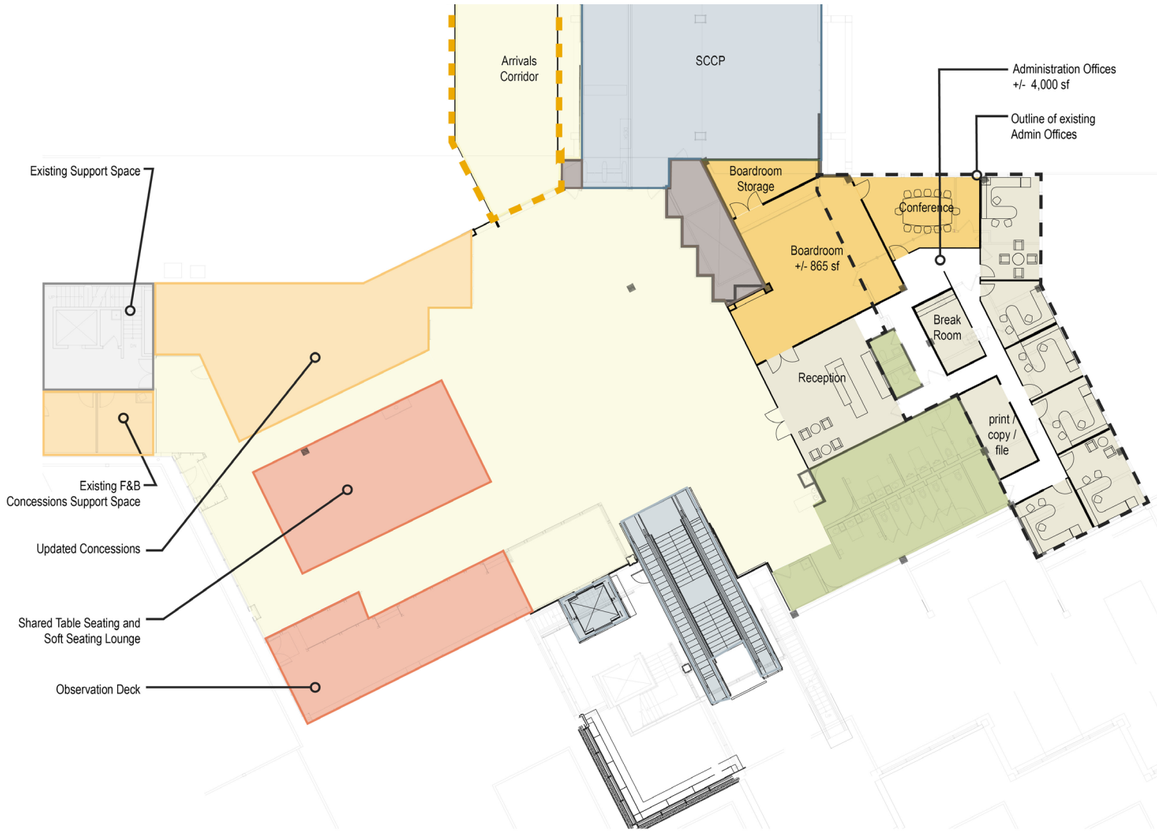
OTHER OPTIONS

Refer to appendix (pg. 34-35) for other options studied relative to the layout of the Pre-Security Concessions and Administration Offices area.

TICKETING, BAGGAGE SCREENING, BAGGAGE MAKEUP, CLAIM HALL, AND CAR RENTALS

PREFERRED OPTION

Updates to the ticketing level focused on creating a consolidated in-line baggage screening area incorporating the required TSA screening equipment as well as space for a future third screening device and oversize baggage screening. This automated system delivers the screened baggage to two baggage makeup devices with frontage for 24 carts. A dedicated zone outside of oversize screening is provided for pickup of these items. The in-line baggage screening area requires roughly 31,000 square foot addition. The existing spaces previously utilized for individual airline bag screening and makeup is reconfigured to provide ATO space and restrooms to support both airline and bag handling personnel. This preferred option also plans for the future expansion of the Ticketing Hall with areas for expanded ticket counters, ATOs, and takeback belts connected to the in-line screening area.



N

CONCEPT PLAN: CONCOURSE LEVEL CONCESSIONS AND ADMINISTRATION OFFICES

Not to Scale

04 CONCEPTUAL DESIGN

PREFERRED OPTION

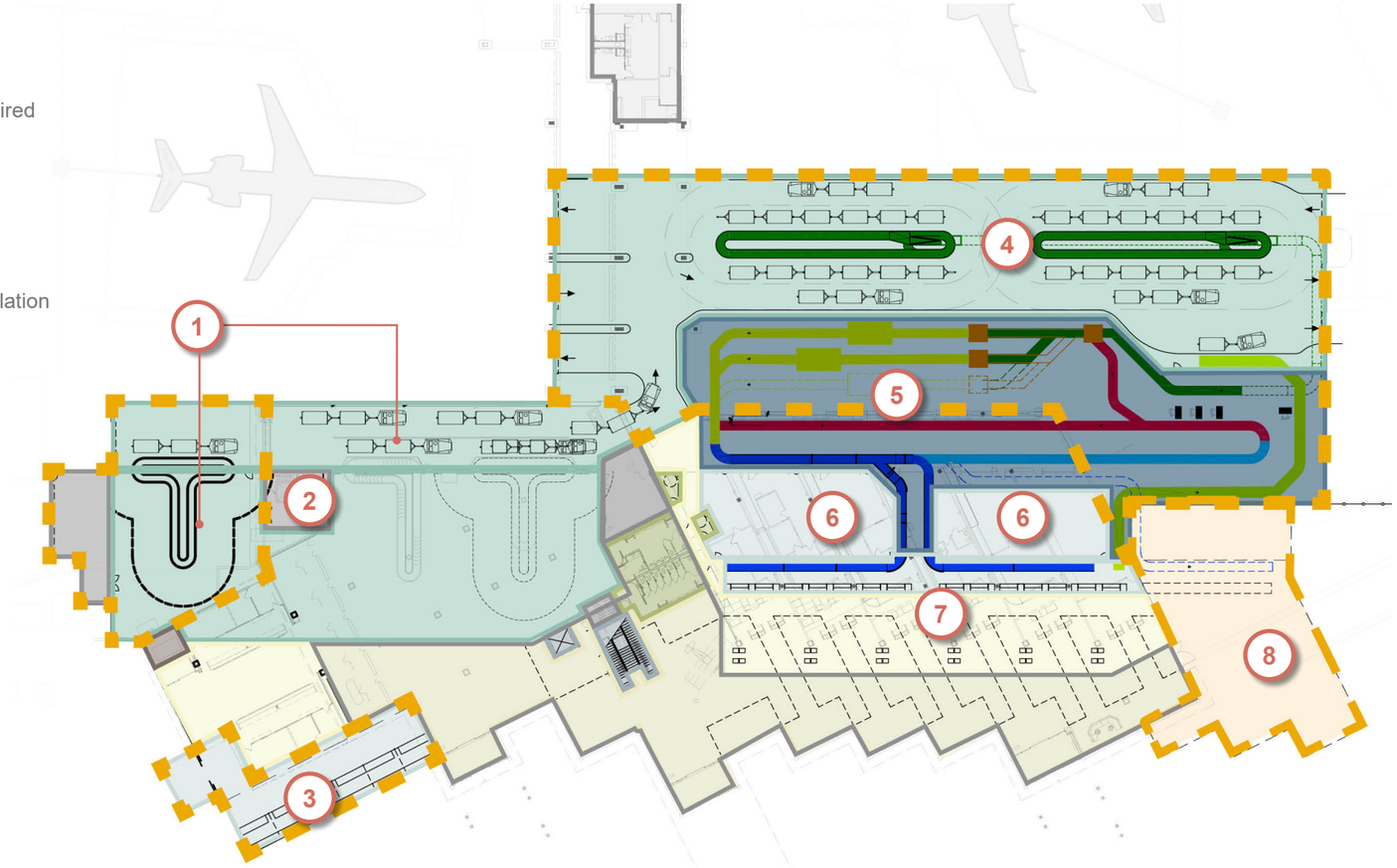
On the west (Arrivals) side of the Ticketing level an addition provides space to accommodate a third required claim device. There is sufficient available space to replace the existing claim device, closest to Ticketing, allowing for a larger device when needed.

The loading dock is relocated from its current position to provide the space for the third claim device. It is located on the west side of the addition, accessed by the existing service road.

Relocating car rentals to a smaller building addition adjacent to the curbside frees up much needed circulation and waiting space adjacent to the claim devices and remains directly accessible to the rental car lot. The overall Arrivals area addition and renovation totals roughly 13,000 square feet.

OTHER OPTIONS

Refer to appendix (pg. 36-37) for other options studied relative to the layout of these areas.



N

CONCEPT PLAN: TICKETING LEVEL BAGGAGE SCREENING, ATOS, BAGGAGE MAKEUP, CLAIM HALL, AND CAR RENTALS

Not to Scale

PLAN KEY NOTES

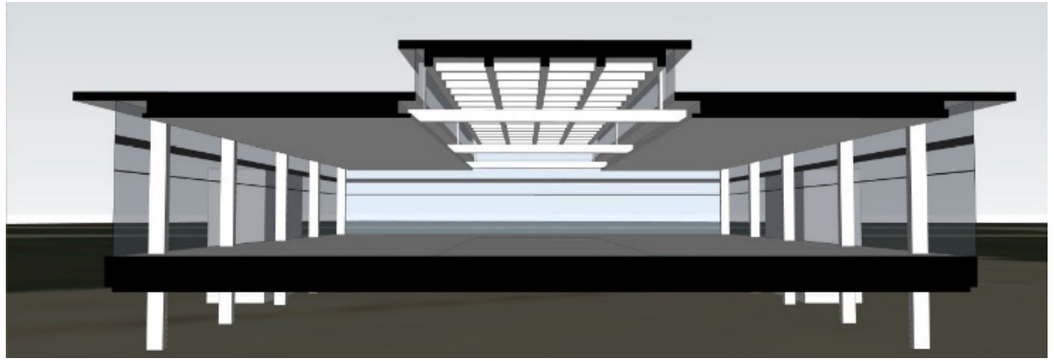
1. Addition for new Loading Dock third 100-150 LF Claim Device, and expanded laydown area (+/- 6,000 sf)
2. New enclosure at existing vertical circulation
3. New addition for Car Rental (+/- 2,800 sf)
4. Baggage Makeup addition for two 160 LF Baggage Makeup flat plate carousels, 24-cart capacity (+/- 20,000 sf)
5. EDS Baggage Screening area
6. ATOs
7. New Ticket Counters & Scales: 28 positions
8. Future Ticketing Hall expansion (+/- 6,000 sf)

04 CONCEPTUAL DESIGN

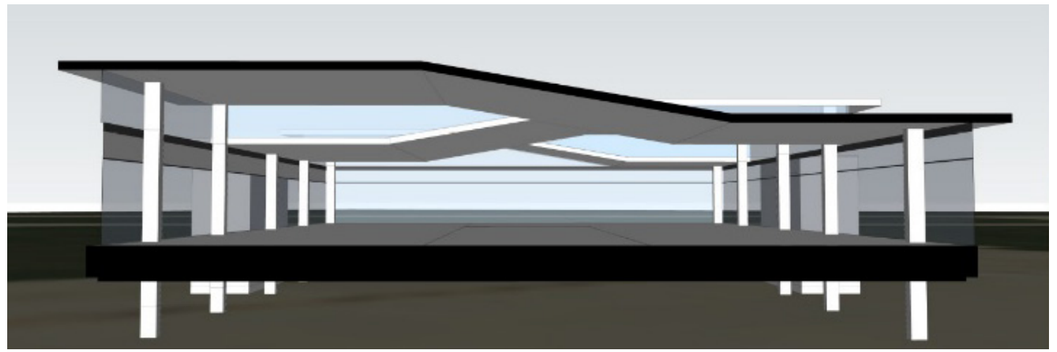
PREFERRED OPTION

BUILDING MASSING

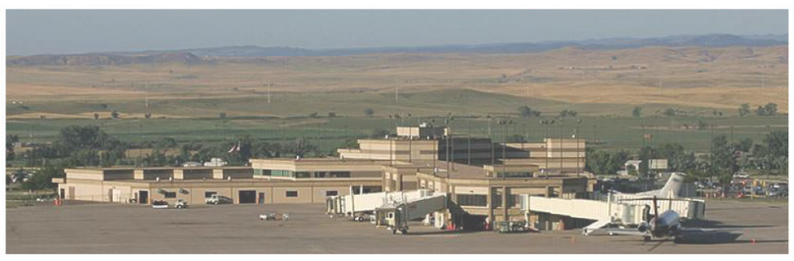
Two building massing options were developed. Both options offer higher ceilings and increased opportunities to bring natural daylight into the concourse, while employing structural bay systems that can easily accommodate future additions to the concourse. Both options draw from the precedent of roof forms of the existing terminal and concourse. Option 1 utilizes a central clerestory to expand on the increased height in the gate holdrooms, drawing light deep into the center of the concourse. Option 2 utilizes a stepped roof form that rises across the width of the concourse directing views to the surrounding hills. The stepped bay is repeated, with every other module reversed, creating a dynamic roof expression along the length of the concourse. Maximum roof height in both studies is forty feet, well within the Part 77 height restriction of sixty feet maximum.



CONCEPTUAL SECTION OPTION 1: CENTRAL CLERESTORY

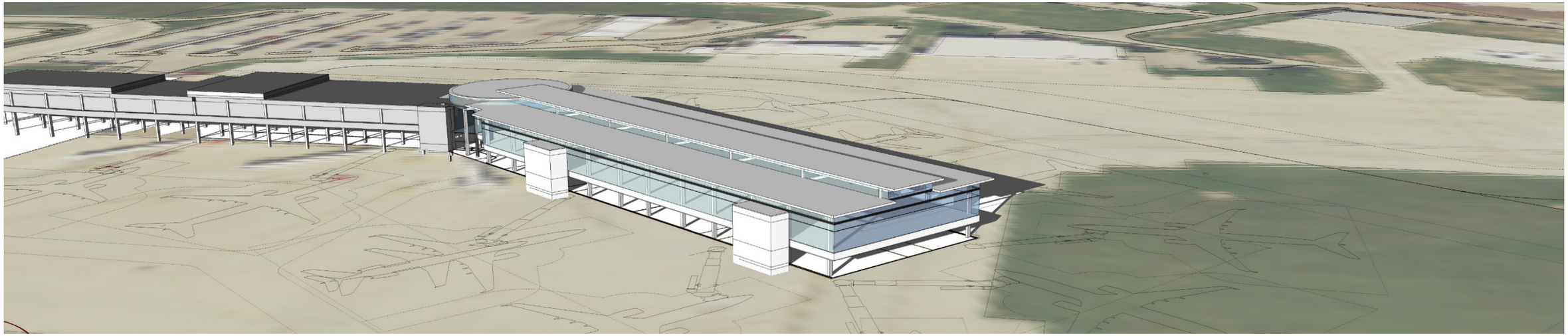


CONCEPTUAL SECTION OPTION 2: STEPPED ROOF

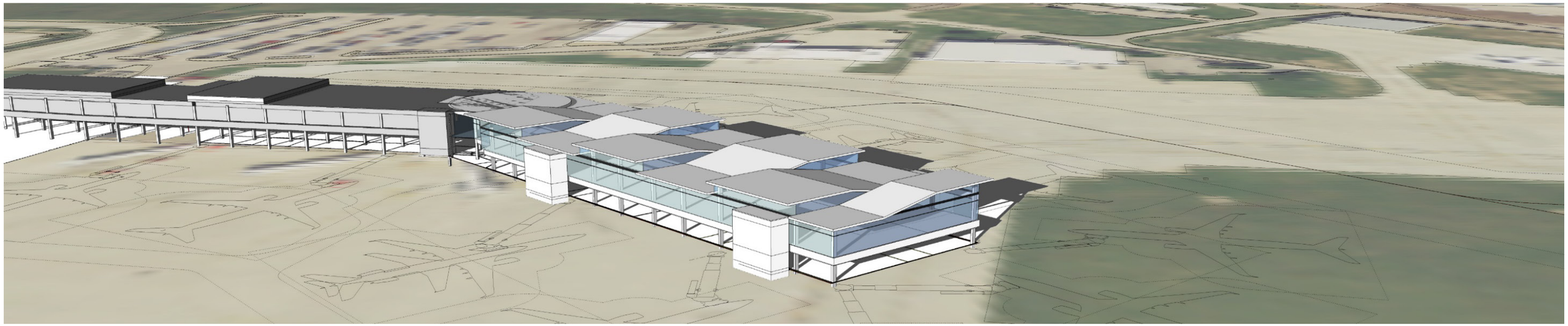


04 CONCEPTUAL DESIGN

PREFERRED OPTION



CONCEPTUAL MASSING OPTION 1: CENTRAL CLERESTORY



CONCEPTUAL MASSING OPTION 2: STEPPED ROOF

05 ROUGH ORDER OF MAGNITUDE (ROM) COSTING

05 ROM COSTING

PREFERRED OPTION

ROM COSTING SUMMARY

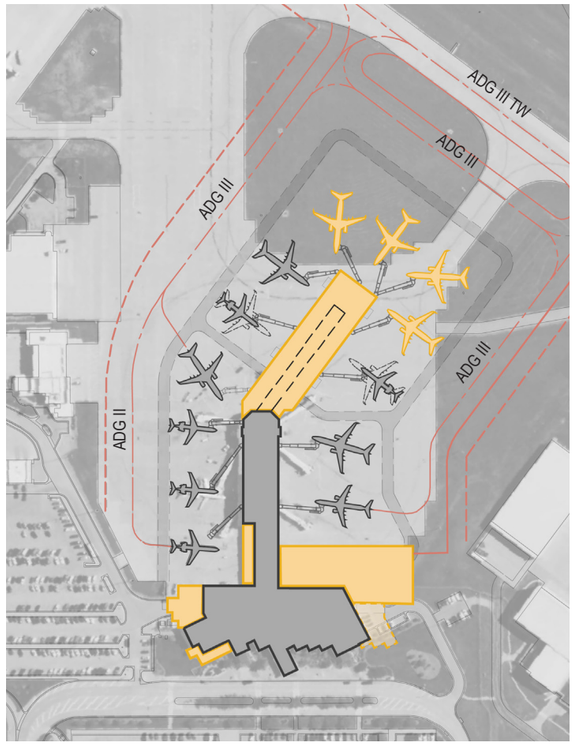
High-level Rough Order of Magnitude (ROM) costs were developed for both the Full Build Concourse and Terminal Expansion Option along with a separate estimate for the Reduced Concourse Build Option. (Larger scale versions of the Full Build and Reduced Build concourse options graphics shown at right are included on pages 14 and 15). Each include “Low” and “High” unit costs providing a range of probable costs for the project. These high-level unit costs were provided based on comparable Alliiance projects throughout the country and pertain to the building and baggage handling systems only. Any civil site and similar work will be addressed in the Master Plan. These costs represent 2021 construction dollars without escalation.

The ROM costs are broken down into three main categories:

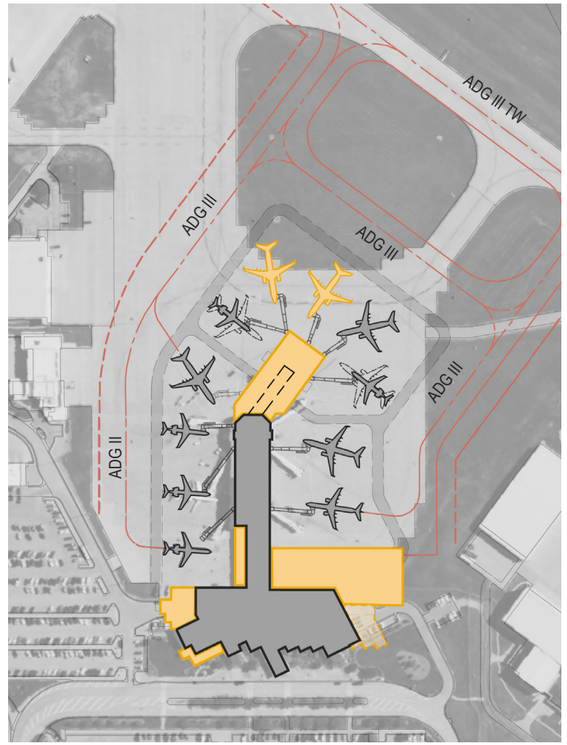
1. **New Concourse**: Includes building expansion, small TSA SSCP building infill expansion; existing concourse and SSCP renovations; existing PBB relocation/installation; new PBB installation and associated GSE services.
2. **Terminal Expansion**: Includes ticket counter renovations and associated ceiling; HVAC; flooring and ATO space; EDS Baggage Screening and Makeup building addition; baggage handling conveyance and make-up devices; Arrivals Hall expansion including baggage claim device; rental car relocation; and loading dock as well as miscellaneous renovations.
3. **Administration & Concessions**: Includes Retail, Food & Beverage remodel; Administration expansion and remodel; and miscellaneous renovations.

Total program costs include the following:

- Direct costs
- Twenty-percent soft costs added to project construction direct costs
- TSA reimbursables



FULL BUILD OPTION



REDUCED BUILD OPTION

05 ROM COSTING

PREFERRED OPTION

Project	QTY	Unit	Unit Cost Low	Unit Cost High	Estimate Low	Estimate High
NEW CONCOURSE EXPANSION						
New Concourse (includes 20% additional apron level tempered space)	42,754	SF	$450	$600	$ 19,239,120	$ 25,652,160
SSCP Building Expansion	3,737	SF	$350	$500	$ 1,307,950	$ 1,868,500
Existing Concourse Renovations (including renovations at SSCP)	26,260	SF	$100	$200	$ 2,626,000	$ 5,252,000
Passenger Boarding Bridge (PBB) Relocation	2	EA	$75,000	$150,000	$ 150,000	$ 300,000
New PBB (Including foundations, PCA, GPU)	5	EA	$700,000	$1,000,000	$ 3,500,000	$ 5,000,000
Subtotal Direct Costs	*72,751*	*SF*			*$ 26,823,070*	*$ 38,072,660*
TERMINAL EXPANSION						
Ticket Counter Renovations (counters, ATO, ceiling, HVAC, flooring)	12,750	SF	$100	$200	$ 1,275,000	$ 2,550,000
EDS Baggage Screening & Makeup Expansion (building expansion)	35,344	SF	$250	$350	$ 8,836,000	$ 12,370,400
Baggage Handling Equipment (ticket counter conveyor lines, oversize line, sortation conveyor lines, 2 make-up devices)	1	LS	$4,750,000	$4,750,000	$ 4,750,000	$ 4,750,000
Arrivals Hall Expansion (bag laydown, loading dock, car rental relocation)	8,760	SF	$350	$450	$ 3,066,000	$ 3,942,000
New Flat Plate Baggage Claim Device	1	EA	$400,000	$400,000	$ 400,000	$ 400,000
Miscellaneous Renovations (renovations at baggage hall/old car rentals and adjacent to ticket counters)	20,793	SF	$100	$200	$ 2,079,300	$ 4,158,600
Subtotal Direct Costs	*77,647*	*SF*			*$ 20,406,300*	*$ 28,171,000*
ADMINISTRATION & CONCESSIONS						
Retail, Food & Beverage Remodel	2,730	SF	$100	$200	$ 273,000	$ 546,000
Administration Expansion & Remodel	40,008	SF	$100	$200	$ 4,000,800	$ 8,001,600
Misc Renovations (renovations to open area adjacent to concessions)	5,915	SF	$100	$200	$ 591,500	$ 1,183,000
Subtotal Direct Costs	*48,653*	*SF*			*$ 4,865,300*	*$ 9,730,600*
DIRECT COST TOTAL	199,051	SF	$262	$382	$ 52,094,670	$ 75,974,260
SOFT COSTS	20%				$ 10,418,934	$ 15,194,852
OWNER CONTINGENCY	10%				$ 5,209,467	$ 7,597,426
TOTAL AIRPORT PROJECT COST					**$ 67,723,071**	**$ 98,766,538**
TSA REIMBURSABLE						
CBIS/CBRA Conveyance	*1*	*LS*	*$8,250,000*		*$8,250,000*	
3rd EDS Shunt Line	*1*	*LS*	*$2,600,000*		*$2,600,000*	
HVAC, Fire Protection, UPS, Interior Construction for CBRA/OSR	*TBD*	*%*			*TBD*	
Direct Costs					*$10,850,000*	
Soft Costs	*20%*				*$2,170,000*	
Total TSA Reimbursable					*$13,020,000*	
TOTAL PROGRAM COST					**$ 80,743,071**	**$ 111,786,538**

ROM COSTS: FULL BUILD

Project	QTY	Unit	Unit Cost Low	Unit Cost High	Estimate Low	Estimate High
NEW CONCOURSE EXPANSION						
New Concourse (includes 20% additional apron level tempered space)	23,784	SF	$450	$600	$ 10,702,800	$ 14,270,400
SSCP Building Expansion	3,737	SF	$350	$500	$ 1,307,950	$ 1,868,500
Existing Concourse Renovations (including renovations at SSCP)	26,260	SF	$100	$200	$ 2,626,000	$ 5,252,000
Passenger Boarding Bridge (PBB) Relocation	2	EA	$75,000	$150,000	$ 150,000	$ 300,000
New PBB (Including foundations, PCA, GPU)	3	EA	$700,000	$1,000,000	$ 2,100,000	$ 3,000,000
Subtotal Direct Costs	*53,781*	*SF*			*$ 16,886,750*	*$ 24,690,900*
TERMINAL EXPANSION						
Ticket Counter Renovations (counters, ATO, ceiling, HVAC, flooring)	12,750	SF	$100	$200	$ 1,275,000	$ 2,550,000
EDS Baggage Screening & Makeup Expansion (building expansion)	35,344	SF	$250	$350	$ 8,836,000	$ 12,370,400
Baggage Handling Equipment (ticket counter conveyor lines, oversize line, sortation conveyor lines, 2 make-up devices)	1	LS	$4,750,000	$4,750,000	$ 4,750,000	$ 4,750,000
Arrivals Hall Expansion (bag laydown, loading dock, car rental relocation)	8,760	SF	$350	$450	$ 3,066,000	$ 3,942,000
New Flat Plate Baggage Claim Device	1	EA	$400,000	$400,000	$ 400,000	$ 400,000
Miscellaneous Renovations (renovations at baggage hall/old car rentals and adjacent to ticket counters)	20,031	SF	$100	$200	$ 2,003,100	$ 4,006,200
Subtotal Direct Costs	*76,885*	*SF*			*$ 20,330,100*	*$ 28,018,600*
ADMINISTRATION & CONCESSIONS						
Retail, Food & Beverage Remodel	2,730	SF	$100	$200	$ 273,000	$ 546,000
Administration Expansion & Remodel	40,008	SF	$100	$200	$ 4,000,800	$ 8,001,600
Misc Renovations (renovations to open area adjacent to concessions)	5,915	SF	$100	$200	$ 591,500	$ 1,183,000
Subtotal Direct Costs	*48,653*	*SF*			*$ 4,865,300*	*$ 9,730,600*
DIRECT COST TOTAL	179,319	SF	$235	$348	$ 42,082,150	$ 62,440,100
SOFT COSTS	20%				$ 8,416,430	$ 12,488,020
OWNER CONTINGENCY	10%				$ 4,208,215	$ 6,244,010
TOTAL AIRPORT PROJECT COST					**$ 54,706,795**	**$ 81,172,130**
TSA REIMBURSABLE						
CBIS/CBRA Conveyance	*1*	*LS*	*$8,250,000*		*$8,250,000*	
3rd EDS Shunt Line	*1*	*LS*	*$2,600,000*		*$2,600,000*	
HVAC, Fire Protection, UPS, Interior Construction for CBRA/OSR	*TBD*	*%*			*TBD*	
Direct Costs					*$10,850,000*	
Soft Costs	*20%*				*$2,170,000*	
Total TSA Reimbursable					*$13,020,000*	
TOTAL PROGRAM COST					**$ 67,726,795**	**$ 94,192,130**

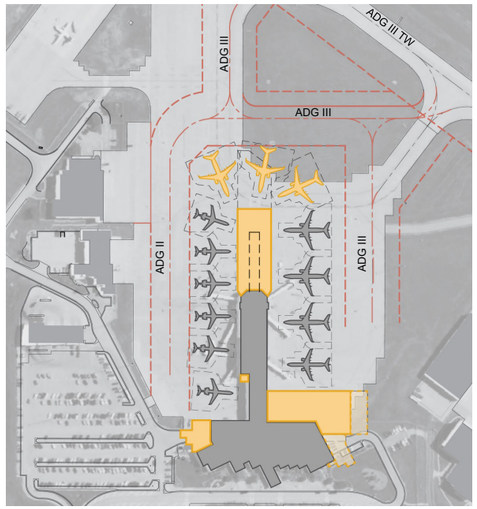
ROM COSTS: REDUCED BUILD

APPENDIX

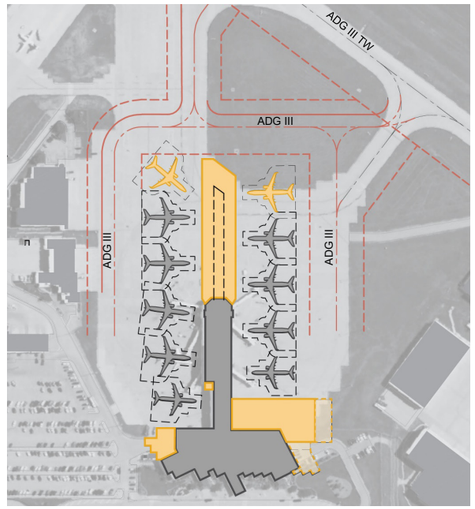
APPENDIX

INITIAL OPTIONS — LINEAR

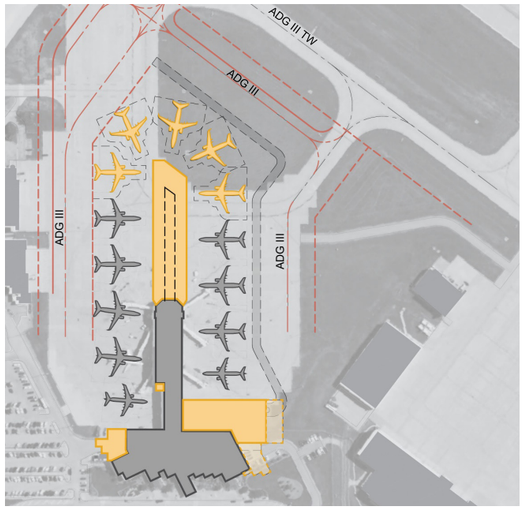
At right are the initial linear-based options that were studied relative to the site layout of the concourse expansion.



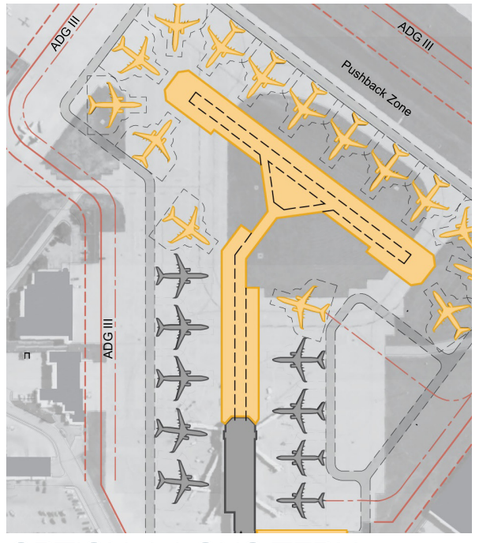
OPTION 1: INITIAL



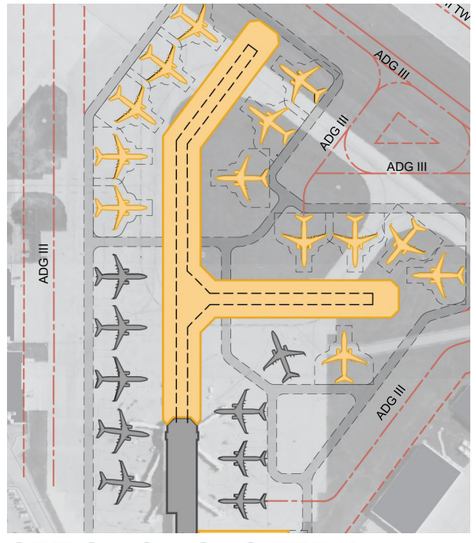
OPTION 1.1: INITIAL



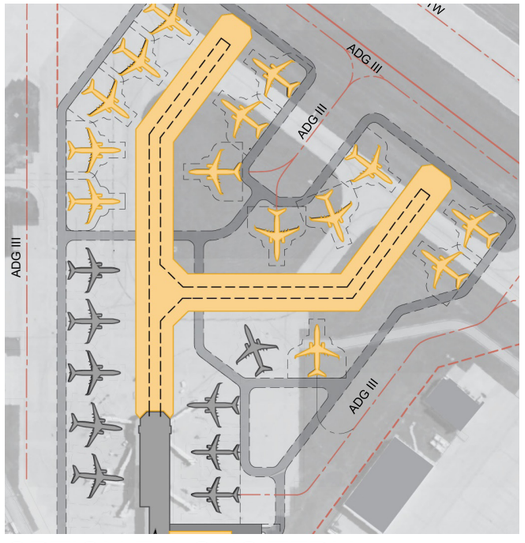
OPTION 1.2: INITIAL



OPTION 4: LONG TERM



OPTION 6: LONG TERM

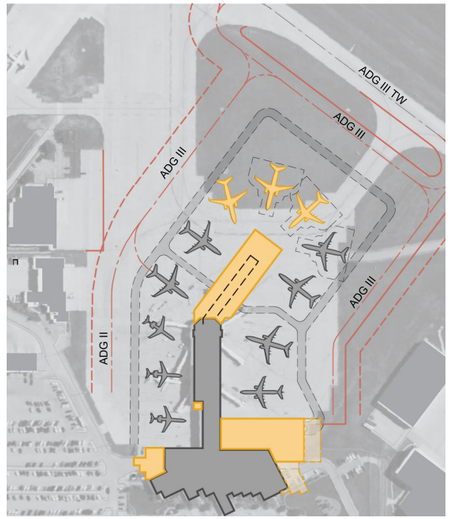


OPTION 7: LONG TERM

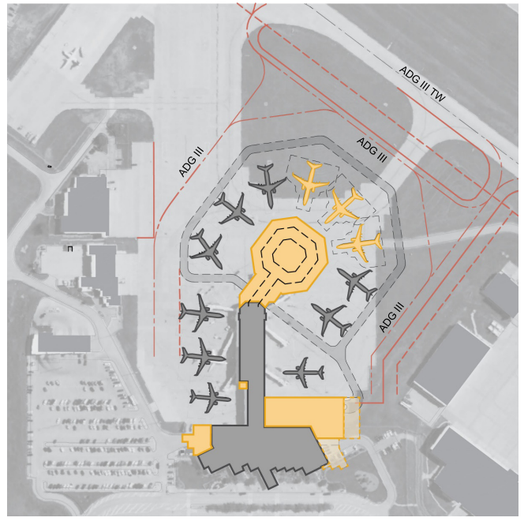
APPENDIX

INITIAL OPTIONS — DOG-LEG

At right are the initial “dog leg” options that were studied relative to the site layout of the concourse expansion.



OPTION 2: INITIAL



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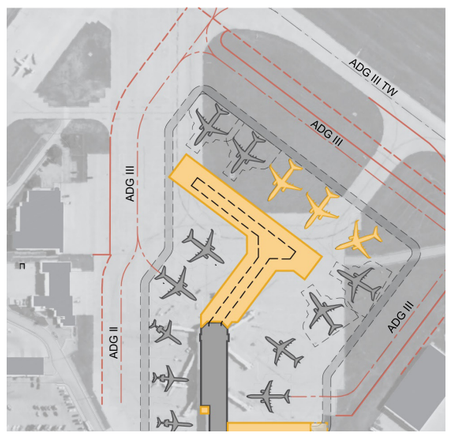
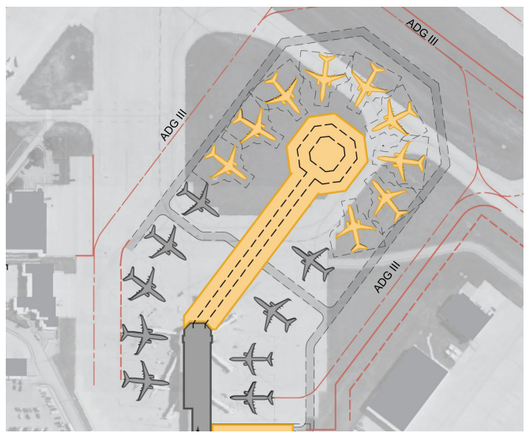
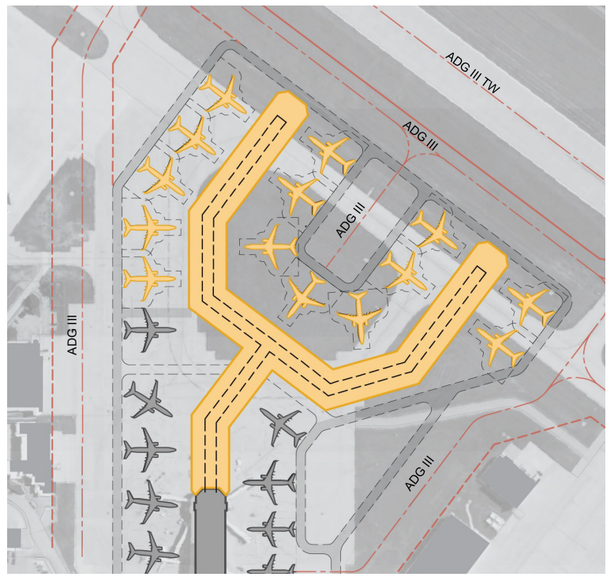


OPTION 2.1: LONG TERM



OPTION 2.2: LONG TERM



OPTION 5: LONG TERM

APPENDIX

ATCT LINE OF SIGHT: PREFERRED OPTION

At right are diagrams corresponding to those on page 17. Figures 1 and 2 depict the view from the ATCT for the larger aircraft operating out of RAP for the Preferred Option, both Full Build and Reduced Build. Figure 3 depicts the view from the ATCT for the Preferred Option, Full Build for smaller aircraft parked at the concourse. Figure 4 represents Preferred Option ATCT Line of Sight shadow analysis for small aircraft.

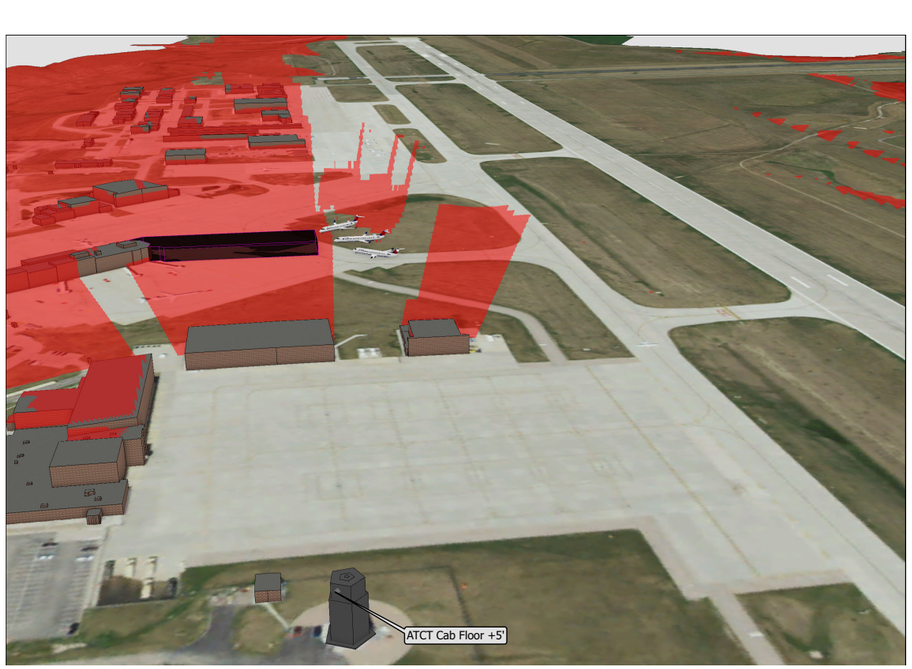


FIGURE 4: LINE-OF-SIGHT SHADOWS: PREFERRED OPTION FULL BUILD — SMALL AIRCRFT — ESTIMATED

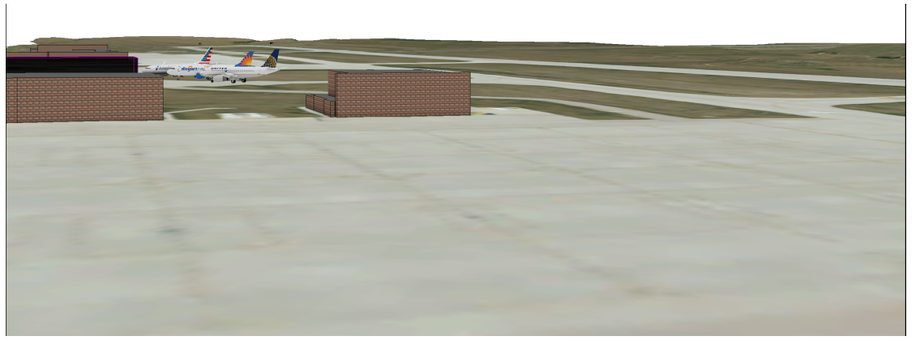


FIGURE 1: VIEW FROM ATCT: PREFERRED OPTION FULL BUILD

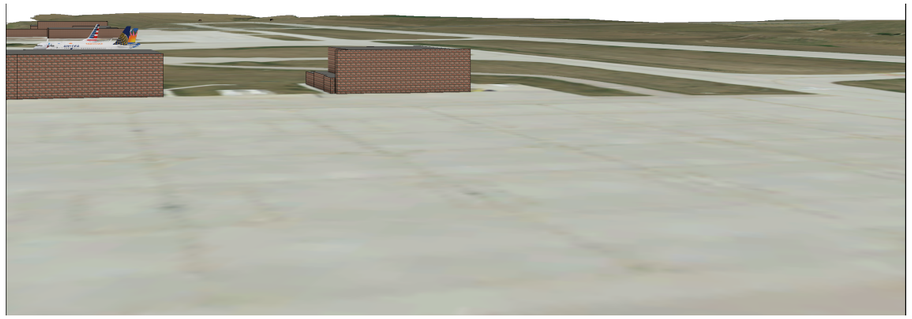


FIGURE 2: VIEW FROM ATCT: PREFERRED OPTION REDUCED BUILD

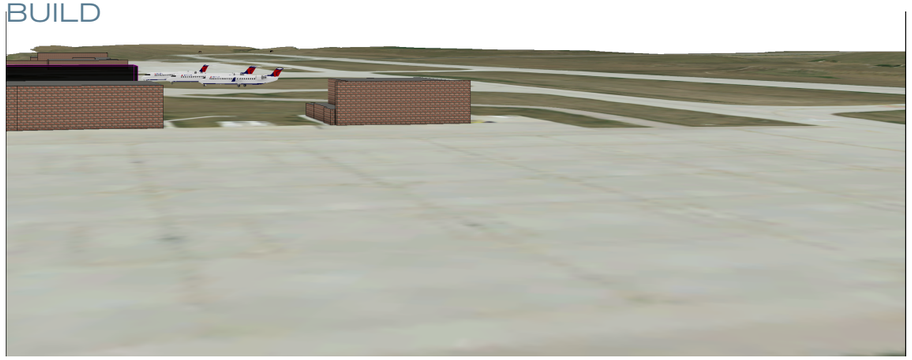
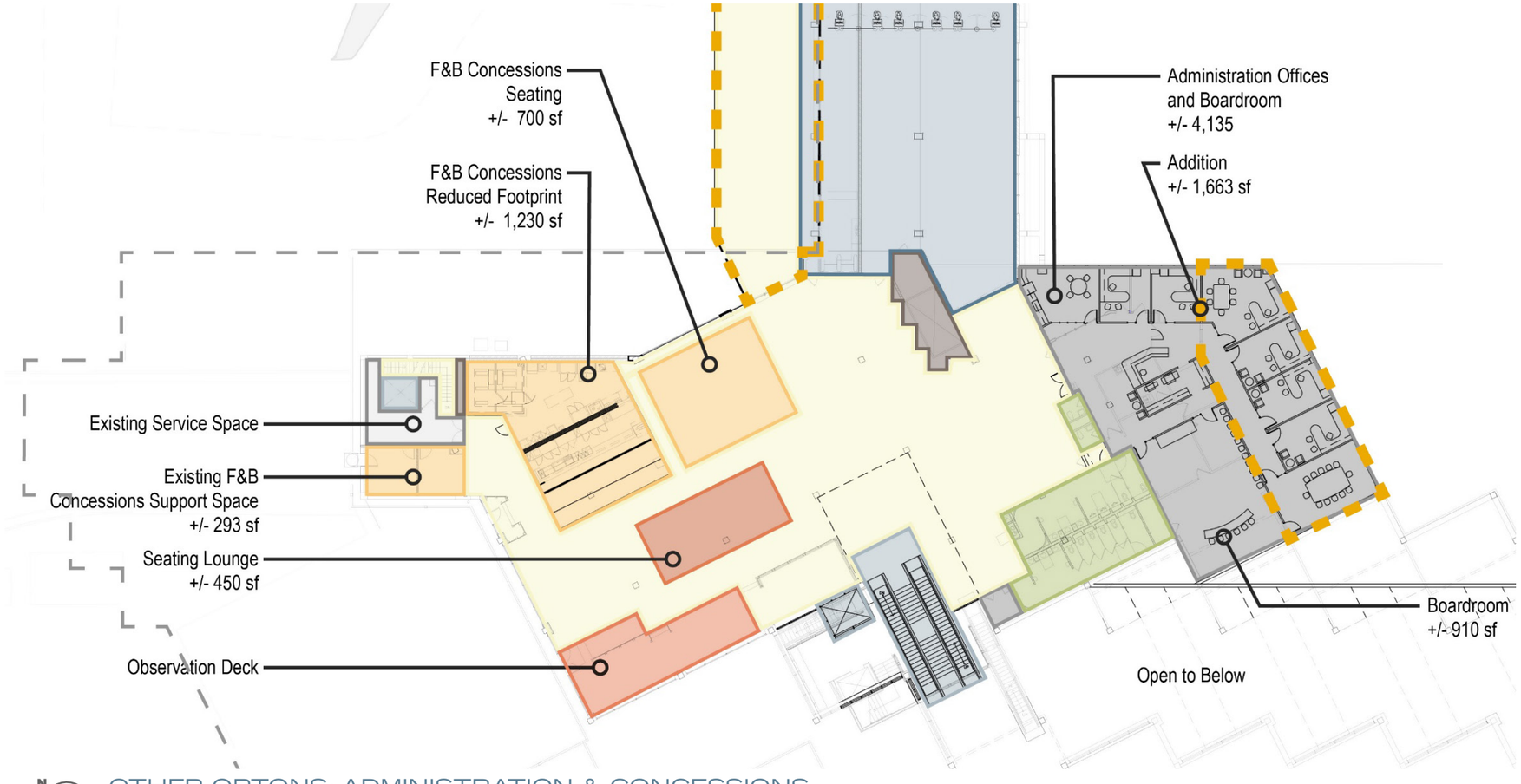


FIGURE 3: VIEW FROM ATCT: PREFERRED OPTION FULL BUILD — SMALL AIRCRAFT

OTHER OPTIONS: ADMINISTRATION SUITE AND CONCOURSE LEVEL PRE-SECURITY COMMONS

Two additional options for the Administration Suite and three additional options for the Pre-Security Commons were considered. Ultimately the addition of the Arrivals corridor opened up the area previously required for entry to the Security Checkpoint for expansion of the Administration Suite and a Board Room within a single space.



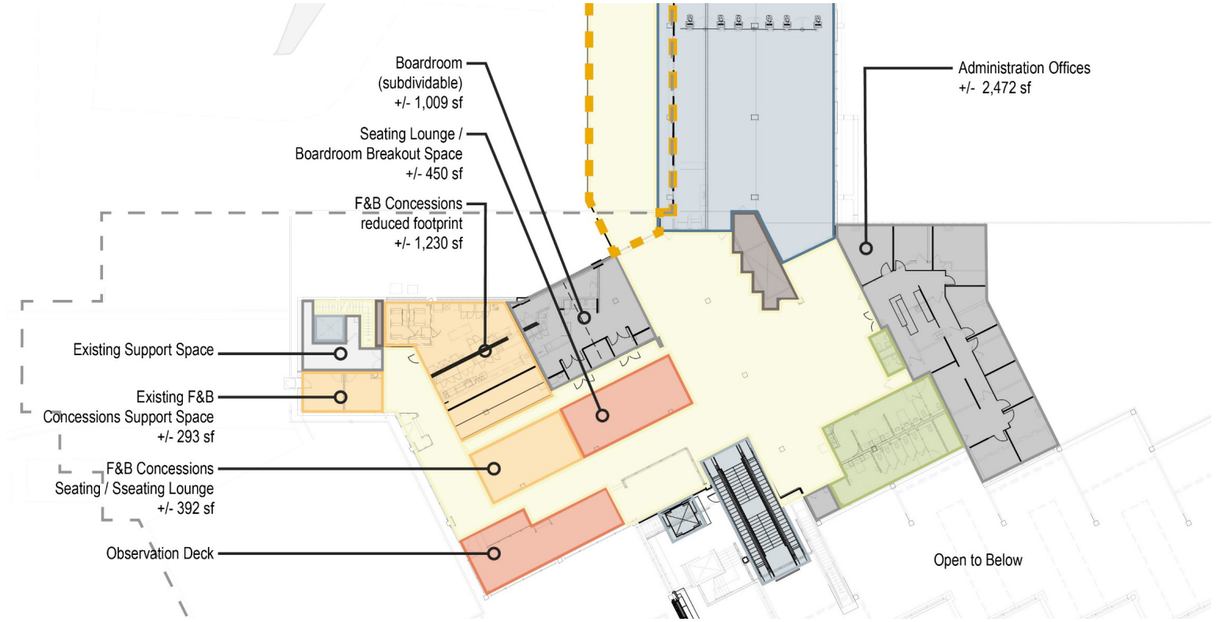
Color Key Legend

- Gate Holdroom
- Circulation
- Concessions (F & B, Retail)
- Passenger Amenity Space
- Restrooms
- Program Space (Support, Operations, etc.)
- Vertical Circulation
- TSA Lease Space
- Security Screening Checkpoint / Queuing
- Baggage Handling
- Airlines / Car Rentals
- Building Support (Mech, Elec, etc.)
- Unassigned
- Existing

N

OTHER OPTONS: ADMINISTRATION & CONCESSIONS - OPTION 1

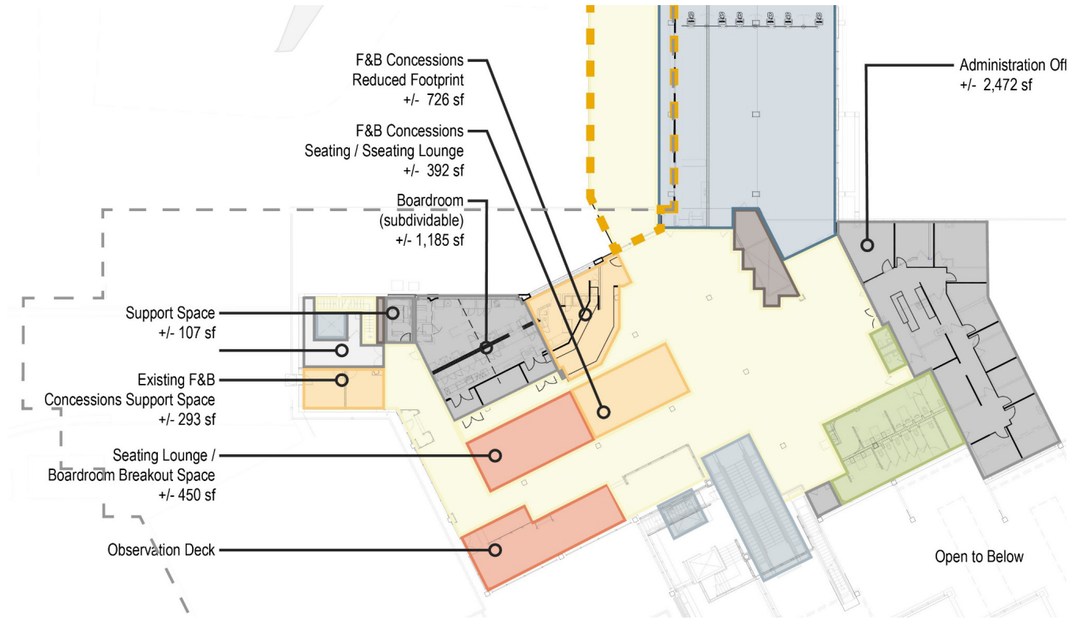
Not to Scale



N

OTHER OPTIONS: ADMINISTRATION & CONCESSIONS - OPTION 2

Not to Scale



N

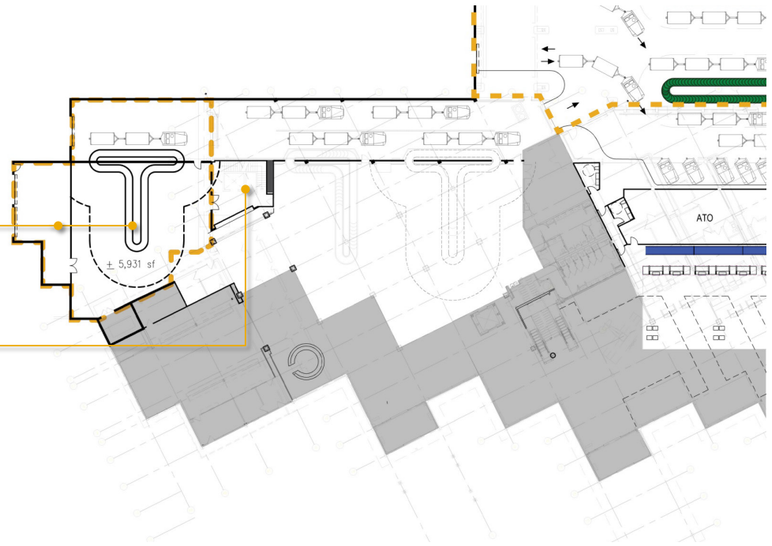
OTHER OPTIONS: ADMINISTRATION & CONCESSIONS - OPTION 3

Not to Scale

APPENDIX

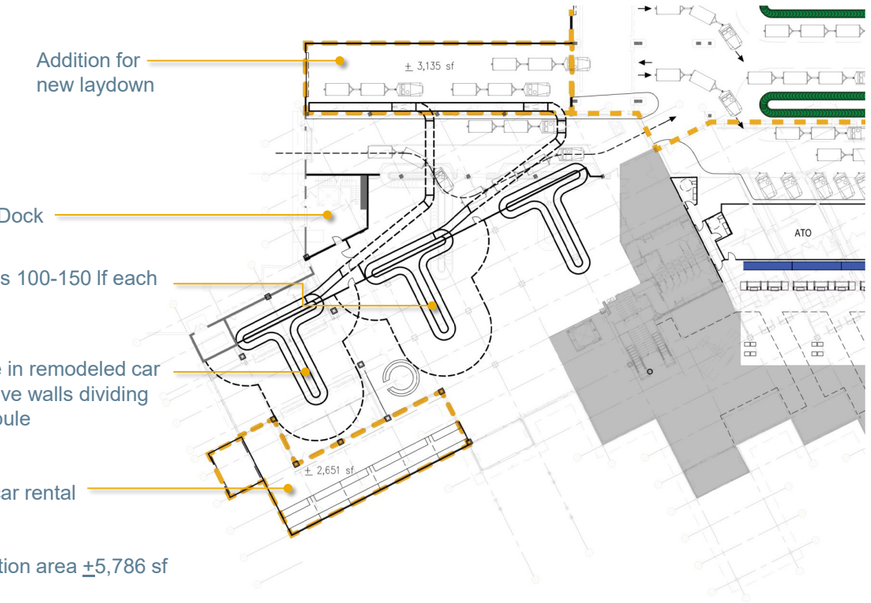
OTHER OPTIONS: BAGGAGE CLAIM AND LAYDOWN

Two additional options for the Baggage Claim and Laydown areas. Option A did not address the congestion around the existing devices and presented visibility and congestion concerns. Option B preserved the existing loading dock but created significant costs related to the conveyor systems required to support the new claim device locations and also did not provide sufficient relief of the congestion issues within the claim hall.



OTHER OPTIONS: BAGGAGE CLAIM AND LAYDOWN - OPTION A

Not to Scale



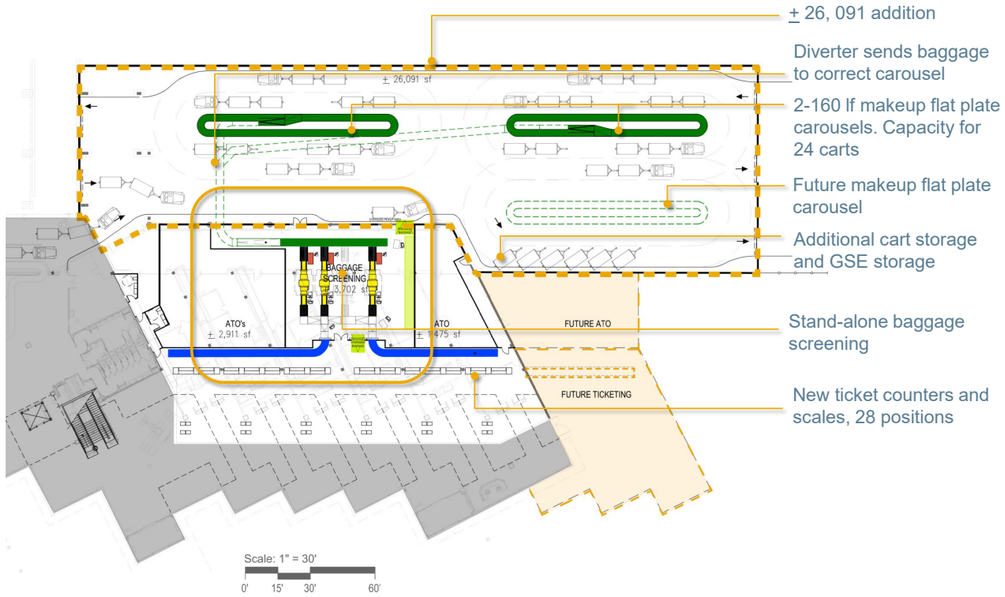
OTHER OPTIONS: BAGGAGE CLAIM AND LAYDOWN - OPTION B

Not to Scale

APPENDIX

OTHER OPTIONS: EDS BAGGAGE SCREENING

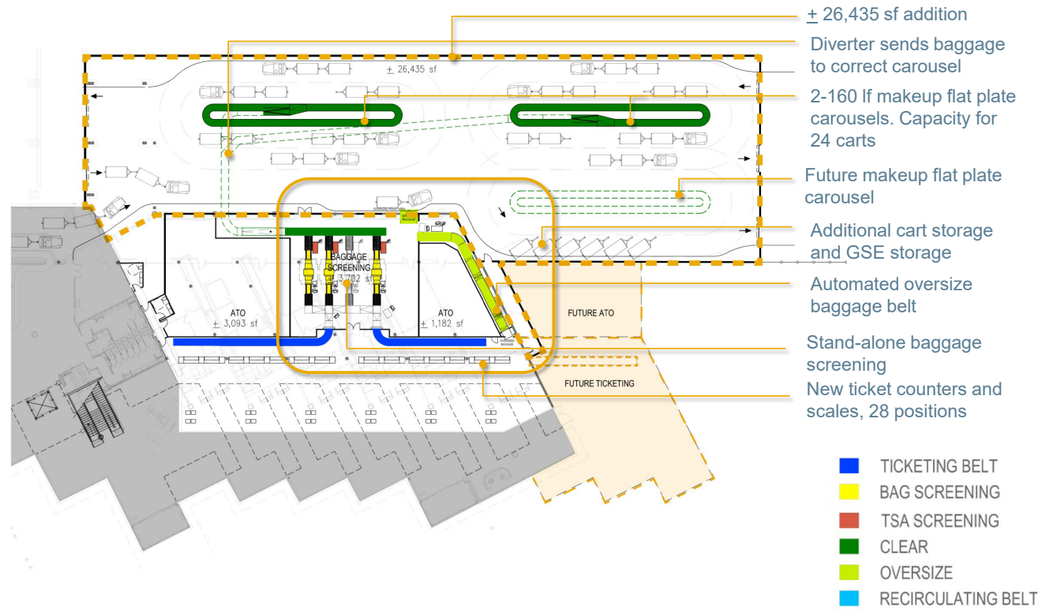
A consolidated stand-alone baggage screening system was considered, but is not an approved screening system supported by the TSA.



N

OTHER OPTIONS: EDS BAGGAGE SCREENING - OPTION D.1

Not to Scale



N

OTHER OPTIONS: EDS BAGGAGE SCREENING - OPTION D.1.1

Not to Scale

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