Appendix A - Glossary of Terms

Introduction

Combing the extremely technical language of airports and aviation with the bureaucratic language of government organizations can create a myriad of unusual words and term. In addition, this combination of technical language and "governmentese" often results in many short-hand phrases or acronyms. This appendix discusses many of the terms used throughout the master plan as well as many of the acronyms used.

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: External publications issued by the FAA consisting of non-regulatory material providing for the recommendations relative to a policy, guidance, and information relative to a specific aviation subject. However, the recommendations in these publications are considered mandatory requirements for airports that have received federal grants.

AIR CARRIER: An operator which: (1) performs at least five round trips per week between two or more points and publishes flight schedules which specify the times, days of the week, and places between which such flights are performed; or (2) transports mail by air pursuant to 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 the airport property designed to protect all aspects related to 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 the stall speed in their landing configuration at their maximum certificated landing weight. The 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): A service and facility located at an airport 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 which contains the facilities necessary for the operation of aircraft.

AIRLINE HUB: A categorization of commercial service airports or group of commercial service airports in a metropolitan or urban area based upon the proportion of annual national

enplanements existing at the airport or airports. The categories are large hub, medium hub, small hub, or non-hub. It forms the basis for the apportionment of entitlement funds.

AIRPLANE DESIGN GROUP (ADG): A grouping of aircraft based upon wingspan. The groups are as follows:

- 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 public 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 which displays a rotating light beam to identify the type of airport.

AIRPORT CAPITAL IMPROVEMENT PLAN (ACIP): The planning program used by the Federal Aviation Administration to identify, prioritize, and distribute funds for airport development and the needs of the National Airspace System to meet specified 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 drawing of the airport showing boundaries and proposed additions to all areas owned or controlled by the sponsor for airport purposes, 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 thereto.

AIRPORT MASTER PLAN: A long-range plan for the development of an airport, including descriptions of the data and analyses on which the plan is based.

AIRPORT MOVEMENT AREA SAFETY SYSTEM (AMASS): A system that provides automated alerts and warnings of potential runway incursions or other hazardous aircraft movement events.

AIRPORT OBSTRUCTION CHART: A scaled drawing depicting the Federal Aviation Regulation (FAR) Part 77 surfaces, a representation of objects that penetrate these surfaces, runway, taxiway, and ramp areas, navigational aids, buildings, roads and other details in the vicinity of an airport.

AIRPORT REFERENCE CODE (ARC): A coding system used to relate airport design criteria to the operational (Aircraft Approach Category) to the physical characteristics (Airplane Design Group) of the airplanes intended to operate at the airport.

AIRPORT REFERENCE POINT (ARP): The latitude and longitude of the approximate center of the airport.

AIRPORT SPONSOR: The entity that is legally responsible for the management and operation of an airport, including the fulfillment of the requirements of laws and regulations related thereto.

AIRPORT SURFACE DETECTION EQUIPMENT (ASDE): A radar system that provides air traffic controllers with a visual representation of the movement of aircraft and other vehicles on the ground on the airfield at an airport.

AIRPORT SURVEILLANCE RADAR (ASR): The primary radar located at an airport or in an air traffic control terminal area that receives a

signal at an antenna and transmits the signal to air traffic control display equipment defining the location of aircraft in the air. The signal provides only 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/ground communications and/or radar, visual signaling and other devices 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 NextGen. AGIS provides standards for surveying and data collection to assist the FAA in the development of instrument approaches as well as providing 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 that contains the facilities necessary for the operation of aircraft.

AIRSPACE: The volume of space above the surface of the ground that is provided for the 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 organization for the purpose of providing for the safe, orderly, and expeditious flow of air traffic.

AIR TRANSPORT ASSOCIATION OF AMERICA (ATA): An organization consisting of the principal U.S. airlines that represents the interests of the airline industry on major aviation issues before federal, state, and local government bodies. It promotes air transportation safety by coordinating industry and governmental safety programs and it 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 which 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: An imaginary obstruction limiting surface defined in FAR Part 77 which is longitudinally centered on an extended runway centerline and extends outward and upward from the primary surface at each end of a runway at a designated slope and distance based upon the type of available or planned approach by aircraft to a runway.

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 that remains within the coverage area of navigational sources being used.

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 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 which senses and indicates the direction to a non-directional radio beacon (NDB) ground transmitter.

AVIGATION EASEMENT: A contractual right or a property interest in land over which a right of unobstructed 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: A 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. 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 adjacent to the end of a runway for the purpose of eliminating the erosion of the ground surface by the wind forces produced by airplanes at the initiation of takeoff operations.

BUILDING RESTRICTION LINE (BRL): A line on an airport layout plan beyond which airport buildings must not be position in order to limit their proximity to aircraft movement areas.

CAPITAL IMPROVEMENT PLAN (CIP): A program for the design and construction of airport improvements necessary to accommodate the operational and passenger levels of the airport.

CARGO SERVICE AIRPORT: An airport served by aircraft providing air transportation of property only, including mail, with an annual aggregate landed weight of at least 100,000,000 pounds.

CATEGORY I ILS: An Instrument Landing System (ILS) that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 100 feet above the horizontal plane containing the runway threshold.

CATEGORY II ILS: An ILS that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 50 feet above the horizontal plane containing the runway threshold.

CATEGORY III ILS: An ILS that provides acceptable guidance information to a pilot from

the coverage limits of the ILS with no decision height specified above the horizontal plane containing the runway threshold.

CEILING: The height above the ground surface to the location of the lowest layer of clouds which is reported as either broken or overcast.

CIRCLING APPROACH: A maneuver initiated by the pilot to align the aircraft with the runway for landing when flying a predetermined circling instrument approach under IFR.

CLASS A AIRSPACE: See Controlled Airspace

CLASS B AIRSPACE: See Controlled Airspace.

CLASS C AIRSPACE: See Controlled Airspace.

CLASS D AIRSPACE: See Controlled Airspace.

CLASS E AIRSPACE: See Controlled Airspace.

CLASS 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 identified in the appropriate aeronautical chart which is 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 one or two of the marker sites.

CONICAL SURFACE: An imaginary obstruction-limiting 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.

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 in accordance with the airspace classification. 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. All persons 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 air space and is designed to contain all published instrument approach procedures to the airport. An air traffic control clearance is required for all aircraft to operate in the area.

• **CLASS C**: Generally, the airspace from the surface to 4,000 feet above the airport elevation (charted 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 (charted as MSL) surrounding those 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 persons 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: A flight path at right angles to the landing runway off its upwind end. 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 end of the runway surface at which a decision must be made by a pilot during the ILS or Precision Approach Radar approach to either continue the approach or to execute a missed approach.

DECLARED DISTANCES: The distances declared available for the airplane's takeoff runway, takeoff distance, accelerate-stop distance, and landing distance requirements. The distances are:

• **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 acceleration and 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 cabinet-level federal government organization consisting of modal operating agencies, such as 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 based upon 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 designated beginning of the runway.

DISTANCE MEASURING EQUIPMENT (DME): Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.

DNL: The 24-hour average sound level, in A-weighted decibels, obtained after the addition of ten decibels to sound levels for the periods between 10 PM and 7 AM as averaged over a span of one year. It is the FAA standard metric for determining the cumulative exposure of individuals to noise.

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. Also see "traffic pattern."

EASEMENT: The legal right of one party to use a portion of the total rights in real estate owned by another party. This may include the right of passage over, on, or below the property; certain air rights above the property, including view rights; and the rights to any specified form of development or activity, as well as any other legal rights in the property that may be 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 aircraft, including originating, stop-over, and transfer passengers, in scheduled and non-scheduled services.

ENPLANEMENT: The boarding of a passenger, cargo, freight, or mail on an aircraft at an airport.

ENTITLEMENT: Federal funds for which a commercial service airport may be eligible based upon its annual passenger enplanements.

ENVIRONMENTAL ASSESSMENT (EA): An environmental analysis per formed pursuant to the National Environmental Policy Act to determine whether an action would significantly affect the environment and thus require a more detailed environmental impact statement.

ENVIRONMENTAL AUDIT: An assessment of the current status of a party's compliance with applicable environmental requirements of an authority's environmental compliance policies, practices, and controls.

ENVIRONMENTAL IMPACT STATEMENT (EIS): A document required of federal agencies by the National Environmental Policy Act for major projects or legislative proposals affecting the environment. It is a tool for decision-making describing the positive and negative effects of a proposed action and citing alternative actions.

ESSENTIAL AIR SERVICE (EAS): A federal program which guarantees air carrier service to selected small cities by providing subsidies as needed to prevent these cities from losing such service.

FEDERAL AVIATION REGULATIONS (FAR): The general and permanent rules established by the executive departments and agencies of the Federal Government for aviation, which are published in the Federal Register. These are the aviation subset of the Code of Federal Regulations.

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. 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 users of an airport. Such services include, but are not limited to, aircraft storage, fueling, flight training, repair, and maintenance.

FLIGHT LEVEL: A designation for altitude within controlled airspace.

FLIGHT SERVICE STATION (FSS): An operations facility in the national flight advisory system which utilizes data interchange facilities for the collection and dissemination of Notices to Airmen, weather, and administrative data and

which provides pre-flight and in-flight advisory services to pilots through air and ground based communication facilities.

FRANGIBLE NAVAID: A navigational aid which 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 which encompasses all facets of aviation except commercial or military aircraft.

GLIDESLOPE (GS): An electronic component of an ILS system that emits signals which provide vertical guidance by reference to airborne instruments during instrument approaches Provides vertical guidance for aircraft during approach and landing.

GLOBAL POSITIONING SYSTEM (GPS): A system of 24 satellites used as reference points to enable 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 classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

HIGH-SPEED EXIT TAXIWAY: A long radius taxiway designed to expedite aircraft turning off the runway after landing (at speeds up to 60 knots), thus reducing runway occupancy time.

HORIZONTAL SURFACE: An imaginary obstruction-limiting surface defined in FAR Part 77 that is specified as a portion of a horizontal plane surrounding a runway located 150 feet above the established airport elevation. The specific horizontal dimensions of this surface are a function of the types of approaches existing or planned for the runway.

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 for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to 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 aircraft is operating.

INSTRUMENT LANDING SYSTEM (ILS): A precision instrument approach system which normally consists of the following electronic components and visual aids:

1. Localizer.
2. Glide Slope
3. Outer Marker
4. Middle Marker
5. Approach lights

INSTRUMENT METEOROLOGICAL CONDITIONS (IMC): Meteorological conditions expressed in terms of 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 an area 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 that are based at the airport and that operate in the local traffic pattern or within sight of the airport, that are 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 which provides course guidance to the runway.

LOCALIZER TYPE DIRECTIONAL AID (LDA): A facility of comparable utility and accuracy to a localizer, but is not part of a complete ILS and is 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 classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

MEDIUM INTENSITY RUNWAY LIGHTS MIRL: The middle classification in terms of intensity or brightness for lights designated for use in delineating the sides of a runway.

MICROWAVE LANDING SYSTEM (MLS): An instrument approach and landing system that provides precision guidance in azimuth, elevation, and distance measurement.

MILITARY OPERATIONS: Aircraft operations that are performed in military aircraft.

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 affected, and occurring normally:

1. When the aircraft has descended to the decision height and has not established visual contact; or
2. When directed by air traffic control to pull up or to go around again.

MOVEMENT AREA: The runways, taxiways, and other areas of an airport which are utilized for

taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those 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 length used in navigation which is equivalent to the distance spanned by one minute of arc in latitude, that is, 1,852 meters or 6,076 feet. It is equivalent to approximately 1.15 statute mile.

NAVIGATIONAL AID (NAVAID): A term used to describe any electrical or visual air navigational aids, lights, signs, and associated supporting equipment (e.g., PAPI, VASI, ILS, etc.).

NEXT GENERATION AIR TRANSPORTATION SYSTEM (NextGen): An umbrella term for the FAA's ongoing transformation for 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 beacon transmitting nondirectional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his or her bearing to and from the radio beacon and home on, or track to, the station. When the radio beacon is installed in conjunction with the Instrument Landing System marker, it is normally called a Compass Locator.

NON-PRECISION APPROACH PROCEDURE: A standard instrument approach procedure in which horizontal but no vertical course guidance is provided, such as VOR, TACAN, NDB, or LOC.

NOTICE TO AIRMEN (NOTAM): A notice containing information concerning the establishment, condition, or change in any component of or hazard in the National Airspace System, the timely knowledge of which is considered essential to personnel concerned with flight operations.

OBJECT FREE AREA (OFA): An area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

OBSTACLE FREE ZONE (OFZ): The airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that 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, in order to provide clearance for aircraft landing or taking off from the runway, and for missed approaches.

OPERATION: A take-off or a landing.

OUTER MARKER (OM): An ILS navigation facility in the terminal area navigation system located four to seven miles from the runway edge on the extended centerline, indicating to the pilot that he/she is passing over the facility and can begin final approach.

PILOT CONTROLLED LIGHTING: Runway lighting systems at an airport that are controlled by activating the microphone of a pilot on a specified radio frequency.

PRECISION APPROACH: A standard instrument approach procedure which provides runway alignment and glide slope (descent) information. It is categorized as follows:

- **CATEGORY I (CAT I):** A precision approach which provides for approaches with a decision height of not less than 200 feet and visibility not less than 1/2 mile or Runway Visual Range (RVR) 2400 (RVR 1800) with operative touchdown zone and runway centerline lights.
- **CATEGORY II (CAT II):** A precision approach which provides for approaches with a decision height of not less than 100 feet and visibility not less than 1200 feet RVR.
- **CATEGORY III (CAT III):** A precision approach which provides for approaches with minima less than Category II.

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 behind the runway threshold that is 200 feet long by 800 feet wide. The POFA is a clearing standard which requires the POFA to be kept clear of above ground objects protruding above the runway safety area edge elevation (except for frangible NAVAIDS). 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: An imaginary obstruction limiting 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 types of approaches existing or planned for the runway.

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 navigational signal generated by a Very High Frequency Omni-directional Range (VOR) station that is measured as an azimuth from the station.

REGRESSION ANALYSIS: A statistical technique that seeks to identify and quantify the relationships between factors associated with a forecast.

REMOTE COMMUNICATIONS OUTLET (RCO): An unstaffed transmitter receiver/facility remotely controlled by air traffic personnel. RCOs serve flight service stations (FSSs). RCOs were 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 that serves general aviation aircraft which might otherwise use a congested air-carrier airport.

REQUIRED NAVIGATION PERFORMANCE (RNP): A type of performance-based navigation that allow an aircraft to fly a specific path between two 3D-defined points, fundamentally similar to RNAV. An RNP specification requires on-board navigation performance monitoring and alerting; an RNAV specification does not.

RESTRICTED AREA: See special-use airspace.

RNAV: Area navigation: airborne equipment which permits flights over determined tracks within prescribed accuracy tolerances with-out 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 would be designated Runway 18. The runway 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). Aircraft can takeoff or land from either end of a runway, depending upon wind direction.

RUNWAY ALIGNMENT INDICATOR LIGHT (RAIL): A series of high intensity sequentially flashing lights installed on the extended centerline of the runway 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, which provide rapid and positive identification of theapproach 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. Its dimensions are 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): An area on the airport to be kept clear of permanent objects so that there is an unobstructed line-of-site from any point five feet above the runway centerline to any point five feet above an intersecting runway centerline.

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

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 and typically do not meet the minimum standards for 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: A system of visual indicators designed to provide traffic pattern 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; support for aircraft running off the pavement; 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 wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. Special-use airspace classifications include:

• ALERT AREA: Airspace which 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 wherein 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 the flight of aircraft is prohibited.
• RESTRICTED AREA: Airspace designated under Federal Aviation Regulation (FAR) 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. 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 which may contain hazards to nonparticipating aircraft.

STANDARD INSTRUMENT DEPARTURE (SID): A preplanned coded air traffic control IFR departure routing, preprinted for pilot use in graphic and textual form only.

STANDARD TERMINAL ARRIVAL (STAR): A pre-planned coded air traffic control IFR arrival routing, preprinted for pilot use in graphic and textual or textual form only.

STOP-AND-GO: A procedure wherein an air craft will land, make a complete stop on the runway, and then commence a takeoff from that point. 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 that is designed to support an aircraft during an aborted takeoff without causing structural damage to the aircraft. It is not to be used for takeoff, landing, or taxiing by aircraft.

STRAIGHT-IN LANDING/APPROACH: A landing made on a runway 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 system which provides suitably-equipped aircraft 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 alongside 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: oneoperation 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 that is 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.

UNCONTROLLED AIRPORT: An airport without an airport traffic control tower at which the control of Visual Flight Rules traffic is not exercised.

UNCONTROLLED AIRSPACE: Airspace within which aircraft are not subject to air traffic control.

UNIVERSAL COMMUNICATION (UNICOM): A non-government communication facilitywhich may provide airport information at certain airports. Locations and frequencies of UNICOM's are shown on aeronautical charts and publications.

UPWIND LEG: A flight path parallel to the landing runway in the direction of landing. See "traffic pattern."

VECTOR: A heading issued to an aircraft to provide navigational guidance by radar.

VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE STATION (VOR): A ground-based electronic navigation aid transmitting very high frequency navigation signals, 360 degrees in azimuth, oriented from magnetic north. Used as the basis for navigation in the national air-space 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 VOR azimuth, TACAN azimuth, and TACAN distance-measuring equipment (DME) at one site.

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

VISUAL APPROACH: An approach wherein an aircraft on an IFR flight plan, operating in VFR conditions under the control of an air traffic control facility and having an air traffic control authorization, may proceed to the airport of destination in VFR conditions.

VISUAL APPROACH SLOPE INDICATOR (VASI): An airport lighting facility providing vertical visual approach slope guidance to aircraft during approach to landing by radiating a directional

pattern of high intensity red and white focused light beams which indicate to the pilot that he is on path if he sees red/white, above path if white/white, and below path if red/red. Some airports serving large aircraft have three-bar VASI's which provide two visual guide 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 thanminimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.

VISUAL METEOROLOGICAL CONDITIONS: Meteorological conditions expressed in terms of specific visibility and ceiling conditions which are 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

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

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 – Airport Master Plan Process

Introduction

An airport master plan is a comprehensive study of an airport and usually describes the short-, medium-, and long-term development plans to meet aviation demand. The elements of the master planning process will vary in complexity and level of detail, depending on the size, function, issues, and problems of the individual airport. This appendix describes the master planning process used by KLJ Engineering, Inc., a process that is based on the FAA's Advisory Circular 150/5070-6B *Airport Master Plans*.

Master Plan Process Overview

Airport master plans are prepared to support the modernization or expansion of existing airports or the creation of a new airport. When completed, the master plan documents the airport sponsor's plan or strategy for the development of the airport. It provides the framework needed to guide future airport development that will cost-effectively satisfy aviation demand, while considering potential environmental and socioeconomic impacts.

The master plan process is intended to meet the following objectives:

1. Document the issues the proposed development will address.
2. Justify the proposed development through the technical, economic, and environmental investigation of concepts and alternatives.
3. Provide an effective graphic presentation of the development of the airport and anticipated land uses in the vicinity of the airport.
4. Establish a realistic schedule for the implementation of the development proposed in the plan, particularly the short-term capital improvement program.
5. Propose an achievable financial plan to support the implementation schedule.
6. Provide sufficient project definition and detail for subsequent environmental evaluations that may be required before the project is approved.
7. Present a plan that adequately addresses the issues and satisfies local, state, and Federal regulations.
8. Document policies and future aeronautical demand to support municipal or local decisions on spending, debt, land use controls, and other policies necessary to preserve the integrity of the airport and its surroundings.
9. Set the stage and establish the framework for a continuing planning process that monitors key conditions and permits changes in plan recommendations as required.

KLJ uses an interactive process to conduct master plan studies. This process involves a variety of stakeholders as appropriate, including the airport sponsor's organization, airport users and tenants, the FAA and state aeronautical organizations, other resource and

governmental agencies, community groups, and the traveling public. See Attachment 1 for a flow chart depicting the master planning process used by KLJ.

The interactive process is the unique element of the KLJ process. The KLJ process focuses on making the master plan's data, analyses, findings, and recommendations more useful and more easily understood by the airport sponsor and interested organizations. This is accomplished through the use of state-of-the-art electronic and graphic technology to present the airport's existing conditions, identified requirements, alternatives and concepts, recommendations, and implementation plans in a visual (3-D if appropriate) format. This format enables the planner to help the sponsor more effectively understand the airport's needs and visualize the alternatives to implement those requirements. It show the flexibility available to the sponsor by visually presenting the recommended improvements, displaying the effect of those improvements on the airfield and its operations, and showing the sponsor the varying options for implementing those improvement projects, thereby enhancing the sponsor's decision-making process.

Types of Master Plan Studies

The master planning process will vary with the size, complexity, and role of the studied airport and may include a variety of supporting studies. However, all master planning studies will fall within one of two basic types: Airport Master Plans or Airport Layout Plan (ALP) Updates.

Airport Master Plans - An airport master plan is a comprehensive study of the airport and typically describes short-, medium-, and long-term plans for airport development. Master planning studies that address major revisions are commonly referred to as "Master Plans," while those that change only parts of the existing document and require a relatively low level of effort tend to be known as "Master Plan Updates." In common usage, however, the distinction refers to the relative levels of effort and detail of master planning studies. In most cases, the master plan will include the following elements:

1. ***Pre-planning*** – The pre-planning process includes an Initial Needs Determination, Request for Proposal and Consultant Selection, Development of Study Design, Negotiation of Consultant Contract, and Application for Study Funding.
2. ***Public Involvement*** – Once the consultant team is under contract and has been issued a notice-to-proceed, establish a public involvement program and identify and document the key issues of various stakeholders.
3. ***Environmental Considerations*** – A clear understanding of the environmental requirements needed to move forward with each project in the recommended development program.
4. ***Existing Conditions*** – An inventory of pertinent data for use in subsequent plan elements.
5. ***Aviation Forecasts*** – Forecasts of aeronautical demand for short-, medium-, and long-term time frames.
6. ***Facility Requirements*** – Assess the ability of the existing airport, both airside and landside, to support the forecast demand. Identify the demand levels that

will trigger the need for facility additions or improvements and estimate the extent of new facilities that may be required to meet that demand. KLJ planners will use the latest technology to present identified requirements in a visual interactive process to assist the sponsor to fully understand the identified facility requirements.

7. ***Alternatives Development and Evaluation*** – Identify options to meet projected facility requirements and alternative configurations for each major component. Assess the expected performance of each alternative against a wide range of evaluation criteria, including its operational, environmental, and financial impacts. A recommended development alternative will emerge from this process and will be further refined in subsequent tasks. This element should aid in developing the purpose and need for subsequent environmental documents. KLJ planners will present the identified alternatives, using the latest technology, in a visual interactive process to assist the sponsor to fully understand the studied alternatives and their effect on the airport.
8. ***Airport Layout Plans*** – One of the key products of a master plan is a set of drawings that provides a graphic representation of the long-term development plan for an airport. The primary drawing in this set is the Airport Layout Plan (ALP). Other drawings may also be included, depending on the size and complexity of the individual airport.
9. ***Facilities Implementation Plan*** – Provides a summary description of the recommended improvements and associated costs. The schedule of improvements depends, in large part, on the levels of demand that trigger the need for expansion of existing facilities. KLJ planners will use the latest technology to present the recommended improvements in a visual interactive process to assist the sponsor to fully understand the recommended improvements, potential phasing of the development, and available flexibility in implementation of the recommended improvements.
10. ***Financial Feasibility Analysis*** – Identify the financial plan for the airport, describe how the sponsor will finance the projects recommended in the master plan, and demonstrate the financial feasibility of the program.

Airport Layout Plan Updates - An update of the airport layout plan (ALP) drawing set should be an element of any master plan study. In fact, keeping the ALP current is a legal requirement for airports that receive Federal assistance. An update of the ALP drawing set will reflect actual or planned modifications to the airport and significant off-airport development. An accompanying ALP Narrative Report should explain and document those changes and contain at least the following elements:

1. Basic aeronautical forecasts.
2. Basis for the proposed items of development.
3. Rationale for unusual design features and/or modifications to FAA Airport Design Standards.
4. Summary of the various stages of airport development and layout sketches of the major items of development in each stage.

An ALP drawing set update is an appropriate alternative to a full master plan whenever the fundamental assumptions of the previous master plan have not changed. If there have not been any major changes in airport activity or improvements that have had unanticipated

consequences, a master plan update is not necessary. Another situation where only an ALP update would be appropriate is the examination of a single development item, such as runway safety area improvements. As indicated above, an ALP update will typically involve fewer elements than a full master plan study, including only the aviation demand forecasts, an assessment of facility requirements, a facility implementation and financing plan, and an airport layout plan drawing set. If additional steps are required to complete the ALP update, a full master plan study is probably a better choice.

Products of the Master Planning Process

The products of the master planning process, often referred to as deliverables, will vary with the complexity of the effort. Master plans can include the following deliverables:

1. ***A Technical Report*** contains the results of the analyses conducted during the development of the master plan and is normally considered as the "Airport Master Plan" when referring to a specific document. For complex studies, interim reports may be produced to facilitate coordination with various government agencies, tenants, users, the general public, and other interested parties. At the conclusion of the study, the interim reports are assembled into the final technical report. In addition to typical studies, such as obstruction analysis, noise modeling, and forecasting, there may also be a need for special studies, such as land use planning (including wildlife assessments), airline service analysis, economic impact studies, and terminal studies. Technical reports by KLJ are prepared in the following format:
    a. Narrative chapters. The narrative chapters do not contain all of the accumulated data in the master plan study, as has been the historical practice for many master plans. Instead, the narrative chapters summarize the collected data, analyses, and conclusions/recommendations to provide a more concise document for the reader, rather than overwhelm the reader with data. If the reader desires more detailed information on a specific subject, the narrative will refer the reader to a specific appendix.
    b. Appendices. The appendices contain all of the data, analyses, findings, recommendations, etc., on specific subjects. Each appendix deals with a specific subject and presents all available information on the subject.
    c. Hyperlinks. Designed for electronic media, hyperlinks will take the reader from a key word or phrase in the master plan narrative to a specific point in the appropriate appendix. This concept allows the reader to focus on high level data and conclusions in the narrative, yet provides immediate access to more complete data if desired.
    d. Media. In addition to the standard printed format, KLJ presents the master plan technical report in several new formats:
        i. CD or DVD. This format allows the reader to use existing computer technology to read the narrative report and then use hyperlinks to move to specific points in the appendices for additional information.
        ii. Tablet. With this format, all of the technical report narratives and appendices are contained on an electronic tablet. In addition to other airport information, this format makes the technical

report portable and allows the user instant access to all of the master plan information.

2. ***A Summary Report*** is useful in bringing together pertinent facts, conclusions, and recommendations for public review. Such a report, often referred to as the Executive Summary, is an excellent place to highlight the economic benefits that flow from the airport to the communities it serves.
3. ***An Airport Layout Plan Drawing Set*** contains a graphical representation of the proposed development in the master plan and is typically produced as a separate set of full-sized drawings. In addition, the ALP drawing set is typically included in the Technical Report in reduced form. KLJ can provide the ALP information in the following formats:
    a. Standard CAD
    b. GIS/EALP
    c. Other (e.g., Google Earth 3-D presentation)
4. ***A Web Page*** – Many airport sponsors maintain a public access web page with general information about the governmental unit involved and specific information regarding the airport or airports operated by the sponsor. The Internet provides an excellent forum for the distribution of information on the progress of the study and its final findings and recommendations.
5. ***Public Information Kit*** – Throughout the master plan study, airport sponsor representatives may be asked to speak to community associations, civic clubs, and other organizations with an active interest in the airport. Visual aids such as models, summary brochures, or computer presentations are excellent tools to use at these events to maintain support for the airport development program.

Exhibit 1 – KLJ Master Plan Process Flowchart

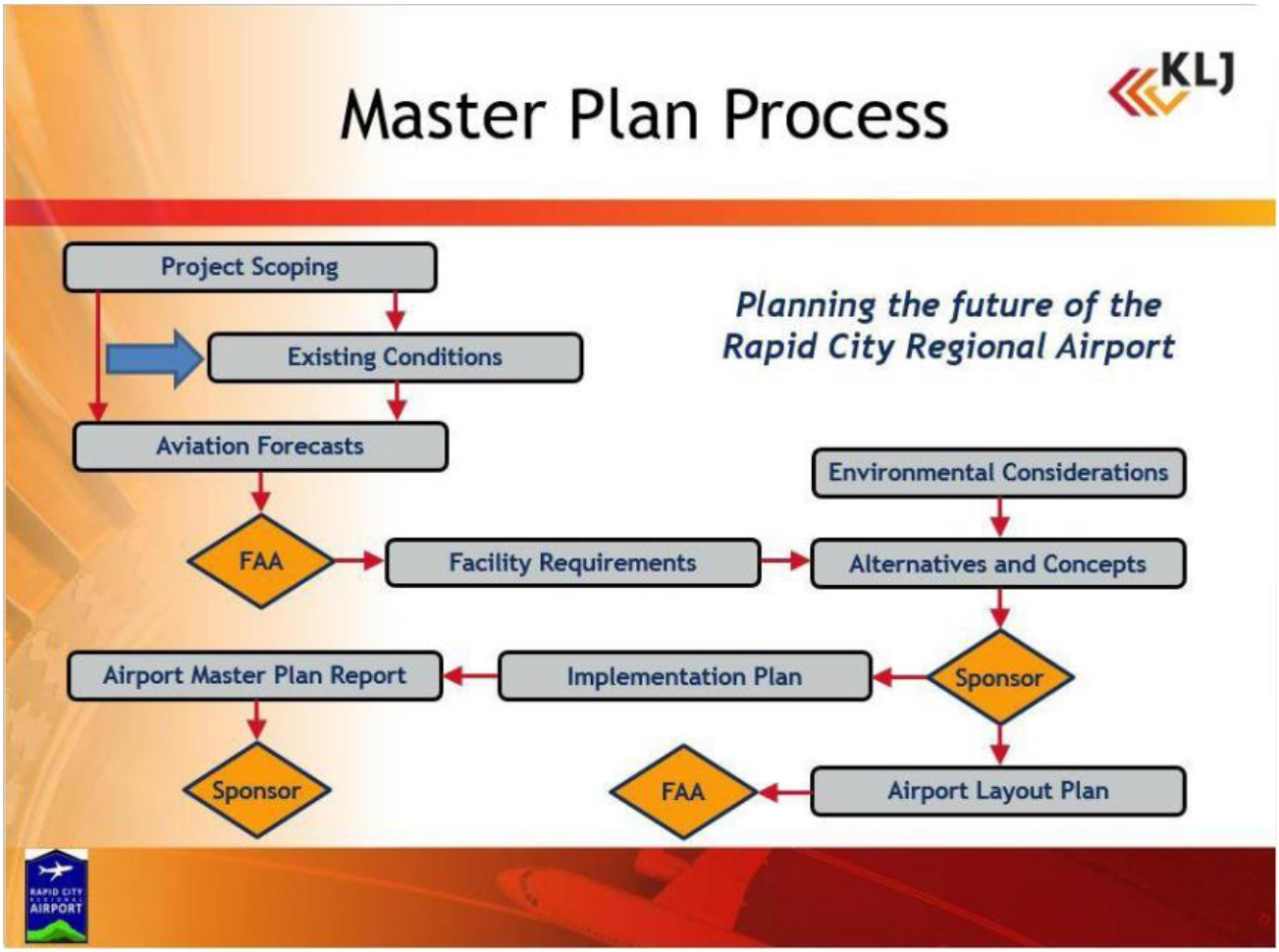
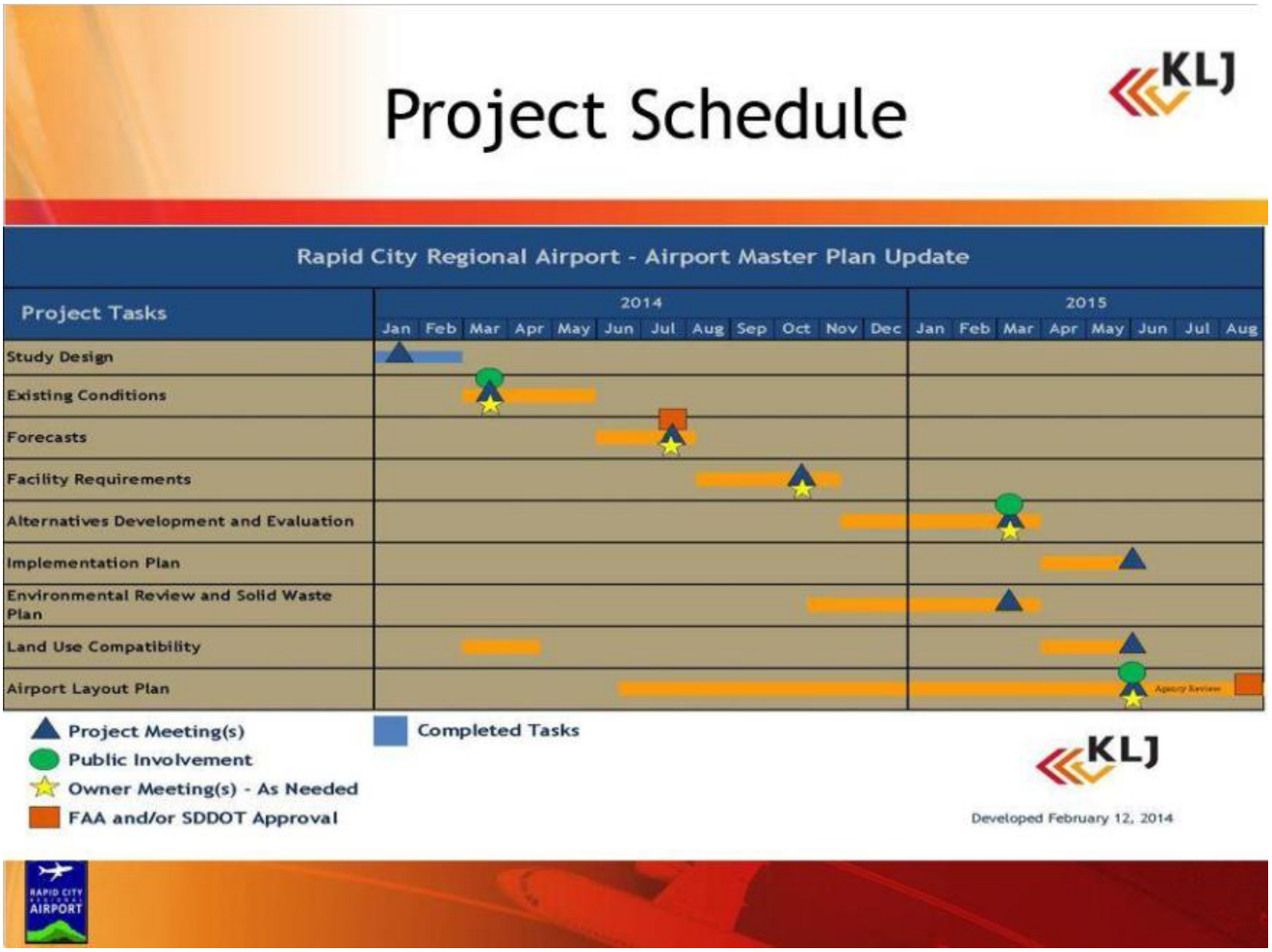


Exhibit 2 – KLJ Master Plan Project Schedule



Appendix C – Public Involvement

Introduction

Rapid City Regional Airport 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, 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.

Project Stakeholders

Communicating the Airport Master Plan with airport stakeholders is vital to a successful planning process. The following key groups/people were contacted for their insight into the Rapid City Regional Airport:

1. Airport Management/Staff
    a. Cameron Humphres - Executive Director
    b. Pete Girtz – Interim Executive Director
    c. Toni Broom – Deputy Director
    d. Doug Curry – Deputy Director
2. Airport Board
    a. Ray Carpenter, President
    b. Shawn Gab, Board Member
    c. Dick McConnell, Board Member
    d. Lisa Modrick, Board Member
    e. Todd Ossenfort, Board Member
3. Air Traffic/TSA
    a. Maureen Wrede, Midwest Air Traffic
    b. Gene Eiring, TSA
4. Airlines & Terminal Tenants
    a. Julie Bell, American/Allegiant
    b. Michael Tousley, Delta/United
    c. Tim Peiper, Hertz
    d. Val Lick, National/Alamo
    e. Dante Dudley, Enterprise
    f. Andrew Kuipers, Avis/Budget
    g. Kevin Leui, Airport Express Shuttle
    h. J.P. Duniphan, Airport Services Gift Shop
    i. Jacob Walks with Eagles, Standard Parking
5. Other Airfield Tenants
    a. Cedric Coleman, Black Hills Life Flight
    b. Don Rydstrom, WestJet Air Center
    c. Linda Rydstrom, WestJet Air Center
    d. Jerry Dale, Dale Aviation

    e. Glenda Brown, Alpine Air
    f. Dennis Gion, Empire Airlines
    g. Kristy Forman, Rapid Fuel
    h. Les Mittleider, L&D Aero
    i. Mike Banto, Fugro Horizons
    j. Gordon Schafer, USFS
    k. Jon Murphy, SDARNG
    l. Rod Nelson, SDARNG
    m. Marcia Elkins, SDARNG
6. Pilots
    a. Zane Brink
    b. Brandon Caneva
    c. Bert Corwin
    d. Milo Schindler
    e. Craig Uhre
7. Local Government/Civic Groups
    a. Brett Limbaugh, City of Rapid City – Community Planning
    b. Patsy Horton, City of Rapid City – Community Planning
    c. Dan Jennissen, Pennington County – Planning
    d. Ron Koan, City of Box Elder – Planning & Zoning
    e. Terri Haverly, Rapid City Economic Development
    f. Linda Rabe, Rapid City Area Chamber of Commerce
    g. Jody Sperlich, Rapid City Convention & Visitors Bureau
    h. Dan Senftner, Destination Rapid City
    i. Benjamin Snow, Rapid City Economic Development

For this master planning effort it was determined that the use of focus groups would provide the best results. The following is a breakout of the focus groups:

1. Airlines/TSA/Air Traffic
2. Terminal Tenants
3. Airfield Tenants
4. Pilot Community
5. Local Government/Civic Groups

In addition to focus groups, KLJ also collected a video log from several individuals preselected by airport management. The individuals provided KLJ a monologue as they went around the airport including airside, landside and inside the airline terminal. The individuals were able to provide more extensive input than was possible in the focus group meetings.

Public Involvement Efforts

Public Outreach efforts throughout the Airport Master Plan project are identified below.

Date Outreach Occurred	Type of Public Information Process	Attendance (if available)	Information conveyed
3-5-2014	Newspaper Coverage	N/A	News article about the Airport Master Plan kickoff
3-12-2014 through 3-14-2014	Focus Groups	35	Shared Master Plan process and gathered information on existing conditions and issues
3-13-2014	Public Open House	15	Described master plan process to the general public and solicit input
5-20-2014	Website Updates	N/A	Updated Website with Focus Group Summaries
8-2014	Focus Group Updates	±45	Shared Chapter 1 and 2
8-2014	Website Updates	N/A	Updated website with Chapters 1 and 2
9-23-2014	Airport Board Meeting	±12	Reviewed Forecast
10-14-2014	Airport Board Meeting	±12	Approved Forecast
12-18-2014	Airport Board Meeting	±12	Reviewed Chapter 4
12-2014	Focus Group Updates	±45	Shared Chapter 4
1-2015	Website Updates	N/A	Updated website with Chapters 3 and 4
2-26-2015	General Aviation Committee Meeting	±15	Shared Alternatives
3-2015	Focus Group Updates	±45	Shared Alternatives
3-24-2015	Airport Board Meeting	±12	Reviewed Alternatives
4-14-2015	Airport Board Meeting	±12	Selected Preferred Alternative
5-3-2015	Newspaper Coverage	N/A	Announcement of Preferred Alternative meeting
5-6-2014	Public Open House	10	Shared Preferred Alternative
5-2015	Website Updates	N/A	Updated website with Chapter 5

Public Involvement Documents, References & Links

The following is a summary of the public involvement documents or links. Copies of the documents are included in following in this appendix.

Rapid City Journal "Airport to hold meeting on master plan"; March 5, 2014; Page C-5

Project Website hosted by Rapid City Regional Airport

- http://www.rcgov.org/Airport/airport-master-plan.html
- Content includes draft technical reports and 2008 Master Plan documents
- Online Public Feedback form see Page C-6

Focus Group Meetings; March 12-14, 2014; Pages C-7 to C-12

- Presentation
- Attendance Sheet(s)

Public Open House Meeting; March 13, 2014; Pages C-13 to C-18

- Presentation
- Blank Comment Sheet
- Attendance Sheet

Rapid City Regional Airport Board Meeting; September 23, 2014; Pages C-19 to C-21

- Presentation of the Aviation Forecasts for Rapid City Regional Airport

Rapid City Regional Airport Board Meeting; December 18, 2014; Pages C-22 to C-25

- Presentation on Facility Requirements for Rapid City Regional Airport

Rapid City Regional Airport Board Workshop Meeting; March 24, 2015; Pages C-26 to C-28

- Presentation on Airport Development Alternatives for Rapid City Regional Airport

Rapid City Journal "Master Plan for airport discussed Wednesday"; May 3, 2015; Page C-29

Public Open House Meeting; May 6, 2015; Pages C-30 to C-40

- Presentation
- Display Boards
- Summary Information
- Blank Comment Sheet
- Attendance Sheet

Rapid City Journal Article – March 5, 2014

Rapid City Journal

Airport to hold meeting on master plan

MARCH 05, 2014 7:00 PM

An open house/kickoff meeting will be held for the updating of the Airport master plan for Rapid City Regional Airport from 5:30 to 7 p.m. Thursday, March 13 in the East Conference Room on the third floor of the City/School Administration Center.

The airport master plan will study the long-term plans for accommodating existing and future aviation demand. The previous master plan was completed in 2008 and many of the projects identified in that plan have been completed.

The public is encouraged to attend.

Online Public Feedback Form

Rapid City Regional Airport Master Plan Update

Feedback Form

We want to hear from you! Please use the form below to provide feedback to the project team regarding the Airport Master Plan Study.

First Name:

Last Name:

Address:

E-mail Address:

Comments:

Study is being conducted by Rapid City Regional Airport in cooperation with KLJ.
Comments may also be sent directly to Kent Penney at kent.penney@kljeng.com

Focus Group Meeting Presentations – March 12-14, 2014

Rapid City Regional Airport
Airport Master Plan

Stakeholder Focus Groups
March 2014

Agenda

- Introduction
- Airport Master Planning
- Group Discussion
- Questions
- Recap
- Next Steps

Introduction

- Project Team:
  - Aviation Project Manager – Ben Mello, KLJ
  - Project Team Member - Kent Penney, KLJ
- The Project Team is responsible for managing the project, completing technical work, and providing recommendations to help the Airport Board make decisions about the future of RAP

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

Airport Master Planning

What are some important facts about Airport Master Planning?

- An Airport Master Plan is prepared by the airport owner
- **An Airport Layout Plan (ALP) is required for every airport within the Federal system**
- **Reviews airport facility needs for next 20 years**
- Plan provides a road map for the airport owner to efficiently and effectively meet aviation demand

Airport Master Planning

What are some important facts about Airport Master Planning?

- Plan is flexible to respond to changing conditions
- Considers potential financial, environmental, and socioeconomic impacts of alternatives
- **Document updated every 5 to 10 years or when the existing plan does not meet needs**

Focus Group Meeting Presentations – March 12-14, 2014 (cont.)

Airport Master Planning

- Why is a Master Plan Update needed now?
  - Last Master Plan completed in 2008 (6 years ago)
  - **Many projects outlined in 2008 have been completed or focus has changed and the project is no longer needed or wanted**
  - Address new FAA requirements

Master Plan Elements

- What are the Elements of an Airport Master Plan?
  - Scoping/pre-planning
  - **Existing Conditions**
  - Aviation Forecasts
  - **Facility Requirements**
  - Alternatives and Concepts
  - Environmental Considerations
  - Implementation Plan
  - **Master Plan Report/Airport Layout Plan**

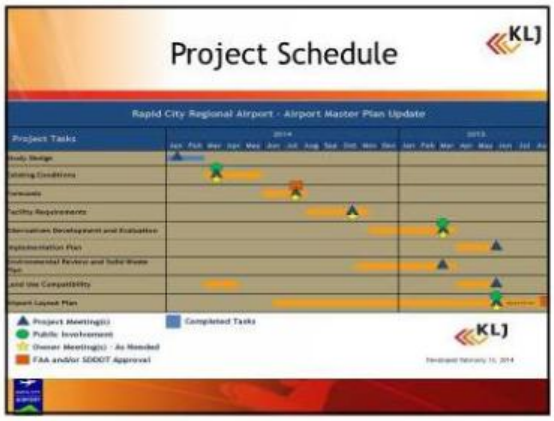
Master Plan Process

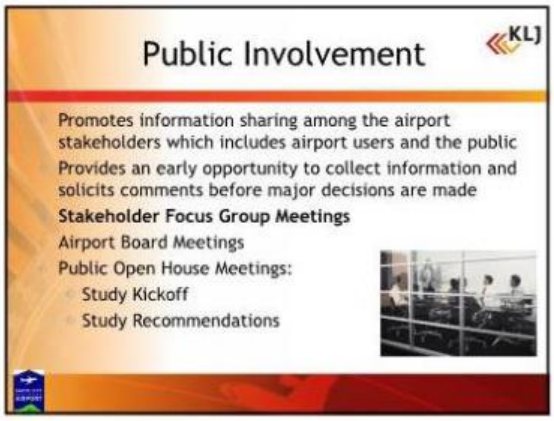
Planning the future of the Rapid City Regional Airport

Identified Planning Considerations

- General Aviation Development - functionality & expansion alternatives
- Cargo Needs - functionality & optimal location for aircraft and vehicles
- Evaluate non-aeronautical development on airport property
- Runway Length & Alternatives when Primary Runway is out of service
- Passenger Terminal Building Needs
  - Inline baggage screening
  - Review Federal Inspection Services
  - Review Terminal Apron Size
  - Deicing Facility Implications
- Public Automobile Parking Needs
- US Forest Service Aerial Firefighting Base - functionality & expansion alternatives
- Relocation of Hangar Road
- Evaluate Snow Removal Equipment & Maintenance Facilities
- Siting options for Air Traffic Control Tower
- Update Land Use Compatibility
- Coordinate Master Plan with City and City Comprehensive Plan

Focus Group Meeting Presentations – March 12-14, 2014 (cont.)





Focus Group Meeting Attendance Sheets – March 12-14, 2014

Airport Master Plan Update
Focus Group Meetings
March 12-14, 2014

Terminal Tenants 03-12-2014 1100

KLJ
ATTENDANCE LIST

Name:	Organization/Business:	Phone:	Email:
J.P. Dunipham	Airport Services, LLC	(605) 381-6399	REP33SD@AOL.com
Valerie Lick	National/Alamo	605-393-2664	Valerie.Lick@NationalCar.co
Tim Pepper	Hertz	605 393-0160	Tpeipe@overlandcesi.com
Andy Kuipers	Avis/Budget	605-393-8911	akuipers@rapidnet.com

Airport Master Plan Update
Focus Group Meetings
March 12-14, 2014

Civic/Government Group 03/12/2014 1600

KLJ
ATTENDANCE LIST

Name:	Organization/Business:	Phone:	Email:
Teci Haverly	RC Economic Development	6057160003	thaverly@rapiddevelopment.com
Jody Sperlich	RC Convention & Visitors Bureau	605-718-8486	sperlich@visitrapidcity.com
Sarah Hanzel	RC community plng & dev services	394-4120	sarah.hanzel@rcgov.org
Patsy Horton	RC Comp Plann & Dev Serv.	394-4120	patsy.horton@rcgov.org
Linda Rabe	RC Chamber	718-8466	rabe@rapidcitychamber.com
BRETT LIMBAUGH	RC. CPDS	394-4120	brett.limbaugh@rcgov.org.
Don Jamison	Pennington County Planning	394-2186	donje@penco.org
P.J. Conner	Pennington County Planning	394-2186	pj.conner@penco.org

Focus Group Meeting Attendance Sheets – March 12-14, 2014 (cont.)

Airport Master Plan Update
Focus Group Meetings
March 12-14, 2014

Airline Meeting March 13, 2014

KLJ
ATTENDANCE LIST

Name:	Organization/Business:	Phone:	Email:
EIRING, GENE	TSA	(605) 390-1134	gene.eiring@tsa.dhs.gov
MAURINE WREDE	FAA ATCT / MIDWEST ATC, INC.	605-393-1161	1-tch-rap-fct@FAA.GOV

Airport Master Plan Update
Focus Group Meetings
March 12-14, 2014

Airfield Tenants 03/13/2014 1300

KLJ
ATTENDANCE LIST

Name:	Organization/Business:	Phone:	Email:
Rodney Nelson	South Dakota Army National Guard	605-737-6907	rodney.d.nelson4.nfg@mail.mil
COLIN POTTER	" "	605 737 6168	COLIN.J.POTTER.MIL@MAIL.MIL
Mike Banton	Fugro Geospatial	605 393 8300	MIKE.BANTON@Fugro.com
LES MITTLEIDER	L&D AERO SERVICE INC. BLACK HILLS N.F.	605-393-2254	Les@Ldaero.Com
JASON VIRTUE	US FOREST SERVICE	605-673-9261	jvirtue@fs.fed.us
Don Rydstrom	Westjet Air Center	605-393-2500	westjet@westjetair.com
LINDA Rydstrom	Westjet Air Center	605-393-2500	LRYDSTROM@Q.com
Andrew Grossbach	Encore Air Cargo	605-939-8293	andrew.grossbach@gmail.com
Gordon Schafer	US Forest Service	605.393.1364	gjschafer@fs.fed.us

Focus Group Meeting Attendance Sheets – March 12-14, 2014 (cont.)

Airport Master Plan Update
Focus Group Meetings
March 12-14, 2014 Pilots 3-13-14 1430

RAPID CITY REGIONAL AIRPORT

KLJ

ATTENDANCE LIST

Name:	Organization/Business:	Phone:	Email:
Bert Carwin	Air Port ~~General Aviation Committee~~	342-8777	bc carwin@RAP.Midco.NET
Les MITTLEIDER	LID AERO SERVICE/General Aviation	393-2254	Les@Lndaero.com
Mike M Schindler	SHM Hangers	393 0030	Mike.Schindler@HOT MAIL
Brandon Caneva	Westjet Air Center, Inc GAAC	393-2500	shop@westjetair.com
Craig Uhre	Gen Aviation Committee	484-2470	craiguhre@gmail.com

Public Open House Meeting Presentation - March 13, 2014

Public Kickoff Presentation – March 13, 2014

Rapid City Regional Airport Airport Master Plan

Public Kickoff Meeting
March 2014

Agenda

- Introduction
- Airport Master Planning
- Planning Considerations
- Public Involvement
- Open House

Introduction

- Pete Girtz, Interim Airport Executive Director,
- Rapid City Regional Airport

Introduction

Project Team:
- Aviation Project Manager - Ben Mello, KLJ
- Project Team Member - Kent Penney, KLJ

The Project Team is responsible for managing the project, completing technical work, and providing recommendations to help the Airport Board make decisions about the future of RAP

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

Airport Master Planning

What are some important facts about Airport Master Planning?
- An Airport Master Plan is prepared by the airport owner
- **An Airport Layout Plan (ALP) is required for every airport within the Federal system**
- **Reviews airport facility needs for next 20 years**
- Plan provides a road map for the airport owner to efficiently and effectively meet aviation demand

Public Kickoff Presentation – March 13, 2014

Airport Master Planning

What are some important facts about Airport Master Planning?

- Plan is flexible to respond to changing conditions
- Considers potential financial, environmental, and socioeconomic impacts of alternatives
- **Document updated every 5 to 10 years or when the existing plan does not meet needs**

Airport Master Planning

Why is a Master Plan Update needed now?

- Last Master Plan completed in 2008 (6 years ago)
- **Many projects outlined in 2008 have been completed or focus has changed and the project is no longer needed or wanted**
- Address new FAA requirements

Master Plan Elements

What are the Elements of an Airport Master Plan?

- Scoping/pre-planning
- **Existing Conditions**
- Aviation Forecasts
- **Facility Requirements**
- Alternatives and Concepts
- Environmental Considerations
- Implementation Plan
- **Master Plan Report/Airport Layout Plan**

Master Plan Process

Identified Planning Considerations

General Aviation Development - functionality & expansion alternatives
Cargo Needs - functionality & optimal location for aircraft and vehicles
Evaluate non-aeronautical development on airport property
Runway Length & Alternatives when Primary Runway is out of service
Passenger Terminal Building Needs
- **Inline baggage screening**
- **Review Federal Inspection Services**
- **Review Terminal Apron Size**
- **Deicing Facility Implications**

Public Automobile Parking Needs
US Forest Service Aerial Firefighting Base - functionality & expansion alternatives
Relocation of Hangar Road
Evaluate Snow Removal Equipment & Maintenance Facilities
Siting options for Air Traffic Control Tower
Update Land Use Compatibility
Coordinate Master Plan with City and City Comprehensive Plan

Public Open House Meeting Presentation - March 13, 2014 (cont.)

Public Kickoff Presentation – March 13, 2014

Public Involvement

Promotes information sharing among the airport stakeholders which includes airport users and the public

Provides an early opportunity to collect information and solicits comments before major decisions are made

Stakeholder Focus Group Meetings

Airport Board Meetings

Public Open House Meetings:

- **Study Kickoff**
- Study Recommendations

Public Involvement

How can I participate in the study moving forward?

- Provide us with your comments
- Provide comments at - www.rcgov.org and select Airport
- View Master Plan documents on Airport's website
- Attend future project meetings

We want to hear from you throughout this study!

Public Open House Meeting Presentation – March 13, 2014 (cont.)

Public Kickoff Presentation – March 13, 2014

Public Open House Comment Sheet – March 13, 2014

COMMENTS

RAPID CITY *Regional Airport*

RAPID CITY REGIONAL AIRPORT

Thursday, March 13, 2014 – 5:30 to 7:00 pm – City/School Administration Center (3rd Floor East Conference Room)

Please use the space below to provide comments regarding the Rapid City Regional Airport.

PLEASE PRINT

Name: _____

Address: _____

E-mail: _____
To sign up for project updates

Please leave comments with meeting conductors or mail comments to:

Kent Penney, Airport Planner
KLJ
330 Knollwood Drive
Rapid City, SD 57701
Email: kent.penney@kljeng.com

Before including your address, phone number, email address or other personal identifying information in your comment, be advised your entire comment, including your personal identifying information may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee we will be able to do so.

To fill out an electronic version, go to ***www.rcgov.org*** *and select* ***Airport*** *from departments.*

Public Open House Attendance Sheet – March 13, 2014

Airport Master Plan Update
Focus Group Meetings
March 12-14, 2014

Public - Kickoff Meeting 03/13/2014 17:30

KLJ

ATTENDANCE LIST

send to him the PPP.

Name:	Organization/Business:	Phone:	Email:
Diane Burkley	none	415-0202	none
Paul Rath	none	415-0202	none
Sally Adrina Taylor	Rapid City Public Library	394-6139	Staylor@rcplib.org
Todd Ossenfort	RC	390-7844	todd@pioneercredit.com
Norma Kraemer	EAA	342-2339	kraemer.norma@gmail.com
Luke MacDonnell	RC	348-4392	dlm4244@midco.net
Tracy Kirkpatrick	Journey Museum & Learning Center	394-2249	EXECDIRECTOR@journeym
Earl + Loretta Davis			
Lisa Modrick	RC Regional Airport Board	605-390-3861	LISA@Modrick.com
John Thurgood	None	343-7771	None
Beau Ellis	RC Council	605-381-1171	bheeresharore.com
Ritchie Nordstrom	RC Council		rithie.nordstrom@rcgov.org

Airport Board Meeting Forecast Presentation - September 23, 2014

Rapid City Regional Airport
Airport Master Plan

Aviation Forecasts

Rapid City Regional Airport Board

September 23, 2014

Study Update

Planning the future of the Rapid City Regional Airport

Aviation Demand Forecasts

What are Aviation Forecasts?

- 5, 10 and 20-year realistic estimates of aviation activity
- Reviews factors that affect aviation activity including socioeconomic conditions within service area and industry trends
- Preferred forecasts developed from multiple forecast scenarios
- Requires FAA approval
- Becomes the basis for size, scope and demand-triggers of airport improvements.
- Assist with project justification, phasing and funding

Aviation Demand Forecasts Activity Trends

- Rapid City area population and employment have remained steady.
- Passenger enplanements have increased 30% over the past thirteen years.
- Enplanements have grown at an average rate of 2.58% since 1990, 1.98% in the past 10 years.
- Passenger load factors have remained high.
- Air cargo has remained flat rising just 1.48% in the past five years.
- Total based aircraft is down from counts in 2008.

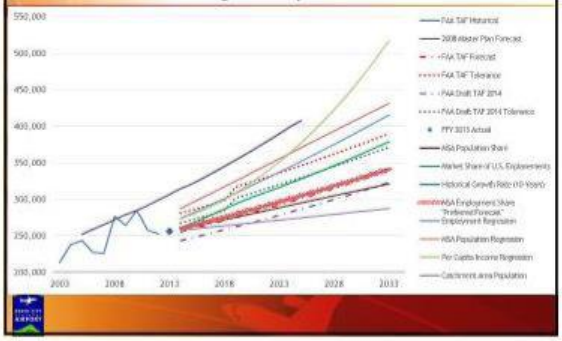
Aviation Demand Forecasts Passenger Enplanements

Forecast Assumptions

- RAP's national market share has been steady from 0.036% to 0.034% (Non Hub)
- Airline service will remain steady with service continuing to existing destinations and possible growth to new destinations
- Replacement of 50-seat regional jets with larger 76-100 seat jets

Rapid City Airline Passengers

Aviation Demand Forecasts
Passenger Enplanements



Aviation Demand Forecasts
Passenger Enplanements

Preferred forecast method is Rapid City MSA employment share with constant growth

Passenger Enplanement Forecast Summary

Metric	2013	2018	2023	2033	CAGR
Master Plan Forecast	256,191	275,634	296,254	341,298	1.44%
FAA TAF Forecast	251,883	271,337	292,302	339,237	1.50%
Difference from TAF	+1.71%	+1.58%	+1.35%	+0.61%	-
FAA Draft TAF 2014 Forecast	253,346	258,445	278,415	323,121	1.22%
Difference from TAF	+1.11%	+6.23%	+6.02%	+5.32%	

Aviation Demand Forecasts
Commercial Operations

Operations includes scheduled passenger and air cargo flights

Operations determined from forecast passenger and cargo aircraft fleet mix

Commercial Operations Forecast Summary

Metric	2013	2018	2023	2033	CAGR
Airline Passenger Operations	14,016	13,700	14,079	14,622	0.21%
Cargo Operations	728	800	880	1,064	1.91%
Total	**14,744**	**14,500**	**14,959**	**15,686**	**0.31%**
FAA TAF Forecast	14,686	15,420	16,194	17,874	0.98%
Difference from TAF	+0.39%	-5.97%	-7.63%	-12.24%	-

Aviation Demand Forecasts
Based Aircraft

Trends & Assumptions:

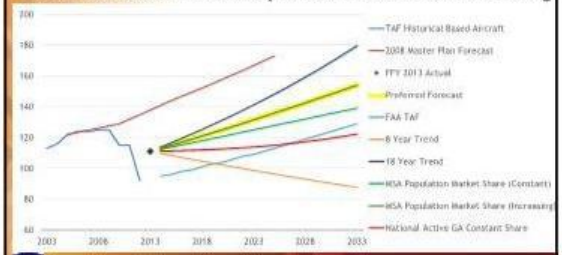
- U.S. based aircraft are at lowest levels since 1996
- Modest FAA forecast growth of 0.88% annually through 2033
- FAA forecast stronger annual based aircraft growth, 1.65% in Rapid City area
- Fleet mix trending to more corporate turboprop/turbojet aircraft
- Rapid City is losing overall market share to surrounding airports.
- Rapid City has 72% of the area population but only 39% of the aircraft are based at Rapid City.

Forecast:

- Preferred based aircraft forecast is MSA Population Share at an increasing rate

Aviation Demand Forecasts
Based Aircraft

Preferred forecast is MSA Population Market Share Increasing



Aviation Demand Forecasts
General Aviation & Military

- Local vs. Itinerant classification
- Trends & Assumptions:
  - U.S. GA and air taxi hours flown forecast to increase 1.56% annually
  - Itinerant operations are in mostly turboprop and turbojet aircraft
  - Largest activity growth in corporate aircraft types
  - Rapid City is the region's corporate aircraft facility
  - Sluggish activity growth in recreational flights
  - Military activity levels remain relatively constant

Airport Board Meeting Forecast Presentation - September 23, 2014 (cont.)

Aviation Demand Forecasts
Summary

KLJ

Aviation Forecast Summary					
Metric	2013	2018	2023	2033	CAGR
Enplanements	256,191	275,634	296,254	341,298	1.44%
Air Cargo	2,281,393	2,438,523	2,718,382	3,378,139	1.98%
Commercial Operations	14,744	14,500	14,959	15,686	0.21%
General Aviation Operations	22,590	24,757	27,628	35,043	2.21%
Military Operations	4,024	4,024	4,024	4,024	0.00%
Total Operations	41,358	43,280	46,610	54,753	1.41%
FAA TAF Forecast	41,908	43,558	44,804	47,482	0.63%
Difference From TAF	-1.32%	-0.64%	+3.87%	+13.27%	-
Based Aircraft	111	121	125	154	1.66%

Airport Board Facility Requirements Presentation – December 18, 2014

Rapid City Regional Airport
Airport Master Plan

Facility Requirements

Rapid City Regional Airport Board

December 18, 2014

Study Update

Planning the future of the Rapid City Regional Airport

Planning Activity Levels

Passengers & Operations (page 4-2)

Planning Activity Levels

Metric	Base	PAL 1	PAL 2	PAL 3	PAL 4
Passengers					
Annual Enplanements	256,191	275,634	296,254	318,133	341,298
Peak Month (12,223)	31,255	33,627	36,143	38,812	41,638
Design Day	1,031	1,110	1,193	1,281	1,374
Design Hour Departing (19.5%)	201	216	233	250	268
Design Hour Arriving (19.5%)	201	216	233	250	268
Design Hour Total Seats (14.3%)	295	317	341	366	393
Passenger Airline Operations					
Total Operations	14,016	13,700	14,079	14,491	14,623
Peak Month	1,713	1,674	1,720	1,771	1,787
Design Day	59.6	58.3	59.9	61.6	62.2
Design Hour	5.4	5.2	5.4	5.5	5.6
Total Operations					
Total Operations	41,358	43,280	46,610	50,396	54,753
Peak Month	4,214	4,410	4,750	5,135	5,579
Design Day	208	218	235	251	276
Design Hour	21	22	23	25	28

Design Aircraft

page 4-8

Airfield Design Aircraft Summary

Design Characteristics	Runway 14/32	Runway 5/23
Aircraft Make/Model	A319/Q400/B717	Single Engine Piston
Airplane Approach Category	C	A
Airplane Design Group	III	I (small)
Taxiway Design Group	4	1
Wingspan	117' 5"	49'
Length	124' 0"	30'
Tail Height	38' 7"	20'
Approach Speed	Up to 138 knots	Up to 91 knots
Maximum Takeoff Weight	166,000 pounds	12,500 pounds
Landing Gear Configuration	Dual Wheel	Dual Wheel
Aircraft Classification Number	47/R/C/W/T	1/F/B/X/T
Takeoff Runway Length*	8,550 feet	4,450 feet
Landing Runway Length*	5,800 feet	4,450 feet

Runway Utilization

page 4-10

Runway Utilization

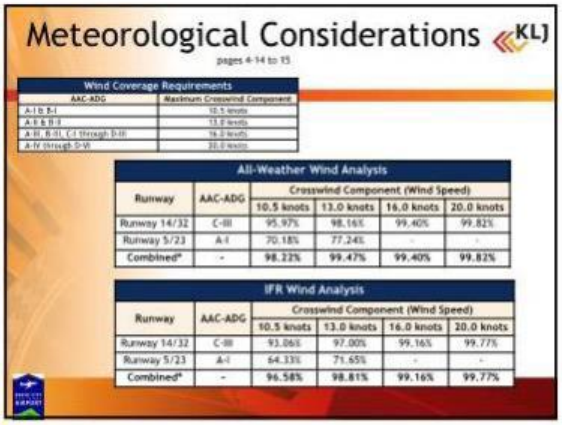
Runway End	End Utilization	Runway Utilization
14	34.9%	97.0%
32	62.1%	
5	2.0%	3.0%
23	1.0%	

Annual Service Volume

page 4-13

Annual Service Volume (ASV)

Metric	Base	PAL 1	PAL 2	PAL 3	PAL 4
Annual Operations	41,358	43,280	46,610	50,396	54,753
Average Design Day	208	218	235	254	276
Average Design Hour	21	22	23	25	28
Annual Service Volume	195,000	195,000	195,000	195,000	195,000
Capacity Level	**21.2%**	**22.2%**	**23.9%**	**25.8%**	**28.1%**



Wind Coverage Requirements	
AAC-ADG	Maximum Crosswind Component
A-I & B-I	10.5 knots
A-II & B-II	13.0 knots
A-III, B-III, C-I through D-III	16.0 knots
A-IV through D-VI	20.0 knots

All-Weather Wind Analysis

Runway	AAC-ADG	Crosswind Component (Wind Speed)			
		10.5 knots	13.0 knots	16.0 knots	20.0 knots
Runway 14/32	C-III	95.97%	98.16%	99.40%	99.82%
Runway 5/23	A-I	70.18%	77.24%	-	-
Combined*	-	98.22%	99.47%	99.40%	99.82%

IFR Wind Analysis

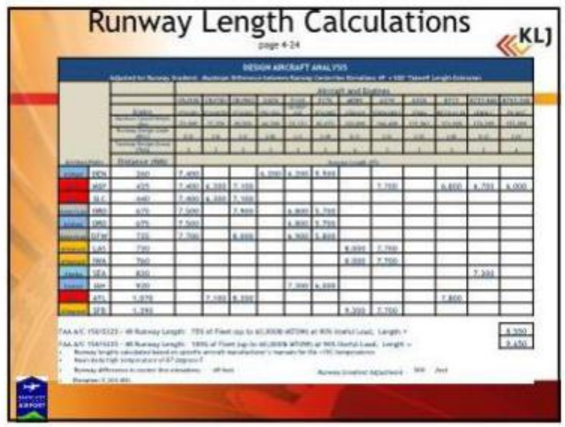
Runway	AAC-ADG	Crosswind Component (Wind Speed)			
		10.5 knots	13.0 knots	16.0 knots	20.0 knots
Runway 14/32	C-III	93.06%	97.00%	99.16%	99.77%
Runway 5/23	A-I	64.33%	71.65%	-	-
Combined*	-	96.58%	98.81%	99.16%	99.77%

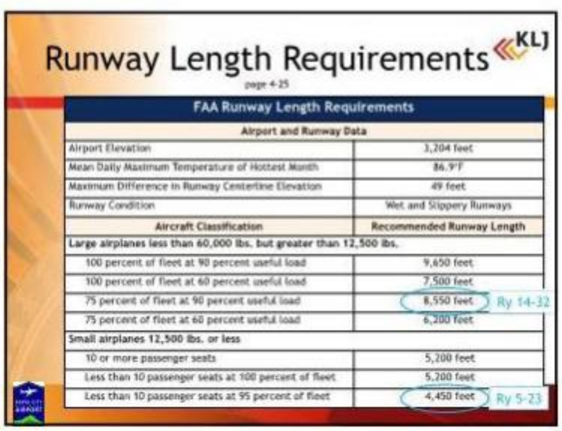
IFR Wind Analysis by Runway End

Runway End	AAC-ADG	Crosswind Component (Wind Speed)			
		10.5 knots	13.0 knots	16.0 knots	20.0 knots
Runway 14	C-III	38.48%	39.18%	39.72%	39.87%
Runway 32	C-III	63.16%	66.40%	68.02%	68.47%
Runway 5	A-I	55.45%	61.95%	68.48%	74.00%
Runway 23	A-I	17.46%	18.27%	19.36%	20.27%

Meteorological Analysis

Weather Condition	Cloud Ceiling Minimum	Visibility Minimum	Observation Percentage
Visual Flight Rules (VFR)	3,000 feet	5 miles	79.20%
Marginal Visual Flight Rules (MVFR)	1,000 feet	3 miles	7.57%
Instrument Flight Rules (IFR)	600 feet	1 mile	6.59%
Instrument Flight Rules (IFR) Category I	200 feet	½ mile	3.64%
Instrument Flight Rules IFR Category II	100 feet	¼ mile	0.59%
IFR Category III & Below	0 feet	$^{1}/_{8}$ mile	2.41%
TOTAL			100.00%





FAA Runway Length Requirements

Airport and Runway Data	
Airport Elevation	3,204 feet
Mean Daily Maximum Temperature of Hottest Month	86.9°F
Maximum Difference in Runway Centerline Elevation	49 feet
Runway Condition	Wet and Slippery Runways
Aircraft Classification	**Recommended Runway Length**
Large airplanes less than 60,000 lbs. but greater than 12,500 lbs.	
100 percent of fleet at 90 percent useful load	9,650 feet
100 percent of fleet at 60 percent useful load	7,500 feet
75 percent of fleet at 90 percent useful load	8,550 feet (Ry 14-32)
75 percent of fleet at 60 percent useful load	6,200 feet
Small airplanes 12,500 lbs. or less	
10 or more passenger seats	5,200 feet
Less than 10 passenger seats at 100 percent of fleet	5,200 feet
Less than 10 passenger seats at 95 percent of fleet	4,450 feet (Ry 5-23)

Passenger Terminal

pages 4-43 to 57

Passenger Terminal Building Space Requirements

Metric	Exist.	Base	PAL 1	PAL 2	PAL 3	PAL 4
Demand						
Annual Enplanements	-	256,191	275,634	296,254	318,133	341,298
Building Areas						
Total Required Gates	7	6	6	6	7	7
Airline Ticket Office (SF)	3,250	4,000	4,000	5,000	5,000	5,000
Airline Ramp/Support (SF)	6,439	7,600	7,600	11,400	11,400	11,400
Staffed Equivalent Positions	-	13	16	17	19	20
Dedicated Kiosks	6	4	5	6	6	7
Baggage Screening Area (SF)	0	2,580	2,580	3,380	3,380	3,380
Baggage Makeup Area (SF)	5,467	6,200	5,900	6,600	6,600	7,000
Security Screening Lanes	2	2	2	3	3	3
Total Security Area (SF)	5,444	3,125	3,125	4,688	4,688	4,688
Total Holdroom Area (SF)	8,644	6,700	6,600	6,600	6,600	8,400
Aircraft Frontage (LF)	860	571	584	640	661	652
Concourse Circulation (SF)	3,760	4,600	4,600	5,000	5,000	5,000
Baggage Claim Frontage (LF)	124	86	107	115	124	133
Baggage Claim Area (SF)	7,160	3,425	4,377	4,613	4,950	5,306
Baggage Handling Area (SF)	3,428	3,400	3,400	3,400	3,400	3,400
Rental Car Area (SF)	3,210	2,748	2,748	2,748	3,435	3,435
Sterile Area Restrooms	23	8	8	9	9	9
Public Area Restroom	24	10	11	11	12	13

RED indicates a deficiency in existing facilities

Air Cargo Apron

page 4-60

Air Cargo Apron Requirements

Category	Existing	Base	PAL 1	PAL 2	PAL 3	PAL 4
Cargo Aircraft						
Design Group I	-	-	-	-	-	-
Design Group II	1*	1*	1*	2*	1*	1*
Design Group III	1	1	1	1	2	2
Total	2	2	2	3	3	3
Cargo Apron Space (SY)						
Design Group I	-	-	-	-	-	-
Design Group II	-	2,400	2,400	4,800	2,400	2,400
Design Group III	-	3,300	3,300	3,300	6,600	6,600
Total Space	0	5,700	5,700	8,100	9,000	9,000

RED indicates a deficiency in existing facilities

Air Cargo and Deicing Areas

General Aviation

pages 4-61 to 65

General Aviation Planning Activity Levels

Metric	Base	PAL 1	PAL 2	PAL 3	PAL 4
Based Aircraft					
Single Engine	70	75	75	86	91
Multi-Engine	31	34	36	43	47
Jet	8	10	11	13	15
Helicopter	1	1	0	0	0
Other	1	1	1	1	1
Total Based Aircraft	111	121	125	143	154
General Aviation Operations					
Local Operations	7,593	8,604	9,750	10,698	11,941
Itinerant Operations	14,997	16,153	17,878	20,216	23,102
Total Operations	22,590	24,757	27,628	30,914	35,043
General Aviation Peak Transient Operations					
Peak Month Transient Operations	1,079	1,162	1,287	1,455	1,662
Design Day Transient Arrivals	24	26	28	32	37
Transient Aircraft Parked on Apron	19	21	23	26	29

Aircraft Storage

page 4-62

Aircraft Storage Requirements

Category	Existing	Base	PAL 1	PAL 2	PAL 3	PAL 4
Hangar Space						
T-Hangar	72,710	85,350	91,800	92,700	107,520	113,970
Small Conventional	80,083	57,000	63,300	66,600	79,980	86,280
Large Conventional	106,375	104,610	118,500	125,820	150,900	164,790
Total	259,168	246,960	273,600	285,120	338,400	365,040
Capacity/(Deficiency)	-	12,208	(14,432)	(25,952)	(79,232)	(105,872)

38,060 square feet of T-Hangar space is scheduled for removal in 4 years

RED indicates a deficiency in existing facilities

General Aviation Apron Space

page 4-64

Total Apron Space Requirements						
Category	Existing	Base	PAL 1	PAL 2	PAL 3	PAL 4
Aircraft						
Single/Multi Engine Piston	-	12	13	13	15	16
Turboprop	-	13	15	16	18	21
Turbojet	-	4	5	6	7	8
Total	31	30	32	35	40	45
Capacity/(Deficiency)	-	1	(1)	(4)	(9)	(14)
Apron Space (SY)						
Single/Multi Engine Piston	-	9,654	10,299	10,686	12,094	13,145
Turboprop	-	26,832	29,022	31,796	36,612	41,183
Turbojet	-	10,321	11,558	12,957	14,965	17,366
Total Space	60,331	46,807	50,880	55,438	63,671	71,693
Capacity/(Deficiency)	-	13,524	9,451	4,893	(3,340)	(11,362)

RED indicates a deficiency in existing facilities

Public Parking

page 4-67

Public Parking Requirements					
Category	Base	PAL 1	PAL 2	PAL 3	PAL 4
Enplanements	256,191	275,634	296,254	318,133	341,298
Public Parking Demand (with 20% daytime accumulation)	553	595	640	687	737
Effective Public Parking Supply	850	850	850	850	850
Capacity/(Deficiency)	297	255	210	163	113

RED indicates a deficiency in existing facilities

Rental Car Parking

pages 4-68 to 69

Rental Car Ready/Return Parking Requirements					
Category	Base	PAL 1	PAL 2	PAL 3	PAL 4
Peak Hour Transactions/Demand		221	237	255	273
Effective Ready/Return Supply	323	323	323	323	323
Capacity/(Deficiency)		102	86	68	50

Rental Car Storage Parking Requirements					
Category	Base	PAL 1	PAL 2	PAL 3	PAL 4
Typical Rental Car Storage Demand		303	326	350	375
Effective Rental Car Storage Supply	133	133	133	133	133
Capacity/(Deficiency)		(170)	(193)	(217)	(242)

RED indicates a deficiency in existing facilities

Support Facilities

pages 4-71 to 75

- Fueling Facilities
  - Capacity Adequate for Planning Period
  - Current location may be better used for aircraft storage hangars
- Aircraft Maintenance & Snow Removal Building
  - Capacity Adequate for Planning Period
  - Current location is impeding on space better used for aircraft storage hangars
- Customs & Border Protection
  - Community has identified a need for General Aviation
  - No space currently exists at the airport for such a facility
- Utilities
  - Water service does not have sufficient capacity for additional hangars but a new service line under construction should meet this need
  - Sanitary Sewer system is outdated. Discussion are underway to tie Airport into City of Rapid City Sanitary Sewer Treatment Facility

Other Users

page 4-75

- SD Army National Guard
  - Space Adequate for planning period
  - Continue to remain apprised of SDARNG needs
- US Forest Service
  - Current layout is inadequate for existing and future aircraft used by USFS
  - New layouts will be developed in Alternatives

Facility Requirements

- Questions/Comments

Airport Board Workshop Alternatives Presentation – March 24, 2015

Rapid City Regional Airport
Airport Master Plan

Alternatives Review Workshop

Rapid City Regional Airport Board

March 24, 2015

Workshop Objectives

- Update Project Status
- Recap Planning Activity Level Facility Requirements
- Overview of 3 Development Alternatives
- Feedback on Preferred Elements of the 3 Development Alternatives
- Action Steps to select a Preferred Alternative

Study Update

Planning the future of the Rapid City Regional Airport

Passenger Terminal

pages 4-43 to 57

Passenger Terminal Building Space Requirements

Metric	Exist.	Base	PAL 1	PAL 2	PAL 3	PAL 4
Demand						
Annual Enplanements	-	256,191	275,634	296,254	318,133	341,298
Building Areas						
Total Required Gates	7	6	6	6	7	7
Airline Ticket Office (SF)	3,150	4,000	4,000	5,000	5,000	5,000
Airline Ramp/Support (SF)	8,439	7,600	7,600	11,400	11,400	11,400
Staffed Equivalent Positions		15	16	17	19	20
Dedicated Kiosks	6	4	5	6	6	7
Baggage Screening Area (SF)	0	2,580	2,580	3,380	3,380	3,380
Baggage Makeup Area (SF)	5,467	6,200	5,900	6,600	6,600	7,000
Security Screening Lanes	2	2	2	3	3	3
Total Security Area (SF)	3,666	3,125	3,125	4,688	4,688	4,688
Total Holdroom Area (SF)	8,644	6,200	6,600	8,600	8,600	8,400
Aircraft Frontage (LF)	860	571	584	640	661	652
Concourse Circulation (SF)	5,160	4,600	4,600	5,000	5,000	5,000
Baggage Claim Frontage (LF)	124	86	107	115	124	133
Baggage Claim Area (SF)	7,160	3,415	4,277	4,613	4,950	5,306
Baggage Handling Area (SF)	3,428	3,400	3,400	3,400	3,400	3,400
Rental Car Area (SF)	3,230	2,748	2,748	2,748	3,425	3,425
Sterile Area Restrooms	23	8	8	9	9	9
Public Area Restroom	24	10	11	11	12	13

RED indicates a deficiency in existing facilities

Public Parking

page 4-67

Public Parking Requirements

Category	Base	PAL 1	PAL 2	PAL 3	PAL 4
Enplanements	256,191	275,634	296,254	318,133	341,298
Public Parking Demand (with 20% daytime accumulation)	553	595	640	687	737
Effective Public Parking Supply	850	850	850	850	850
Capacity/(Deficiency)	297	255	210	163	113

RED indicates a deficiency in existing facilities

Rental Car Parking

pages 4-68 to 69

Rental Car Ready/Return Parking Requirements

Category	Base	PAL 1	PAL 2	PAL 3	PAL 4
Peak Hour Transactions/Demand		221	237	255	273
Effective Ready/Return Supply	323	323	323	323	323
Capacity/(Deficiency)		102	86	68	50

Rental Car Storage Parking Requirements

Category	Base	PAL 1	PAL 2	PAL 3	PAL 4
Typical Rental Car Storage Demand		303	326	350	375
Effective Rental Car Storage Supply	133	133	133	133	133
Capacity/(Deficiency)		(170)	(193)	(217)	(242)

RED indicates a deficiency in existing facilities

Air Cargo Apron

page 4-60

Air Cargo Apron Requirements

Category	Existing	Base	PAL 1	PAL 2	PAL 3	PAL 4
Cargo Aircraft						
Design Group I	-	-	-	-	-	-
Design Group II	1*	1*	1*	2*	1*	1*
Design Group III	1	1	1	1	2	2
Total	2	2	2	3	3	3
Cargo Apron Space (SY)						
Design Group I	-	-	-	-	-	-
Design Group II	-	2,400	2,400	4,800	2,400	2,400
Design Group III	-	3,300	3,300	3,300	6,600	6,600
Total Space	0	5,700	5,700	8,100	9,000	9,000

RED indicates a deficiency in existing facilities

Aircraft Storage

page 4-62

Aircraft Storage Requirements

Category	Existing	Base	PAL 1	PAL 2	PAL 3	PAL 4
Hangar Space						
T-Hangar	72,710	85,350	91,800	92,700	107,520	113,970
Small Conventional	80,083	57,000	63,300	66,600	79,980	86,280
Large Conventional	106,375	104,610	118,500	125,820	150,960	164,790
Total	259,168	246,960	273,600	285,120	338,400	365,040
Capacity/(Deficiency)	-	12,208	(14,432)	(25,952)	(79,232)	(105,872)

38,060 square feet of T-Hangar space is scheduled for removal in 4 years

RED indicates a deficiency in existing facilities

General Aviation Apron Space

page 4-64

Total Apron Space Requirements

Category	Existing	Base	PAL 1	PAL 2	PAL 3	PAL 4
Aircraft						
Single/Multi Engine Piston	-	12	13	13	15	16
Turboprop	-	13	15	16	18	21
Turbojet	-	4	5	6	7	8
Total	31	30	32	35	40	45
Capacity/(Deficiency)	-	1	(1)	(4)	(9)	(14)
Apron Space (SY)						
Single/Multi Engine Piston	-	9,654	10,299	10,686	12,094	13,145
Turboprop	-	26,832	29,022	31,796	36,612	41,183
Turbojet	-	10,321	11,558	12,957	14,965	17,366
Total Space	60,377	46,807	50,880	55,438	63,671	71,693
Capacity/(Deficiency)	-	13,524	9,451	4,893	(3,340)	(11,362)

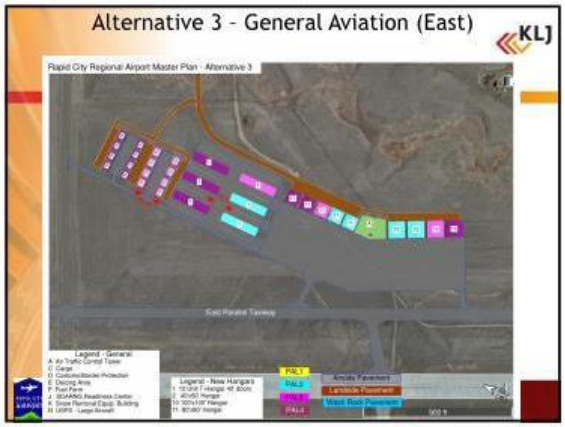
RED indicates a deficiency in existing facilities

RCRA Fly Through of one Alternative

Alternative 1

Alternative 1 - General Aviation

Airport Board Workshop Alternatives Presentation – March 24, 2015 (cont.)



Rapid City Journal Article – May 3, 2015

Rapid City Journal

Master plan for airport discussed Wednesday

MAY 05, 2015 11:00 PM • JOURNAL STAFF

The public is invited to participate in a Wednesday meeting concerning the Rapid City Regional Airport's master plan.

The meeting is from 5 p.m. to 6:30 p.m. in the Community Room of the City/School Administration Center, 300 Sixth St.

Anyone wishing to attend may review the master plan and its preferred alternative at this link: rcgov.org/Airport/airport-master-plan.html

According to a release from the airport's consulting team, the meeting will include an overview of the plan and comments from the public.

Public Open House Meeting Presentation – May 6, 2015

Rapid City Regional Airport Airport Master Plan

Preferred Alternative
Public Open House

Rapid City City/Schools Administration Center
May 6, 2015

Slide 1 of 15

Open House Format

1. Sign-In, take an agenda and information handout
2. View an introductory presentation (here)
3. Proceed to the designated stations to review the preferred airport development alternatives
4. Feel free to ask questions of the project team
5. Submit comments now, or at a later time

Slide 2 of 15

Open House Stations

We have graphics available and staff on-hand to discuss the preferred airport development plans formulated during the Airport Master Plan:

1. Airfield (runways, taxiways)
2. Airline Terminal (parking, building, apron, baggage screening/makeup)
3. General Aviation (hangars, cargo, support)
4. US Forest Service (Air Tanker Base)

Slide 3 of 15

Project Background

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

Slide 4 of 15

Facts about Airport Master Plans

- An Airport Master Plan is prepared by the airport owner
- An Airport Layout Plan (ALP) is required for every airport within the Federal system
- Reviews airport facility needs for next 20 years
- Plan provides a "road map" for the airport owner to efficiently and effectively meet aviation demand

Slide 5 of 15

Why Update the Master Plan Now

- Last Plan completed in 2008
- Most short term projects from 2008 plan have been completed
  - Airline Terminal renovated
  - Old terminal was removed
  - Consolidated Rental Car Quick Turn Facility was constructed
  - Taxiway A was realigned adding apron space
- Existing Air Cargo facilities eliminated with removal of old terminal
- 3 T-Hangars for housing 27 aircraft are scheduled for demolition within 4 years
- A plan was needed to locate Air Cargo, General Aviation and other uses without conflicting with each other
- Assure that future airport projects address changes in FAA requirements

Slide 6 of 15

Steps in a Master Plan

1. Inventory the existing built & natural environment
2. Develop aviation activity forecasts of demand
3. Identify airport safety, capacity and operational needs
4. Analyze alternatives that best meet the needs
5. Create a realistic implementation and financial plan
6. Update the Airport Layout Plan

Slide 7 of 15

Current Project Status

1. Inventory the existing built & natural environment
2. Develop aviation activity forecasts of demand
3. Identify airport safety, capacity and operational needs
4. **Determine an alternative that best meets the needs**
5. Create a realistic implementation and financial plan
6. Update the Airport Layout Plan

Slide 8 of 15

Project Steps Completed

1. Kickoff/Public Informational Meeting (03/13/14)
2. Airport Inventory
3. Activity Forecasts (approved by FAA: 04/16/15)
4. Facility Requirements
5. Alternatives (preferred approved by RCRA Board: 04/14/15)

Draft report documents are available on the airport's website:
www.rcgov.org/Airport/airport-master-plan.html

Slide 9 of 15

Key Study Findings to Date

- Total airport passengers are forecast to grow by **24.2%** over the next 20 years, with aircraft operations to grow by **32.4%**
- No additional runway length needed for the existing runways
- Precision Instrument Approach needed for Runway 14
- Airline activity within the 20 year period can be accommodated in the existing terminal
- Additional baggage screening and baggage makeup space needed to meet current demands
- Space is needed for Air Cargo, General Aviation Hangars, USFS tanker base and support facilities

Slide 10 of 15

Preferred Alternative Fly Through

Slide 11 of 15

Next Steps

1. Consider comments from Public Open House
2. Finalize Alternatives Analysis/Preferred Development
3. Prepare Implementation plan
4. Prepare Environmental and Land Use plans
5. Prepare draft Airport Master Plan report
6. Prepare draft Airport Layout Plan

Goal is to have a draft Master Plan Report and Airport Layout Plan submitted by August 2015.

Slide 12 of 15

Public Open House Meeting Presentation – May 6, 2015 (cont.)

Public Involvement

- Promotes information sharing among the airport stakeholders, which includes airport users and the public
- Provides an opportunity to collect information and solicit comments before major decisions are made
- Study has been coordinated with airport management, Airport Board and airport focus group stakeholders
- Public Open House Meetings:
  1. Study Kickoff (03/13/14)
  2. Preferred Development (today)

Slide 13 of 15

Public Involvement

How can I participate further in the study?

- Ask questions of the project team to learn more about what is important to you/your organization
- Complete a comment card tonight or in the near future
- Submit your comments through Airport's website - www.rcgov.org/Airport/airport-master-plan.html
- View draft Master Plan documents on Airport's website

Slide 14 of 15

Thank You!

Please proceed to the Open House Stations

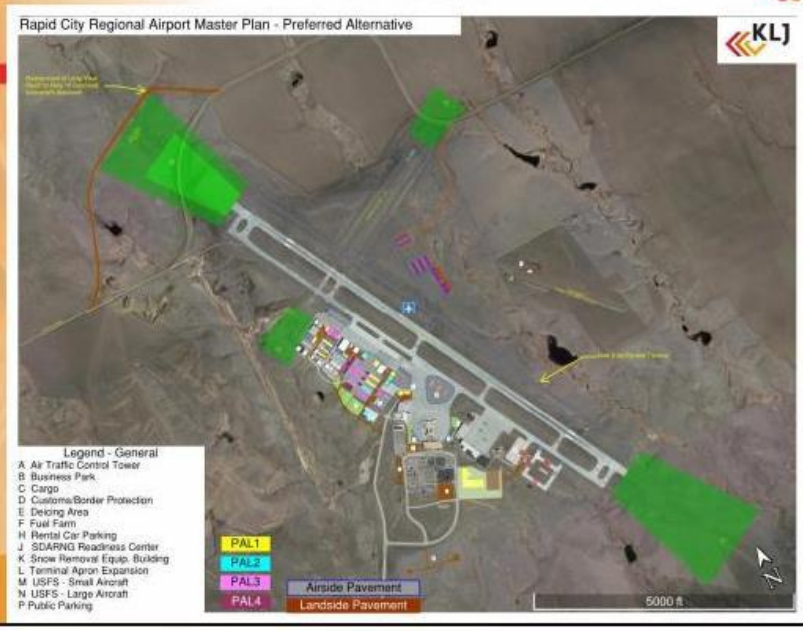
Slide 15 of 15

Open House Stations

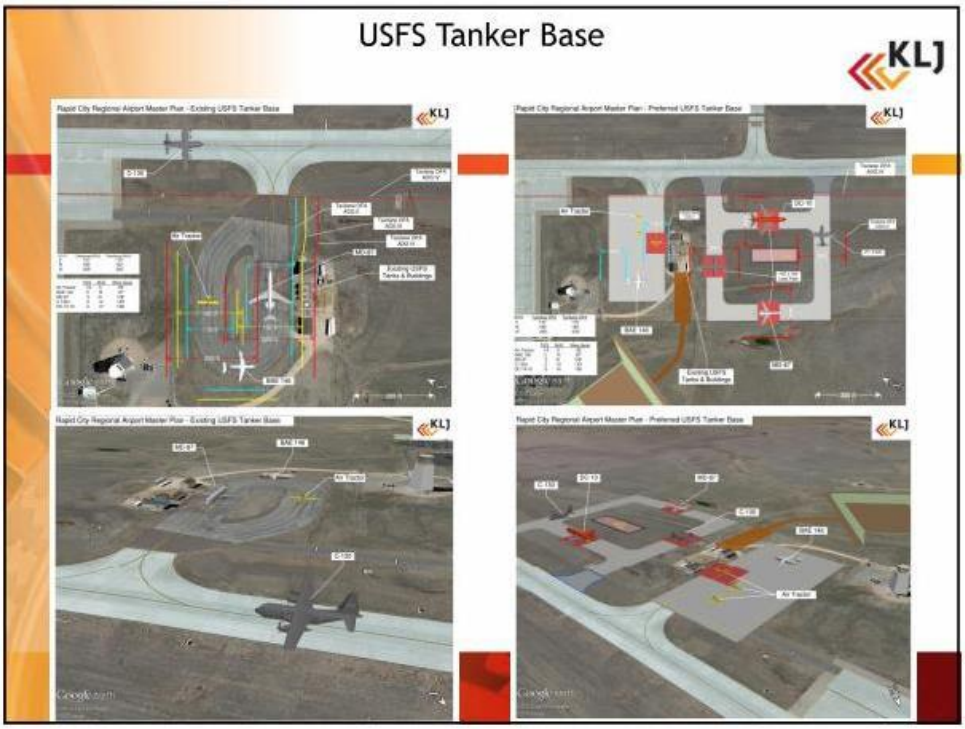
We have graphics available and staff on-hand to discuss the preferred airport development plans formulated during the Airport Master Plan:

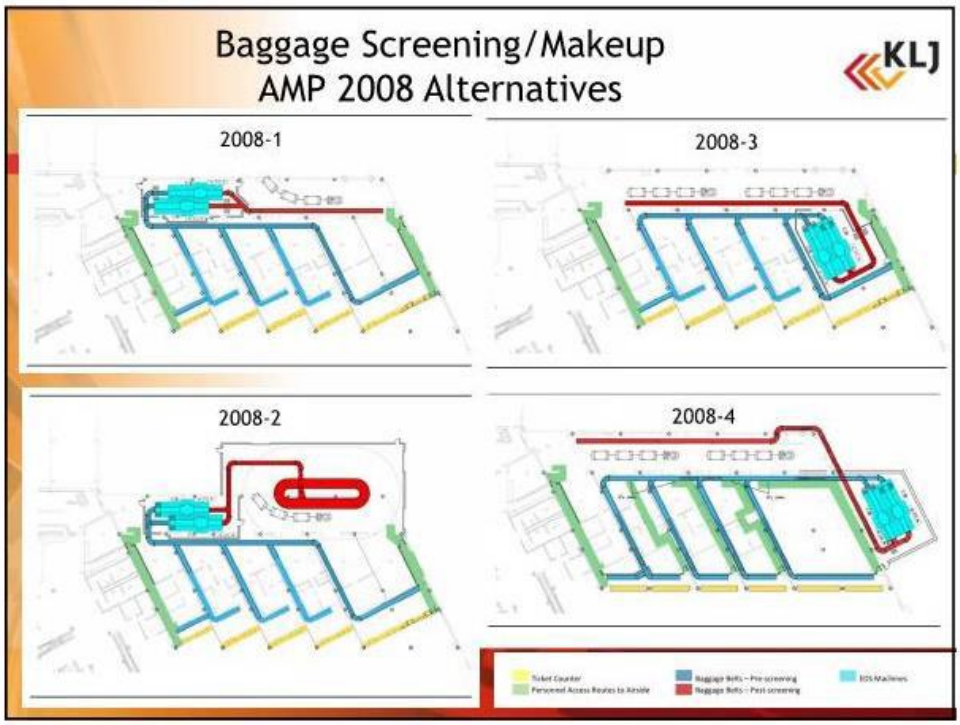
1. Airfield (runways, taxiways)
2. Airline Terminal (parking, building, apron, baggage screening/makeup)
3. General Aviation (hangars, cargo, support)
4. US Forest Service (Air Tanker Base)

Airfield

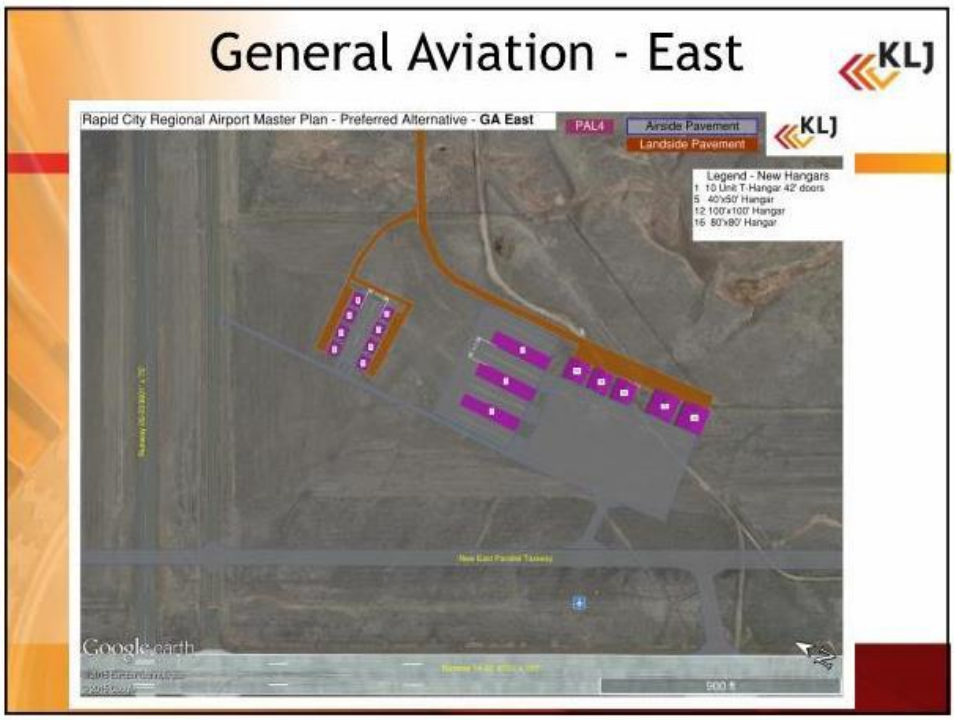


Airline Terminal
KLJ
Legend - General
A Air Traffic Control Tower
C Cargo
D Customs/Border Protection
E Deicing Area
H Rental Car Parking
J SDARNG Readiness Center
K Snow Removal Equip. Building
L Terminal Apron Expansion
P Public Parking
Rapid City Regional Airport Master Plan - Preferred Alternative - Terminal
PAL1
PAL2
PAL3
PAL4
Airside Pavement
Landside Pavement
1000 ft


USFS Tanker Base
KLJ


Baggage Screening/Makeup
AMP 2008 Alternatives
KLJ
2008-1
2008-3
2008-2
2008-4

Legend
Tractors
Baggage Carts
Overhead Doors
New Additional Wall
Baggage Belts
EDS Machines
Airline Ticket
Airline Offices
Baggage Screening
Baggage Make Up
KLJ
Baggage Screening /Makeup
AMP 2015 Alternative
(recommended for consideration but not reviewed or selected by Airport Board)


General Aviation - East
KLJ
Rapid City Regional Airport Master Plan - Preferred Alternative - GA East
PAL4
Airside Pavement
Landside Pavement
Legend - New Hangars
1 10 Unit T-Hangar 42' doors
5 40'x50' Hangar
12 100'x100' Hangar
16 80'x80' Hangar
Google earth
900 ft

General Aviation - West
KLJ
Rapid City Regional Airport Master Plan - Preferred Alternative - GA West
Legend - New Hangars
1 10 Unit T-Hangar 42' doors
2 3 Unit Hangar 42' doors
3 4 Unit Hangar 42' doors
4 3 Unit T-Hangar 42' doors
5 40'x50' Hangar
10 80'x120' Hangar
11 100'x120' Hangar
12 100'x100' Hangar
13 4 Unit Hangar 55' doors
14 3 Unit Hangar 55' doors
15 8 Unit T-Hangar 60' doors
16 80'x80' Hangar
17 80'x100' Hangar
20 65'x120' Cargo Building
Legend - General
C Cargo
D Customs/Border Protection
E Deicing Area
F Fuel Farm
K Snow Removal Equip. Building
PAL1
PAL2
PAL3
PAL4
Landside Pavement
Wash Rack Pavement
Airside Pavement
900 ft

May 2015 Project Status Update
Alternatives Analysis

What is an Airport Master Plan?

An Airport Master Plan is a study used to determine the long-term development plans at an airport. With the ever increasing activity at the Rapid City Regional Airport, the Airport identified the need to update the plan to identify and prioritize improvements to continue to meet passenger and other airport user demands. It is a tool to help direct resources to meet airport development needs over the next 20 years. KLJ is assisting the airport in completing the Airport Master Plan.

Airport master planning consists of several steps: 1) inventory the existing built & natural environment, 2) develop aviation activity forecasts of demand, 3) identify airport safety, capacity and operational needs, 4) analyze alternatives to best meet the needs, and 5) create a realistic implementation and financial plan. The primary goal is to craft a plan that develops a safe and efficient airport for airport users and the overall community. The final product is an Airport Master Plan report and Airport Layout Plan (ALP), public documents that contain the technical analysis, graphical concepts, and describes the basis for decision making. The ALP is approved by the Federal Aviation Administration (FAA). These documents become a tool to prioritize airport capital improvement decisions. Projects are constructed only when they are justified.

The process is an opportunity for various airport stakeholders, including the general public, to participate in the development of the airport's plans. This input feeds directly into the development of the plan. The Airport Master Plan reflects the community's vision for the airport.

The Master Plan is updated periodically to reflect changes of a dynamic aviation industry. Each plan should provide development flexibility to react to industry changes. This Master Plan project is funded by the FAA and the Rapid City Regional Airport.

Master Plan Steps Completed

The Airport Master Plan began in March 2014 with a public informational meeting to kick off the project. The airport inventory, activity forecasts, facility requirements and draft alternatives analysis have been completed. FAA approved the activity forecasts on April 16, 2015. Draft documents are available at www.rcgov.org/Airport/airport-master-plan.html. The airport reached out to the focus groups at several points throughout the study to obtain input.

Current Project Status

The project team has completed the alternatives analysis to evaluate airport development options that balance current and forecasted future airport facility needs with impacts. Alternatives were evaluated based on operational, environmental and fiscal impacts. Focus groups have had an opportunity to provide comments on the alternative concepts. The Rapid City Regional Airport Board has reviewed the alternatives and selected a preferred alternative.

Preferred Alternative Summary

Below is a list of the airport preferred 20-year development concept for each functional area:

Airfield

- No changes to runway length for the airport's two runways, current length is sufficient.
- Upgrade airport infrastructure to accommodate Precision Instrument approaches to Runway 14 to increase the airport's operational utility.
- Add an east parallel taxiway to Runway 14-32.

Passenger Terminal

- Expand the aircraft parking apron to improve aircraft maneuvering.
- Add a deicing pad capable of handling three Aircraft Design Group III aircraft.
- Improve baggage screening and handling with an inline baggage screening system and baggage makeup carousel.
- Add parking for rental car storage.
- Construct additional paved public parking.

Air Cargo

- Construct a new air cargo apron and building near the location of the old terminal building.

General Aviation

- Develop the west general aviation area to accommodate aircraft hangar storage with a mix of aircraft sizes.
- Preserve space on the east side of the airport for future general aviation use.

Roads

- Construct a new road to the general aviation area, approximately 600 feet west of the existing road, to allow more hangar development.
- Realign Long View Road outside of the Runway Protection Zone for the Runway 14 Precision Instrument Approach.

Support Facilities & Other

- Relocate the Snow Removal Equipment Buildings to a new area to allow for hangar construction.
- Develop airport-owned land for non-aeronautical use off of Terminal Road.
- Relocate/replace the Airport Traffic Control Tower between the airline terminal and SDARNG.

Master Plan Next Steps

Based on the comments received, the alternatives analysis will be refined and the Airport Layout Plan (ALP) will be drafted. In addition an implementation plan will be completed and included as a chapter in the Master Plan. A draft Master Plan report and ALP document is planned to be submitted by August 2015.

For More Information

In addition to the Public Open House, draft project information and report chapters are available at www.rcgov.org/Airport/airport-master-plan.html. A feedback form is also available through the website to send comments or questions directly to the airport and project team.

Public Open House Comment Sheet – May 3, 2015

COMMENTS

RAPID CITY *Regional Airport*

RAPID CITY REGIONAL AIRPORT

Wednesday, May 6, 2015 – 5:00 to 6:30 pm City/School Administration Center (Community Room)

Please use the space below to provide comments regarding the Rapid City Regional Airport.

PLEASE PRINT

Name: _____

Address: _____

E-mail: _____
To sign up for project updates

Please leave comments with meeting conductors or mail comments to:

Kent Penney, Airport Planner
KLJ
330 Knollwood Drive
Rapid City, SD 57701
Email: kent.penney@kljeng.com

Before including your address, phone number, email address or other personal identifying information in your comment, be advised your entire comment, including your personal identifying information may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee we will be able to do so.

To fill out an electronic version, go to ***www.rcgov.org*** *and select* ***Airport*** *from departments.*

Public Open House Attendance Sheet – May 3, 2015

RAPID CITY REGIONAL AIRPORT

Rapid City Regional Airport
Airport Master Plan - Public Open House
May 6, 2015 -- 5:00 p.m. - 6:30 p.m.

KLJ

ATTENDANCE LIST

Name:	Organization/Business:	Phone:	Email:
Ritalie Nordstrom	City of Rapid City	721.6398	Ritalie.Nordstrom@rcgov.org
Todd Ossenfort	Airport Board	390-7844	todd@pioneercredit.com
Gary Telkamp		381-5530	garytelkamp@gmail.com
Mark Haugen	Sen. Thune	348-7551	mark_haugen@thune.senate.gov
Marcia Elkins	SDARNG	737-6725	marcia.j.elkins.nfg@mail.mil
Toni Broom	airport	394-4195	toni.broom@rcgov.org
Doug Curry	Airport	430-9297	doug.curry@rcgov.org
Rod Senn	KLJ	721-5553	rod.senn@kljeng.com
David & Connie Finneman	Farm	431-4533	ctfinneman@hotmail.com
Kent Penney	KLJ	605.721.5553	kent.penney@kljeng.com
Dick McConnell	Airport Board		

Appendix D – Airport Classification

Introduction

Airports are given different classifications or designations, depending on the source. This appendix 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. See www.faa.gov/airports/aip/grant_assurances for the grant assurances for Airport Sponsors.

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.
- **Non-hub**: 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 **Non-hub 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 2,500 annual boardings and therefore are not classified as commercial service 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. The current FAA criteria for reliever airports includes more than 75,000 annual operations, a runway greater than 5,000 feet, a precision instrument landing procedure, more than 100 based aircraft, and relieving an airport with 20,000 hours of annual delays of commercial passenger aircraft operations.

Rapid City Regional Airport Classification

The Rapid City Regional Airport is classified as a Primary Category Non-Hub airport in the current NPIAS. This is based on enplaning 256,052 revenue passengers in calendar year 2013 which is 0.034% of total enplanements in the U.S. and thus below the 0.05% threshold to be considered a Small-Hub airport. The enplanement levels and classification of other South Dakota and surrounding Primary Category airports are listed in **Table D-1**.

Table D-1 Primary Category Airports in the Region

ID	Airport	City	State	2013 Enplanements	% of All US Airports	Class
ABR	Aberdeen Regional	Aberdeen	SD	25,567	0.003%	N
BIL	Billings Logan Intl	Billings	MT	387,765	0.052%	S
BIS	Bismarck Municipal	Bismarck	ND	238,929	0.032%	N
CPR	Natrona County Intl	Casper	WY	98,622	0.013%	N
ORD	Chicago O'Hare Intl	Chicago	IL	32,317,835	4.366%	L
DEN	Denver Intl	Denver	CO	25,496,885	3.445%	L
DIK	Dickinson Regional	Dickinson	ND	34,980	0.004%	N
GCC	Gillette-Campbell County	Gillette	WY	29,130	0.004%	N
MSP	Minneapolis/St. Paul Intl	Minneapolis	MN	16,280,835	2.199%	L
PIR	Pierre Regional	Pierre	SD	14,507	0.002%	N
RAP	Rapid City Regional	Rapid City	SD	256,052	0.034%	N
SLC	Salt Lake City Intl	Salt Lake City	UT	9,668,048	1.306%	L
BFF	Heilig Field	Scottsbluff	NE	10,172	0.001%	N
SHR	Sheridan County	Sheridan	WY	14,126	0.002%	N
FSD	Joe Foss Field	Sioux Falls	SD	481,716	0.065%	S
	Total of US Airports			740,147,691	100.0%	

Airport Classes: N - Non-Hub; S - Small Hub; M - Medium Hub; L - Large Hub

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 **Appendix H – Airfield Desig**n for more information on ARC codes. The airport classification categories are:

- Commercial Service: These airport 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. They typically have an ARC of 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. These airports typically have an ARC of 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, and an ARC of 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 airport 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 and an ARC of 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, have an ARC of A-I, and may have turf runways.

Rapid City Regional Airport is classified as a Commercial Service airport in the current South Dakota State Aviation System Plan. There are 6 airports in South Dakota that are included in this category. **Table D-2** includes all Commercial Service airports in the South Dakota SASP and other airports in the vicinity of Rapid City.

Table D-2 South Dakota Commercial Service Airports and other nearby South Dakota Airports

ID	Airport	City	2013 Enplanements	Based Aircraft	State Category
ABR	Aberdeen Regional	Aberdeen	25,567	72	Commercial
EFC	Belle Fourche Municipal	Belle Fourche	-	25	Medium GA
CUT	Custer County	Custer	-	14	Medium GA
3V0	Custer State Park	Fairburn	-	0	Basic
6V0	Edgemont Municipal	Edgemont	-	2	Small GA
HSR	Hot Springs Municipal	Hot Springs	-	19	Medium GA
HON	Huron Regional	Huron	1,783	31	Commercial
PIR	Pierre Regional	Pierre	14,507	97	Commercial
IEN	Pine Ridge	Pine Ridge	0	0	Small GA
RAP	Rapid City Regional	Rapid City	256,052	111	Commercial
FSD	Joe Foss Field	Sioux Falls	481,716	93	Commercial
SPF	Black Hills-Clyde Ice Field	Spearfish	33	69	Large GA
49B	Sturgis Municipal	Sturgis	-	25	Medium GA
6V4	Wall Municipal	Wall	-	13	Small GA
ATY	Watertown Regional	Watertown	4,348	32	Commercial

Appendix E – Airport Funding

Introduction

Airport funding is derived from many sources. This appendix discusses the various sources available to the airport sponsor. Funding sources can be categorized into three main categories:

a. Federal funding
b. State funding
c. Local or Private funding

Federal Funding

Most funding for airport development comes from federal government programs. Currently the most predominant program is the Airport Improvement Program, commonly referred to AIP, managed by the Federal Aviation Administration. This section describes the program, the guidance and procedures for obtaining AIP grants, and the AIP funding history for the Rapid City Regional Airport.

Federal Funding Legislation

The Federal Aviation Administration (FAA) is allowed to issue grants for airport planning and development in the United States under Public Law 49 United States Code (USC) § 47104(a). The FAA normally needs two separate legislative actions in order to be able to issue grants and operate the Airport Improvement Program (AIP) grant program: an authorization and an appropriation.

a. **Authorization.** The authorization legislation has numerous titles but is often referred to as the FAA Reauthorization and may be passed by Congress for varying lengths of time. The authorization sets yearly limits on the AIP funding levels and gives the FAA contract authority to issue grants. The AIP is currently operating under the FAA Modernization and Reform Act of 2012 (Public Law 112-95), and this law has authorized $3,350,000,000 for each of the fiscal years 2012 through 2015 for airport planning and airport development, airport noise compatibility planning and carrying out noise compatibility programs.

b. **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)

It is important to note that AIP funds are not drawn from the government's General Fund, which consists primarily of tax payments from all sources. Instead, revenue for AIP is drawn from the Airport and Airway Trust Fund, commonly referred to as the Trust Fund. The Trust Fund is funded by a variety of revenue sources in the aviation industry, including a 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 tax, a commercial aviation fuel tax and a general aviation fuel tax

Categories of AIP Funding

The authorization and appropriation legislation determine the amount of AIP funding available in a given period. Once that amount is established, a complex set of formulas and categories, defined by the FAA authorization law, determines how much funding is available in 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 several categories.

Passenger 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 > 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.

Cargo Entitlements

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

Nonprimary Entitlements

By a special provision in the authorization, when $3,200,000,000 or more AIP is appropriated in the fiscal year, airports not receiving passenger entitlements will receive nonprimary entitlements. 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 the total AIP funds available for grants is apportioned for airports based on an area/population formula. When the amount of AIP funds available in a fiscal year are $3,200,000,000 or more, 20 percent of the total AIP funds is allocated to nonprimary entitlements with the remaining funds distributed by state based on an area/population formula. These funds are generally limited to commercial service nonprimary and general aviation airports.

Discretionary

These are the remaining appropriated funds after the other types of funds have been established. 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 remaining discretionary funds, 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, as the program proceeds throughout the fiscal year, some airport sponsors, who have decided not to proceed with an AIP project during the year, will choose to "waive" their entitlements for that year. Those funds are then converted to discretionary funds, creating an additional amount of discretionary funds to be used throughout the country for eligible projects.

Federal Share of Project Funding

Federal AIP funds typically do not cover the entire cost of an airport development project. First, the project costs must be eligible for federal funding under current legislation. Then, the costs must be allowable, i.e., reasonable and justified. Once costs have been determined to be allowable, the federal share of allowable costs is limited to a fixed percentage of the total costs. Although there are some exceptions, the current legislation limits the federal share of allowable AIP costs at 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 Regional Airport

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 funding eligibility for the airport. See **Appendix D - Airport Classification** for more information. Rapid City Regional Airport currently meets the definition for the category of a Non-Hub Primary Category airport.

Most AIP-eligible projects would 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.

Federal Funding History for Rapid City Regional Airport

Between 1982 and 2013, Rapid City Regional Airport has received almost $75 million in federal airport development funds under various programs. The following table gives a brief history of the grants for projects on Rapid City Regional Airport.

Table E-1 - Airport Improvement Program Funding

Airport Improvement Program Funding Rapid City Regional Airport					
Project Number	**Description of Development**	**State Funds**	**Local Funds**	**Federal Funds**	**Total Cost**
10-81 (1982)	Construct Base for Runway Extension and Relocate Localizer	$41,902	$41,902	$754,236	$838,040
001-1982 (1982)	Rehabilitate Runway, Install Runway Lighting, Groove Runway, Improve Airport Drainage, Extend Taxiway	31,952	31,952	575,146	639,050
002-1983 (1983)	Groove Runway, Extend Runway	65,693	65,693	1,182,478	1,313,864
003-1984 (1984)	Rehabilitate Taxiway, Rehabilitate Taxiway Lighting, Install Apron Lighting	57,210	57,210	1,029,797	1,144,217
004-1985 (1985)	Construct Apron, Construct Taxiway, Construct Terminal Building	239,216	6,266,227	4,140,713	10,646,156
005-1985 (1985)	Acquire Land for Noise Compatibility within 75 DNL	12,401	13,195	99,208	124,804
006-1986 (1986)	Construct Apron, Improve Access Road	54,837	55,350	987,068	1,097,255
007-1986 (1986)	Acquire Land for Noise Compatibility within 75 DNL	30,858	30,858	246,869	308,585
008-1986 (1986)	Construct Apron, Improve Airport Drainage, Improve Access Road, Construct Taxiway	74,737	93,560	1,479,789	1,648,086
009-1987 (1987)	Construct Apron, Improve Access Road	50,350	50,671	906,300	1,007,321
010-1987 (1987)	Construct Apron, Construct Taxiway	53,440	65,487	1,009,597	1,128,524
011-1988 (1988)	Improve Access Road, Construct Taxiway	117,963	1,005,898	1,707,442	2,831,303
012-1989 (1989)	Install Apron Lighting, Install Miscellaneous NAVAIDS, Improve Airport Drainage	30,823	30,823	554,826	616,472
013-1990 (1990)	Rehabilitate Apron	21,908	21,908	394,359	438,175
014-1991 (1991)	Conduct Airport Master Plan Study, Install Apron Lighting, Acquire Aircraft Rescue & Fire Fighting Safety Equipment, Acquire Snow Removal Equipment	47,932	47,932	862,780	958,644
015-1992 (1992)	Acquire Security Equipment, Rehabilitate Apron, Acquire Snow Removal Equipment	53,060	53,060	955,093	1,061,213
016-1993 (1993)	Acquire Security Equipment, Improve Access Road, Install Guidance Signs, Acquire Aircraft Rescue & Fire Fighting Safety Equipment	44,012	44,012	792,233	880,257
017-1994 (1994)	Install Apron Lighting, Improve Runway Safety Area, Acquire Land for Approaches	15,070	15,070	271,257	301,397
018-1995 (1995)	Rehabilitate Taxiway, Acquire Security Equipment, Install Apron Lighting, Acquire Snow Removal Equipment, Acquire Handicap Passenger Lift Device	55,142	55,142	992,556	1,102,840
019-1996 (1996)	Conduct Airport Master Plan Study	10,000	93,688	180,000	283,688

Airport Improvement Program Funding Rapid City Regional Airport					
Project Number	**Description of Development**	**State Funds**	**Local Funds**	**Federal Funds**	**Total Cost**
020-1996 (1996)	Rehabilitate Runway, Rehabilitate Taxiway	481,751	647,753	6,457,521	7,587,026
021-1997 (1997)	Extend Runway	38,427	38,427	691,679	768,026
022-1998 (1998)	Improve Building, Rehabilitate Taxiway, Improve Snow Removal Equipment Building, Install Runway Lighting	67,825	82,419	1,220,859	1,371,103
023-1999 (1999)	Expand Terminal Building, Rehabilitate Runway	19,477	92,632	570,054	682,163
024-1999 (1999)	Acquire Aircraft Rescue & Fire Fighting Vehicle	30,706	30,824	552,708	614,238
025-2000 (2000)	Rehabilitate Runway Lighting, Conduct Master Plan Study, Improve Access Road, Rehabilitate Taxiway, Improve Terminal Building	62,281	68,328	849,976	980,584
026-2001 (2001)	Rehabilitate Apron, Rehabilitate Runway, Rehabilitate Taxiway, Acquire Snow Removal Equipment	99,727	99,727	1,699,897	1,899,351
028-2002 (2002)	Rehabilitate Apron, Rehabilitate Runway, Expand Apron, Security Enhancements	114,336	171,505	2,542,302	2,828,143
029-2003 (2003)	Improve Runway Safety Area, Update Airport Master Plan Study, Improve Terminal Building	52,064	78,096	968,509	1,098,669
030-2004 (2004)	Rehabilitate Runway, Rehabilitate Taxiway	35,026	52,539	1,663,755	1,752,320
031-2004 (2004)	Rehabilitate Taxiway	83,019	124,529	3,258,052	3,465,600
032-2005 (2005)	Rehabilitate Taxiway	224,274	342,135	10,653,029	11,219,438
033-2006 (2006)	Update Airport Master Plan Study	6,372	9,558	302,665	318,595
034-2007 (2007)	Security Enhancements, Rehabilitate Runway Lighting, Expand Apron	35,800	53,700	1,605,174	1,694,674
035-2008 (2008)	Improve Access Road, Rehabilitate Apron, Rehabilitate Taxiway, Construct Aircraft Rescue & Fire Fighting Building	35,310	28,180	892,380	955,870
036-2009 (2009)	Rehabilitate Taxiway, Construct Aircraft Rescue & Fire Fighting Building, Construct Apron	19,929	28,573	829,391	877,893
037-2009 (2009)	Construct Building	19,621	29,431	904,476	953,528
038-2009 (2009)	Construct Aircraft Rescue & Fire Fighting Building	117,931	176,897	5,601,763	5,896,591
039-2010 (2010)	Acquire Aircraft Rescue & Fire Fighting Vehicle	29,708	14,805	920,761	965,274
040-2010 (2010)	Rehabilitate Taxiway	87,145	58,097	2,759,609	2,904,851
041-2010 (2010)	Rehabilitate Taxiway	63,157	42,105	2,000,000	2,105,262
042-2011 (2011)	Expand Terminal Building, Improve Terminal Building	93,173	10,414,830	2,950,500	13,458,503
043-2012 (2012)	Improve Terminal Building	173,252	2,570,851	2,257,455	5,001,558
044-2013 (2013)	Wildlife Hazard Assessments, Rehabilitate Runway	192,222	192,222	3,460,000	3,844,444
Totals		$3,291,038	$23,588,801	$74,734,262	$101,614,101

Current AIP Funding Available for Rapid City Regional Airport

Rapid City Regional Airport currently receives AIP Primary Airport entitlements averaging about $2.2 million each year. Although that amount is subject to annual Congressional appropriation legislation, it is reasonable to expect continued funding at this level for the duration of the current FAA reauthorization law, which extends through 2015.

While projects may be eligible for discretionary funding, the availability of discretionary funding cannot be predicted with any degree of certainty. Assignment of discretionary funds to an AIP project depends on a variety of factors, including total funding availability, national priorities and project justification. In 2004, 2005, 2009, 2010, and 2013, Rapid City Regional Airport received over $19.5 million in discretionary AIP funding, but there is no guarantee of future funding at that level. In-depth discussions with FAA representatives are necessary to determine the potential availability of discretionary funding for an AIP-funded project.

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 following paragraphs summarize the various steps of the process. However, depending on the specific details of the planned project or the sponsor's status, additional steps may be required. The current version of FAA Order 5100.38 will contain a more 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 include a number of actions that 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 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 the projects that are eligible for AIP funding. From that data, 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, it is important to note that inclusion of the project in the NPIAS or the ACIP is not a guarantee of funding, nor is the value of the project considered a final determination by the FAA.

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. Depending on the project, there may be additional steps required, but the common key steps in the grant process schedule include:

- Submission of environmental review documents
- Selection of sponsor's engineer
- Completion of final plans and specifications
- Submission of an airspace study
- Submission of a construction safety phasing plan
- Completion of safety management system (SMS) coordination
- Submission of disadvantaged business enterprise (DBE) plan
- Completion of necessary land acquisition
- Notice of intent to use entitlement funds (as established in annual Federal Register Notices)
- Advertisement for bids
- Acceptance of grant offer
- Award of contract

In addition to completion of the schedule and coordination with the ADO, the ADO will take a number of actions, including verification of sponsor eligibility, verification that all project requirements will be met and verification the sponsor's Airport Layout Plan (ALP) is current. As required by the Department of Transportation (DOT) Office of Inspector General, the FAA, as an element of its risk-based oversight system, will also verify that a sponsor risk assessment has been completed, a risk level has been assigned, and the risk level is still current. The ADO will also review the sponsor's grant history, focusing on open grants, to ensure the sponsor can comply with the requirement to carry out and complete AIP-funded projects without unreasonable delay.

Grant Programming

Once the pre-grant actions have been completed, there are three major steps before the grant application can be processed:

- Grant Programming
- Congressional Notification
- Sponsor Notification

A grant is "programmed" when the ADO takes the action to create a proposed grant in the automated AIP system. These proposed grants are typically based on estimated costs, either from the sponsor's CIP or as submitted by the sponsor. The grant is then reviewed at various levels with

the FAA Office of Airports. If the grant is approved, it then enters into the congressional notification process.

After the FAA Office of Airports approves the grant, it is forwarded to the FAA's Office of Government and Industry Affairs (AGI). After AGI reviews the grant, it is forwarded to the DOT Office of the Secretary (OST). OST will review the grant, a process that varies with the type and amount of funding as well as current legislative requirements, and notify the appropriate congressional office that the grant can be publicly announced. OST will notify FAA when this process is complete, but the FAA can share specific information about the grant only after the OST notification has been received.

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

Grant Application, Offer and Acceptance

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

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

Before the ADO can issue a grant, the sponsor must submit a complete and correct grant application. This application package must include an Application for Federal Assistance (Standard Form 424), an Application for Development Projects (FAA Form 5100-100 or equivalent) and other documentation (narratives, sketches, photographs, etc.) as requested by the ADO.

The ADO will then review the application package for accuracy and completeness, with the level of review depending on the complexity of the project, the amount of the grant, the size of the airport and past experience with the sponsor. After the ADO completes their review, they will coordinate with the FAA's accounting service to officially reserve the grant funds.

The ADO then prepares a formal grant offer package. This package typically includes a grant cover letter, the actual grant agreement, special conditions, grant assurances, sponsor certifications and current FAA advisory circulars.

The grant cover letter highlights important grant information, such as when the grant document needs to be returned. The grant agreement, when fully signed and executed, is a binding agreement obligating the sponsor and the FAA to the terms and conditions of the agreement. Special conditions highlight extra steps the sponsor must take as part of accepting the grant offer and are included in the actual grant agreement. Grant assurances are a very important part of the grant agreement, since these assurances are obligations that the sponsor agrees to when they accept an AIP grant and the assurances require the sponsor maintain and operate their facilities safely, efficiently and in accordance with specified conditions. Sponsor certifications are sponsor

statements that they have met or will meet the specific requirements of certain elements of the process. Finally, the grant offer package contains a list of the current FAA Advisory Circulars (AC) that set out the applicable policies, standards and specifications that sponsors must follow in an AIP-funded project.

Grant Acceptance

If the sponsor agrees with the grant offer, they must take certain steps to finalize the offer. The grant agreement cannot be altered by the sponsor and must be signed by an authorized representative of the sponsor. The agreement must then be signed by the sponsor's attorney, confirming that the sponsor is legally able to enter into the contract with the US government. After the grant has been executed, a specified number of copies must be returned to the ADO. Until the ADO receives an original signed agreement and enters it into the FAA's system, no funds can be drawn from the grant allocation.

Grant Payments

Once the grant agreement has been fully executed and returned to the ADO, the sponsor may begin requesting payments from the FAA. 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 more frequent submissions are requested by the ADO. 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 of the documentation supporting the grant payment for the required time period and must make this information available on request.

Grant Amendments

Under certain circumstances, a grant agreement can be amended. 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 changed (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.

Coordinate with the ADO to determine requirements for grant amendments.

Grant Closeouts

After the project has been completed, the final step in the process is to complete all of 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 still has additional grant actions it must follow.

- 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.
- The grant assurances and special conditions remain as an obligation the sponsor must comply with. Most grant assurances and special conditions are 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 perpetuity.
- If a sponsor expends more than $500,000 in federal funds (all federal funds, not just AIP) in a fiscal year, it must comply with the Office of Management and Budget (OMB) single audit requirements. Unless the sponsor is an independent airport authority, this requirement applies to the airport's governing organization, i.e., city, county, state, etc.
- If the sponsor desires to dispose of equipment or land acquired with AIP funds, it must have FAA approval.

NOTE: As stated before, the above discussions on the AIP grant process are a summary of current program guidance. It does not include all the details and program requirements available. 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 funding programs available for airport development. The most predominant programs use of funds from a variety of sources, such as aviation fuel taxes or aircraft registration fees, to provide funding for a portion of an airport sponsor's local share of a federally-funded airport development project. This section describes the program and a history of the state funding for the Rapid City Regional Airport.

South Dakota State Aviation Funding

State funding for airport development is managed by the South Dakota Department of Transportation's Office of Air, Rail & Transit, under the direction of the South Dakota Aeronautics Commission. 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 4% to 8% of the cost of an AIP-funded project In recent times this has been 5% which means the state is contributing half of the local 10% match for these federally 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. Contact the SDDOT Office of Aeronautics for application procedures and more information.

For Rapid City, the State has contributed approximately $3.2 million in funding since 1982. The history of funding from the South Dakota Aeronautics Fund is included in **Table E-1**.

Local Funding

While most funding for airport development is derived from federal or state sources, portions of most capital projects as well as the majority of airport operating expenses must be funded through local sources. Ideally, the airport generates sufficient revenue to meet those costs. Rapid City Regional Airport has contributed approximately $23.5 million as the local share for federally funded projects. The history of local funding for the Airport Improvement Program projects is included in **Table E-1**.

Rapid City Regional Airport Revenues

The Rapid City Regional Airport operates with income derived from airport tenants and customers and does not utilize local tax dollars for funding airport operations. The airport also uses funding from the FAA Airport Improvement Program and money derived from a Passenger Facility Charge for eligible projects. The rates and charges for the use of airport facilities is reviewed on an annual basis by the Rapid City Regional Airport Board. The current Rates and Charges, effective January 1, 2014, are listed in **Figure E-1** and **E-2**.

Figure E-1 Rates & Charges - page 1

Rapid City Regional Airport
RATES & CHARGES (Effective FY2014)

2011 to 2012 CPI Adjustment 2.1%

TERMINAL RENTAL RENTS AND FEES:						
			Signatory		*Non-Signatory*	
	Terminal Facilities Rental Rate	$	17.25	$	25.88	/ Square Foot
	Exclusive Conditioned Ground Storage	$	8.62	$	12.93	/ Square Foot
	Terminal Depreciation	$	4.68	$	7.02	/ Square Foot
	Jetway	$	22.50	$	22.50	Per Use
	O&M Rate #2(Old Terminal)	$	8.12			/ Square Foot
LANDING FEES:						
			Signatory		*Non-Signatory*	
	Landing Fees	$	1.59	$	2.39	/1000 lbs. GLW
Applicable on aircraft 12,500 lbs and greater						
GROUND LEASE RATES:						
FBO's:	Building Area	$	0.06670	/ Square Foot		
	Tie-Down Area	$	0.01955	/ Square Foot		
GA/Private Hangars: Ground Lease Rates						
	Unimproved Area	$	0.1252	/ Square Foot		
	Improved Area*	$	0.2502	/ Square Foot		
* Improved means water, electric and gas... utilities are available at owner expense						
AIRCRAFT FUEL FLOWAGE FEE:						
Except on Air Carriers, Cargo Operators, and Slurry Bombers on Fuel Contract with FBO.		$	0.05	/ Gallon		
UNLEADED/DIESEL FUEL SALES RATE:						
		$	0.15	/ Gallon		over cost adjusted monthly
PUBLIC PARKING CONCESSIONS:	**(Standard Parking)**		**Term:**	January 1, 2005 – December 31, 2015		
722 Long Term stalls (Includes 6 ADA Accessible Stalls)			**Minimum Guarantee**			**% of Gross**
315 Short Term Stalls (Includes 6 ADA Accessible Stalls)		$	350,000.00	/yr (29,166.67/mo)		72.00%
1037 Total Parking Spaces (Includes 12 ADA Accessible Stalls)						
Parking Rates:						
Short Term: 1st 20 minutes free / $1.25 for 21-40 minutes / $1.25 for each 20 minutes thereafter / Daily Maximum: $9.00						
Long Term: $2.00 for each 60 minutes / Daily Maximum: $8.00 / Weekly Maximum: $40.00						
Employee Rate: $10.00 per month						
RENTAL CAR AGENCIES:	**(Avis, Budget, Hertz, Alamo/National, Enterprise)**		**Term:**	October 1, 2008 to December 31, 2018		
			Minimum Guarantee			**% of Gross**
Concessions:		$	50,000.00	Annual Minimum		11.00%
			Other Charges			
Customer Facility Charge		$	3.00	per transaction day		
QTA O&M Rate		$	9.47	per square foot		
QTA Car Wash Rate		$	1.00	per wash		
OFF SITE CAR RENTALS:	**(Dollar, Casey's & Craigco)**		**Term:**	January 1, 2013 - December 31, 2016		
						% of Gross
						7.00%
LIMOUSINE SERVICES:	**(Airport Express Shuttle)**		**Term:**	January 1, 2010 - December 31, 2014		
Terminal Space : 2 each 120 Square Feet (10x12)	Parking Stalls: 4 each Stalls		**Minimum Guarantee**			**% of Gross**
Concession Fee:	MAG = 85% of previous year "Airport User Fee"	TBD		/yr (TBD/mo)		5.00%
RESTAURANT:	**(Air Host)**		**Term:**	January 1, 2012 - December 31, 2016		
Concession Fee:		$0.01 to $999,999.99				8% of Gross
		$1,000,000 and greater				10% of Gross
GIFT SHOP:	**(Airport Services, LLC.)**		**Term:**	January 1, 2010 - December 31, 2014		
Concession Fee:	MAG = 95% of previous year "Airport User Fee"		**Minimum Guarantee**			**% of Gross**
		TBD		/yr (TBD/mo)		9.50%

Effective: January 1, 2014 Page 1 of 2 Board Approved: 12/10/13

Table E-2 Rates & Charges - page 2

ADVERTISING:	**(Clear Channel Airport Advertising)**		**Term:**	Month to Month	
			Minimum Guarantee		**% of Gross**
		$	22,000.00	Annual Minimum	30% (Indoor) 15% (Outdoor)
AGRICULTURAL LEASES:			**Term:**	January 1, 2011 to December 31, 2015	
	Total Acreage Available		**Rate:**		
Area A	112.6	$	7.60	per acre per year	
Area B	45.6	$	6.95	per acre per year	
Area C	56.1	$	10.81	per acre per year	
Area D	43.9	$	8.57	per acre per year	
Area E	382.9	$	6.95	per acre per year	
Area F	197.2	$	16.38	per acre per year	
Area G				per acre per year	
Area H	125.1	$	5.35	per acre per year	
Area I				per acre per year	
BADGES & SECURITY:	**(Rapid City Regional Airport)**				
Renewal/Reissue - $10.00	SIDA - $50.00	AOA - $25.00		Public Area - $25.00	
Accessory Fees (6% tax included):	Lanyard $10.00	Arm Band $5.00		Badge Reel $5.00	Badge Pouch $1.00
Security Violation Fines:					
(Fines are assessable at the discretion of the ASC and AED and may also include revocation of access to security areas.)	First Fine		$500	3 offenses within 60 days.	
	Second Fine		$2,500	Subsequent offense within 60 days of 1st fine	
	Third Fine		$5,000	Subsequent offense within 60 days of 2nd fine	
CONFERENCE ROOM RENTAL:	**(Rapid City Regional Airport)**				
Spaces Available:	Administration Meeting Room	**Rate:**		$10 per hour or $50 per day	
	Airport Board Room	**Amenities Available*:**			
	Station 8 Training Room	Conference Phone; Computer/Data Telephone Line; Overhead Projector; SMART Board; Dry Erase Presentation Board; TV/VCR/DVD; Easel; Podium; Recording Capability			
Contact Airport Administration at 394-4195 ext 2 for Reservations or Questions					
					*Additional Charges May Apply and Vary by Facility
MISCELLANEOUS CHARGES:	**(Rapid City Regional Airport)**				
	Telephone Equipment Charge	$	40.00	/ handset	
	Telephone Long Distance	Cost plus Administrative Fee			
	Water Cart Rental	$	75.00	/ month	
	GSE Repair Area	$	100.00	/ day or any portion thereof	
	Labor Rates	$	85.00	/ hour	
	Airport Administrative Fee	Actual cost plus 15%			
Finance Charge on Overdue Payments:	1.5% per month (18% APR) on any past due balances over 30 days				

Appendix F - Airport Background

Introduction

The appendix provides a broad background related to the airport with information covered in the following sections:

- General History
- Management/Governing Structure
- Airline/FBO/Major Tenant History
- Planning History

General History

An airport is more than just a physical facility that exists here and now. It became this physical facility because of actions by public and private interests over the years who have had an interest in an airport existing and thriving in Rapid City, South Dakota. The history of the airport, its projects and planning is pertinent to aid this current Airport Master Plan as this familiar quote reminds us "those who cannot remember the past are condemned to repeat it."

The first airport site for Rapid City was established in 1924 near east North Street and Roosevelt School. It was operational until 1928 after it was determined by the U.S. Army that the field was too short for their aircraft supporting President Calvin Coolidge's summer home in the Black Hills. To replace it, Halley Field was established as a privately owned airport for public use in 1928. Halley Field was located on Maple Avenue at the current location of North Middle School and functioned until 1959 when Interstate 90 was constructed. The U.S. Mail Service refused to use a privately owned airport and in 1938 a new Municipal Airport was constructed east of Rapid City at the current location of Ellsworth Air Force Base. The city offered the municipal airport for the Army Air Corp during World War II and the Rapid City Army Air Base was constructed there in 1942. Because of the significant use of the airfield by the Air Force, the city moved the municipal airport to the current location of Rapid City Regional Airport in 1950.[1] **Exhibit F-1 Historic Airfield Locations** shows the general location of each of Rapid City's four airport sites.

[1] Historic Information provided by Norma J. Kraemer

Exhibit F-1 Historic Airfield Locations

*Intended for Planning Purposes Only

KLJ

N

0 1 2 4 Miles

Rapid City Regional Airport
Historic Airfield Locations
Exhibit F-1

Management/Governing Structure

Airports function as public entities and can exist in a variety of ways related to both how they are governed and how they are managed. Before outlining the current governing and management structure for Rapid City Regional Airport, 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 main types of airport governing structures that are used to provide public oversight for airports. These are as follows:

City/County Department – the City/County governing board serves as the airports 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.

Semi-Independent Airport Authority – there are provisions in state statutes that allow for a City or County to create an Airport Authority 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/County while final responsibility for the airport still rests with the City/County which owns the airport. The City/County 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.

Independent 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 established human resources structure 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.

FBO/Aircraft Services Provided by the Airport

The final element of the airports 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.

Airport with Responsibility for only Airport Operations/Infrastructure – this structure carries out all the traditional responsibilities of an airport such as infrastructure maintenance, airfield safety and security, capital improvements, leasing, finance and related matters. The services directly to aircraft are then provided by private entities such as an FBO.

Airport with Responsibility for Airport Operations/Infrastructure and Aircraft Servicing (similar to an FBO) – this structure carries out all the traditional responsibilities of an airport listed above 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.

Governing Structure at Rapid City Regional Airport

For the Rapid City Regional Airport, the Rapid City Mayor and Council serve as the governing body which owns and is responsible for the operations and capital development of the airport. The City of Rapid City is the airport sponsor as recognized by the FAA. The City of Rapid City was formed in 1876 and functions under an aldermanic form with a mayor elected at large and council members elected with two from each of five wards. Rapid City also has an Airport Board in accordance with South Dakota Codified Laws §§ 50-6 et. Seq. 'City Airport

Boards'. The Rapid City Regional Airport Board is responsible to hire an Executive Director, approve contracts, rules and regulations, establish rates and charges and expend funds for operating and improving the airport. Such powers and responsibilities of the Rapid City Airport Board are subject to oversight and in some cases approval of the Rapid City Mayor and Council. The Rapid City Airport Board consists of five members appointed by the Mayor, and confirmed by the City Council, to three year terms not to exceed two consecutive terms.

As indicated, the Airport Executive Director is appointed by the Rapid City Regional Airport Board. The Executive Director in turn oversees the airport with a management team consisting of three Deputy Director's, one for Operations & Security, one for Maintenance & Facilities, and one for Finance & Administration. One other division, Aircraft Rescue and Firefighting also reports to the Executive Director through the Rapid City Fire Department.

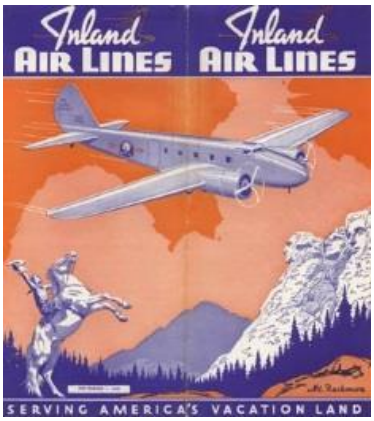
The Rapid City Community Planning & Development Services Department is currently updating the Comprehensive Plan for the City. The plan addresses issues by 'neighborhoods' and the airport is in the 'Airport Neighborhood Area' of the Comprehensive Plan. The findings of the Comprehensive Plan relevant to the airport are referenced from time to time in the narrative of this Airport Master Plan. In addition please note, the City of Rapid City Planning Department serves in a dual role planning for the City and providing staff services as the Metropolitan Planning Organization.

Airline/FBO/Major Tenants History

For the most part, the face of the airport is not the runways and snow plow operator but it is the company they are directly doing business with as an airport user. These companies include those such as Fixed Base Operators, Airlines, Military, or others. The status of existing tenants will be covered in **Appendix T - Terminal Facilities** and **Appendix I - General Aviation**, but this appendix will cover the changes and development of those major tenants throughout the airports history.

The Rapid City Regional Airport is currently home to eighteen different businesses/tenants providing services at the airport. These include five aircraft servicing companies, two U.S. Government tenants, two cargo airlines, four passenger airlines, six car rental agencies and two other terminal tenants.

Airline Service from the Past



The history of airline service for Rapid City began in 1938 with Inland Air Lines (formed as Wyoming Air Service in 1930). Inland served Rapid City on a route to Minneapolis and Denver including stops in Watertown, Huron, Pierre, Spearfish and Cheyenne. The service began at the first Rapid City Municipal Airport later to become Ellsworth Air Force Base and ticket office existed at the Alex Johnson Hotel. When the second municipal airport opened in 1950, scheduled airlines service moved to the new, now present airport.

Inland Air Lines was acquired by Western Airlines in 1944 but continued to fly under the Inland Air Lines name until 1952. Western Airlines was later merged with Delta Airlines in the 1987. Western Airlines continued to serve Rapid City to Denver until 1981, to Minneapolis until 1983, and to Salt Lake starting in 1962 until 1987. Delta continues to serve Rapid City westerly with flights to Salt Lake City.

Frontier Airlines began service to Rapid City in 1970 with service to Denver on a route that included Minot and Bismarck. Frontier also connected Rapid City to Great Falls MT and Kansas City MO on a route that included Billings, Omaha, and Saint Joseph MO. Frontier continued to serve Kansas City until 1973 and Denver until 1985. Frontier went bankrupt at the time, but came back to Rapid City in 2008 with service to Denver until 2010.

North Central Airlines began service to Rapid City in 1959 then became Republic in 1979 until Northwest Airlines started in 1985. North Central and Republic Airlines primarily connected to Minneapolis.

Northwest Airlines began to serve Rapid City in 1985 with service to Minneapolis. This service continued under the Northwest banner until 2008 when Northwest Airlines merged with Delta. Delta continues to serve Rapid City easterly with flights to Minneapolis.

Continental Airlines began serving Rapid City in 1983 with service to Denver. This service continued in the Continental name until around 1993 when Continental removed most regional airline service to Denver.

Current Airlines

Delta Airlines began service under the Delta name in Rapid City in 1987. Delta provides connections to Salt Lake City and Minneapolis and began seasonal service to Atlanta in 2014.

United Airlines began serving Rapid City in 1984 with flights to Denver. United continues this service to this day and also has seasonal service to Chicago O'Hare and Houston Intercontinental.

American Airlines began serving Rapid City in 2011 with flights to Chicago O'Hare and Dallas-Fort Worth. Service to Dallas-Fort Worth continues to this day and seasonal service to Chicago O'Hare is also in place.

Allegiant Airlines provides air service on a weekly basis to various destinations as compared to daily service on traditional airlines. For Rapid City, Allegiant began flights to Las Vegas in 2005 and to Phoenix/Mesa Gateway in 2007.

Recent Airline flights schedules from July and December 2013 and March 2014 are included in **Tables F-1**, **F-2** and **F-3**.

Table F-1

Airline Schedule - Rapid City Regional Airport July 7-13, 2013

Rapid City Regional Airport is not responsible for the content or accuracy of information provided.

Leg	Airline	Flight	Airport	Time	Aircraft	7-Jul-13	8-Jul-13	9-Jul-13	10-Jul-13	11-Jul-13	12-Jul-13	13-Jul-13
out	United Express	5902	Chicago-O`Hare	5:45	ERJ	x	x	x	x	x	x	x
out	Delta	4637	Salt Lake City	6:00	CRJ	x	x	x	x	x	x	x
out	United Express	6073	Denver	6:00	ERJ	x	-	-	-	-	-	x
out	United Express	6112	Denver	6:00	ERJ	-	x	x	x	x	x	-
out	Delta	1133	Minneapolis	6:45	M90	x	x	x	x	x	x	x
out	American	2570	Dallas-Ft Worth	7:20	CRJ	x	x	x	x	x	x	x
out	Delta	4740	Minneapolis	8:00	CRJ	x	x	x	x	x	x	x
out	United Express	3867	Denver	8:45	DH4	x	x	x	x	x	x	x
in	Delta	4576	Minneapolis	9:33	CRJ	x	x	x	x	x	x	x
in	United Express	6007	Denver	9:42	ERJ	-	x	x	x	x	x	-
in	United Express	6007	Denver	9:49	ERJ	x	-	-	-	-	-	-
in	United Express	6007	Denver	9:52	ERJ	-	-	-	-	-	-	x
out	Delta	4576	Minneapolis	9:58	CRJ	x	x	x	x	x	x	-
out	Delta	4576	Minneapolis	9:59	CRJ	-	-	-	-	-	-	x
in	American	2869	Chicago-O`Hare	10:10	ER4	x	x	x	x	x	x	x
out	United Express	5961	Houston	10:12	ERJ	-	x	x	x	x	x	-
out	United Express	4676	Houston	10:19	ERJ	x	-	-	-	-	-	-
out	United Express	4430	Houston	10:23	ERJ	-	-	-	-	-	-	x
in	United Express	4512	Houston	10:41	ERJ	x	x	x	x	x	x	x
out	American	2869	Chicago-O`Hare	10:45	ER4	x	x	x	x	x	x	x
in	United Express	4649	Chicago-O`Hare	10:49	ERJ	x	-	-	-	-	-	x
in	United Express	4625	Chicago-O`Hare	10:51	ERJ	-	x	x	x	x	x	-
out	United Express	6007	Denver	11:06	ERJ	x	x	x	x	x	x	x
in	Allegiant	160	Phoenix-Mesa	11:10	M86	-	x	-	-	-	x	-
out	United Express	4649	Chicago-O`Hare	11:19	ERJ	x	-	-	-	-	-	x
out	United Express	4625	Chicago-O`Hare	11:19	ERJ	-	x	x	x	x	x	-
in	Delta	4823	Salt Lake City	11:23	CRJ	-	-	-	-	-	-	x
in	Delta	4823	Salt Lake City	11:24	CRJ	x	x	x	x	x	x	-
in	Allegiant	160	Phoenix-Mesa	11:45	31B	-	-	-	x	-	-	-
out	Delta	4584	Minneapolis	11:49	CRJ	x	x	x	x	x	x	x
out	Allegiant	161	Phoenix-Mesa	11:50	M86	-	x	-	-	-	x	-
in	Delta	4699	Minneapolis	12:06	CRJ	x	x	x	x	x	x	-
out	Delta	4515	Minneapolis	18:25	CRJ	x	x	x	x	x	x	-
in	United Express	3865	Denver	18:51	DH4	-	-	-	-	-	-	x
out	Allegiant	161	Phoenix-Mesa	19:00	31B	-	-	-	-	-	-	x
in	Allegiant	428	Las Vegas	19:25	M86	-	x	-	-	-	x	-
out	Allegiant	429	Las Vegas	20:05	M86	-	x	-	-	-	x	-
in	Delta	4781	Minneapolis	20:33	CRJ	x	x	x	x	x	x	-
in	United Express	6142	Denver	20:45	ERJ	-	-	-	-	-	-	x
in	American	2530	Dallas-Ft Worth	20:55	CRJ	x	x	x	x	x	x	x
in	United Express	3866	Denver	20:56	DH4	x	-	-	-	-	-	-
in	United Express	3866	Denver	21:03	DH4	-	x	x	x	x	x	-
in	United Express	4401	Chicago-O`Hare	21:38	ERJ	-	x	x	x	x	x	-
in	United Express	4628	Chicago-O`Hare	21:41	ERJ	-	-	-	-	-	-	x
in	United Express	4422	Chicago-O`Hare	21:44	ERJ	x	-	-	-	-	-	-
in	Delta	4543	Salt Lake City	21:55	CRJ	x	-	-	-	-	-	-
in	Delta	4543	Salt Lake City	21:57	CRJ	-	x	x	x	x	x	-
in	Delta	2187	Minneapolis	22:37	M90	-	x	-	-	-	-	x
in	Delta	2187	Minneapolis	22:38	320	-	-	x	-	-	-	-
in	Delta	2187	Minneapolis	22:39	M90	x	-	-	x	x	x	-
in	United Express	4334	Denver	22:59	ERJ	x	-	-	-	-	-	-
in	United Express	6142	Denver	23:03	ERJ	-	-	-	-	-	x	-
in	United Express	6142	Denver	23:04	ERJ	-	-	-	x	-	-	-
in	United Express	6142	Denver	23:08	ERJ	-	x	x	-	x	-	-

Table F-2

Airline Schedule - Rapid City Regional Airport December 8-14, 2013

Rapid City Regional Airport is not responsible for the content or accuracy of information provided

Leg	Airline	Flight	Airport	Time	AircraftType	8-Dec	9-Dec	10-Dec	11-Dec	12-Dec	13-Dec	14-Dec
out	Delta	1133	Minneapolis	6:40	M88	X	X	X	X	X	X	X
out	American	2542	Dallas-Ft Worth	7:10	CRJ	X	X	X	X	X	X	X
out	United Express	3895	Denver	7:45	DH4	X	X	X	X	X	X	X
out	United Express	3867	Denver	9:00	DH4	X	X	X	X	X	X	X
out	Delta	4544	Minneapolis	9:30	CRJ	X	X	X	X	X	X	-
in	Allegiant	160	Phoenix-Mesa	10:00	M80	-	X	-	-	-	X	-
in	Delta	4576	Minneapolis	10:08	CRJ	X	X	X	X	X	X	-
in	United Express	5236	Denver	10:11	CRJ	X	X	X	X	X	X	-
out	Allegiant	161	Phoenix-Mesa	10:40	M80	-	X	-	-	-	X	-
in	United Express	3863	Denver	10:47	DH4	-	-	-	-	-	-	X
out	United Express	5236	Denver	10:55	CRJ	X	X	X	X	X	X	-
out	United Express	3863	Denver	11:22	DH4	-	-	-	-	-	-	X
out	Delta	4584	Minneapolis	11:25	CRJ	-	-	-	-	-	-	X
out	Delta	4584	Minneapolis	11:50	CRJ	X	X	X	X	X	X	-
in	Delta	4699	Minneapolis	12:04	CRJ	-	-	-	-	-	-	X
in	Delta	4699	Minneapolis	12:05	CRJ	X	X	X	X	X	X	-
out	Delta	4729	Salt Lake City	12:30	CRJ	-	X	X	X	X	X	-
in	American	2970	Dallas-Ft Worth	13:45	ER4	X	X	X	X	X	X	X
in	United Express	6051	Denver	13:49	ERJ	-	-	-	-	-	-	X
out	Delta	4478	Minneapolis	13:50	CRJ	-	-	-	-	-	-	X
in	United Express	3864	Denver	13:54	DH4	X	X	X	X	X	X	-
in	Delta	4483	Minneapolis	13:59	CRJ	-	-	-	-	-	-	X
out	American	2970	Dallas-Ft Worth	14:15	ER4	X	X	X	X	X	X	X
out	United Express	6051	Denver	14:23	ERJ	-	-	-	-	-	-	X
out	United Express	3864	Denver	14:29	DH4	X	-	-	-	-	-	-
out	United Express	3864	Denver	14:41	DH4	-	X	X	X	X	X	-
in	Delta	4511	Salt Lake City	15:27	CRJ	-	X	X	X	X	X	-
in	Delta	4483	Minneapolis	15:41	CRJ	X	-	-	-	-	-	-
in	Delta	4483	Minneapolis	15:57	CRJ	-	X	X	X	X	X	-
out	Delta	4663	Minneapolis	16:06	CRJ	X	X	X	X	X	X	-
in	United Express	3865	Denver	16:36	DH4	-	-	-	-	-	-	X
in	United Express	3865	Denver	16:37	DH4	X	X	-	-	X	X	-
in	United Express	4930	Denver	16:37	DH4	-	-	X	X	-	-	-
out	United Express	3865	Denver	17:29	DH4	X	X	-	-	X	X	-
in	Allegiant	428	Las Vegas	18:07	M80	-	-	-	-	X	-	-
in	Allegiant	428	Las Vegas	18:37	M80	X	-	-	-	-	-	-
in	Allegiant	428	Las Vegas	18:46	M80	-	X	-	-	-	-	-
out	Allegiant	429	Las Vegas	18:48	M80	-	-	-	-	X	-	-
in	Allegiant	428	Las Vegas	19:00	M80	-	-	-	-	-	X	-
out	Allegiant	429	Las Vegas	19:18	M80	X	-	-	-	-	-	-
out	Allegiant	429	Las Vegas	19:27	M80	-	X	-	-	-	-	-
out	Allegiant	429	Las Vegas	19:41	M80	-	-	-	-	-	X	-
in	United Express	3866	Denver	19:55	DH4	X	X	X	X	X	X	-
in	United Express	3871	Denver	19:55	DH4	-	-	-	-	-	-	X
in	American	2541	Dallas-Ft Worth	20:10	CRJ	X	X	X	X	X	X	X
in	Delta	2187	Minneapolis	20:12	M88	-	-	-	-	-	-	X
in	Delta	2187	Minneapolis	22:17	M88	X	X	X	X	X	X	-
in	United Express	4930	Denver	23:18	DH4	X	X	-	-	X	X	-

Table F-3

Airline Schedule - Rapid City Regional Airport March 9-15, 2014

Airport is not responsible for the content or accuracy of information provided

Leg	Airline	Flight	Airport	Time	AircraftType	9-Mar	10-Mar	11-Mar	12-Mar	13-Mar	14-Mar	15-Mar
out	United Express	6089	Denver	6:00	ERJ	-	x	-	x	x	x	-
out	United Express	4927	Denver	6:00	DH4	-	-	x	-	-	-	x
out	Delta	3796	Minneapolis	6:30	CRJ	x	x	x	x	x	x	x
out	American	2522	Dallas-Ft Worth	7:00	CRJ	x	x	x	x	x	x	x
out	United Express	6089	Denver	7:25	ERJ	x	-	-	-	-	-	-
out	United Express	6089	Denver	7:30	ERJ	-	-	-	-	-	-	x
out	United Express	4927	Denver	7:40	DH4	-	x	-	x	x	x	-
out	United Express	6089	Denver	7:40	ERJ	-	-	x	-	-	-	-
out	Delta	4576	Minneapolis	8:00	CRJ	x	x	x	x	x	x	x
in	United Express	3863	Denver	9:19	DH4	x	x	x	x	x	x	x
in	Allegiant	160	Phoenix-Mesa	9:49	M80	-	x	-	-	-	x	-
out	United Express	3863	Denver	9:54	DH4	x	x	x	x	x	x	x
out	Allegiant	161	Phoenix-Mesa	10:29	M80	-	x	-	-	-	x	-
in	Delta	3513	Minneapolis	11:08	CRJ	x	x	x	x	x	x	-
in	Delta	4729	Salt Lake City	11:40	CRJ	-	-	-	-	-	-	x
out	Delta	3536	Minneapolis	11:40	CRJ	x	x	x	x	x	x	-
in	Delta	4729	Salt Lake City	11:41	CRJ	-	-	x	-	-	-	-
out	Delta	4729	Salt Lake City	12:30	CRJ	-	-	x	-	-	-	x
in	American	2970	Dallas-Ft Worth	13:50	ER4	x	x	x	x	x	x	x
out	American	2970	Dallas-Ft Worth	14:15	ER4	x	x	x	x	x	x	x
in	United Express	4930	Denver	14:40	DH4	x	x	x	x	x	x	-
in	United Express	4930	Denver	14:41	DH4	-	-	-	-	-	-	x
out	United Express	3864	Denver	15:15	DH4	x	x	x	x	x	x	-
out	United Express	3864	Denver	15:16	DH4	-	-	-	-	-	-	x
in	Delta	4699	Minneapolis	15:21	CRJ	-	-	-	-	-	-	x
in	Delta	3440	Minneapolis	15:22	CRJ	x	-	-	-	-	-	-
in	Delta	4699	Minneapolis	15:22	CRJ	-	x	x	x	x	x	-
out	Delta	3770	Minneapolis	15:48	CRJ	x	-	-	-	-	-	-
out	Delta	4740	Minneapolis	15:48	CRJ	-	x	x	x	x	x	x
in	United Express	5266	Denver	16:19	CRJ	-	-	-	-	-	-	x
in	United Express	3865	Denver	16:29	DH4	x	-	-	-	-	-	-
in	United Express	3865	Denver	16:46	DH4	-	x	x	x	x	x	-
out	United Express	5266	Denver	16:49	CRJ	-	-	-	-	-	-	x
in	Allegiant	160	Phoenix-Mesa	16:59	M80	-	-	-	x	-	-	-
out	United Express	3865	Denver	17:04	DH4	x	-	-	-	-	-	-
in	Delta	4663	Minneapolis	17:08	CRJ	-	-	-	-	-	-	x
in	Delta	4663	Minneapolis	17:09	CRJ	x	x	-	x	x	x	-
out	United Express	3865	Denver	17:21	DH4	-	x	x	x	x	x	-
out	Delta	4729	Salt Lake City	17:36	CRJ	x	x	-	x	x	x	-
out	Allegiant	161	Phoenix-Mesa	17:42	M80	-	-	-	x	-	-	-
in	Allegiant	428	Las Vegas	18:59	M80	-	-	-	-	-	x	-
out	Allegiant	429	Las Vegas	19:39	M80	-	-	-	-	-	x	-
in	American	2541	Dallas-Ft Worth	20:00	CRJ	x	x	x	x	x	x	x
in	Allegiant	428	Las Vegas	20:09	M80	-	x	-	-	-	-	-
in	United Express	3866	Denver	20:27	DH4	-	-	x	-	-	-	-
in	United Express	3866	Denver	20:37	DH4	-	x	-	x	x	x	-
in	Delta	3790	Minneapolis	20:38	CRJ	-	-	-	-	-	-	x
in	Delta	4585	Minneapolis	20:39	CRJ	-	-	x	-	-	-	-
in	United Express	6169	Denver	20:48	ERJ	-	-	-	-	-	-	x
out	Allegiant	429	Las Vegas	20:49	M80	-	x	-	-	-	-	-
in	Delta	4841	Salt Lake City	21:35	CRJ	x	x	-	x	x	x	-
in	United Express	3866	Denver	21:47	DH4	x	-	-	-	-	-	-
in	Delta	3790	Minneapolis	22:19	CRJ	x	x	x	x	x	x	-
in	United Express	6169	Denver	23:05	ERJ	-	x	x	x	x	x	-
in	United Express	6169	Denver	23:22	ERJ	x	-	-	-	-	-	-

FBOs

WestJet Air Center was founded in 1959 and has been serving Rapid City since it began.

Major Tenants

The Rapid City Regional Airport has been a home for the South Dakota Army National Guard (SDARNG) since 1953. The City leased a portion of the then newly opened municipal airport on a 100 year lease with no remuneration as it was determined to be in the public interest. The current mission of the SDARNG is to provide medical transport and air cargo transport. The mission is completed using six UH-60 Blackhawk helicopters, six UH-72 Lakota helicopters, and one C12 Huron Aircraft. The SDARNG has identified improvements planned at the airport and those items will be included in the master plan as applicable.

The U.S. Forest Service has maintained a tanker base at Rapid City Regional Airport since the 1990's. A loop taxilane was constructed at its present location and there are three buildings at the tanker base in addition to a retardant mixing station. The main building houses the flight operations office, pilot briefing area, and crew quarters. A garage houses a vehicle, workshop, and general storage. A storage building houses hoses and filling equipment. Maintenance of the facilities and pavement has been conducted at the tanker base over the years but no other substantial improvements have been constructed.

Planning History

The Federal Aviation Administration has placed an emphasis on planning for many decades. The Rapid City Regional Airport has conducted a number of planning projects which are outlined chronologically below:

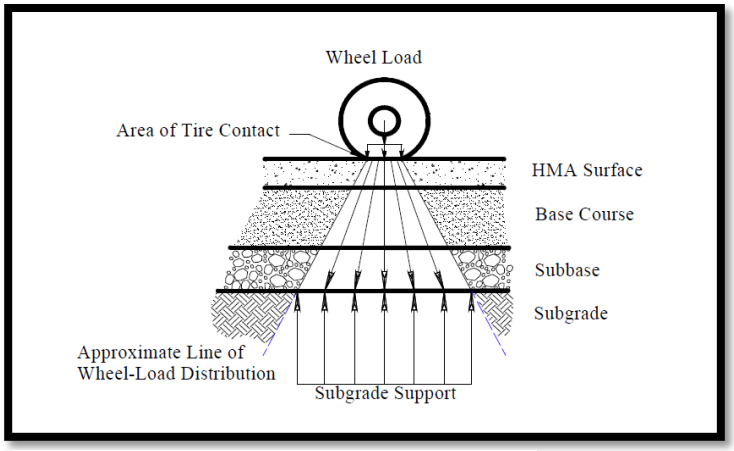
- Conduct Airport Master Plan Study 1991 ($145,000)
- Conduct Airport Master Plan Study 1996 ($180,000)
- Conduct Airport Master Plan Study 2000 ($28,000)
- Update Airport Master Plan 2003 ($150,000)
- Update Airport Master Plan 2008 RS&H ($302,665)
- Compatible Land Use Plan 2010 ($119,972)

Appendix G - Airfield Pavements

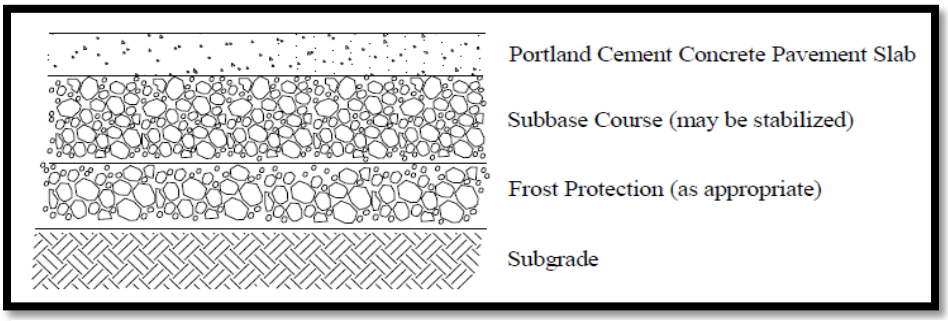
Pavement is one of the most important aspects of an airport. If an airport has failing pavement (runway, taxiway, or apron), aircraft operations will suffer and can affect aircraft safety. When considering pavement design, construction, and maintenance, certain elements need to be considered in order to develop pavement surfaces. Some of these elements include but are not limited to the design aircraft that serves the airport, economic factors, weather conditions, the location of the airport, and personal preference of the owner/operator. This section highlights general knowledge of airfield pavements and things to consider when viewing the pavement at your airport.

Types

There are two main types of pavement on an airfield; one type is Hot-Mix Asphalt (HMA). HMA is a flexible-type of pavement, and distributes aircraft weight through the layers below the asphalt surface (See exhibit below). When constructed, the HMA surface is in a smooth state. This is a result of the application method of rolling the surface for proper compaction.



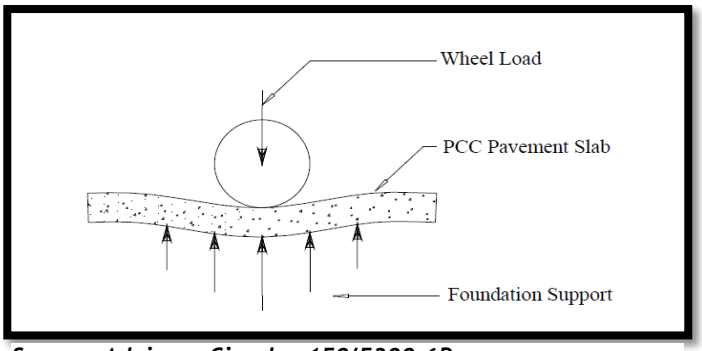
Source: Advisory Circular 150/5380-6B



Source: Advisory Circular 150/5380-6B

The second type of pavement found at an airport is Portland Cement Concrete (PCC). This type of pavement is known as rigid pavement, and distributes weight evenly across the surface (See exhibit below). When initially poured, the PCC surface is a smooth surface.

Both HMA and PCC have FAA specifications and design criteria. HMA is typically referred to as "P-401", and PCC is typically referred to as "P-501". P-401 and P-501 are FAA specifications that contain requirements for the materials used in the pavement such as aggregate, bituminous or cement material, or any admixtures. These specifications also contain requirements for proper construction, quality control, and quality assurance. For further detail, refer to FAA Advisory Circular 150/5370-10F, *Standards for Specifying Construction of Airports*.



Source: Advisory Circular 150/5380-6B

Surface Texturing/Measuring

Because both HMA and PCC initially have a smooth surface when constructed, it is important to look at methods that increase the friction of the surface. This can be completed for either surface type by grooving. Grooving tends to be the most common type of surface treatment, and is typically constructed by cutting transverse grooves, 1 1/2 inches apart, and 1/4 inch deep the entire length of the runway after the pavement has set. These saw cut grooves help with water runoff and reduce the risk of aircraft hydroplaning.

Moreover, contractors can also use a brush/broom finish, burlap dragging, or wire combing to increase the friction of PCC surfaces on taxiways and aprons. Other methods to increase surface friction for HMA consist of Porous Friction Course (PFC), Chip Seals, and Aggregate Slurry Seals. The ultimate goal in this process is to give the aircraft greater friction and better maneuverability during adverse weather conditions.

At commercial services airports, it is a requirement to monitor the level of friction provided by pavements during adverse weather conditions. This can be completed by operations personnel on the field monitoring the braking action of various surfaces with friction measurement equipment. On runways and taxiways used by commercial service aircraft, Continuous Friction Measurement Equipment (CFME) or Decelerometers are utilized to give specific values of friction that are associated with a piece of pavement. This value, known as a "M_u", is a percentage from 0-100 percent (100 percent being absolute friction and 0 percent no friction whatsoever). A Mu

reading of less than 40 requires that a Notice To Airman (NOTAM) be issued to alert aircraft using the airport that less than optimal friction is available for breaking action.

A CFME can be used when calculating the general friction of the runway. When aircraft continually land on a section of pavement, a build-up of rubber can occur. This build up, known as rubber-reversion, collects rubber on the pavement section and decreases the M_u value.

At an airport serving general aviation aircraft only, pavement friction is not required to be monitored by friction measuring equipment during adverse weather conditions. This pavement is monitored by operations personnel and presented with values of braking action reported as good, fair, poor, or nil.

Strength

Pavement strength is driven by multiple factors. Initially, the airport needs to determine the design aircraft that will be using the airport. The design aircraft can be determined by one single-most demanding aircraft, or a mix of the most demanding aircraft that drive similar standards. By identifying the design aircraft, the airport can determine the pavement strength needed for the pavement surfaces on the airfield.

After determining the design aircraft, the FAA has identified a standard method to report pavement strength at an airport. In the aviation world, there are two types of pavement strength classification; Utility and Other-Than-Utility. Utility pavements are capable of handling aircraft of up to 12,500 pounds maximum gross weight, while Other-Than-Utility pavements are capable of handling aircraft greater than 12,500 pounds.

If the design aircraft is 12,500 pounds or less, the pavement strength reporting remains fairly simple and straight forward. However, if the design aircraft is determined to have a maximum gross weight of greater than 12,500 pounds, the ACN-PCN[1] method is used to calculate what the pavement is capable of handling. Aircraft Classification Number (ACN) is the number that expresses relative effect of an aircraft at a given configuration on a pavement structure for a specified subgrade strength. The Pavement Classification Number (PCN) is a number that expresses the load-carrying capacity of a pavement for unrestricted operations. The ACN-PCN method of determining pavement strength does have some drawbacks. It is only intended to report relative pavement strength (so airport operators can evaluate acceptable operations of aircraft), but it is not intended for pavement design.

PCN Reporting Format				
	Pavement Type	**Subgrade Strength (CBR)**	**Tire Pressure (psi)**	**Method of Determination**
Numerical Value	R – Rigid	A – High (≥ 13 CBR)	W – no limit	T – Technical Study
		B – Medium (>8 but < 13 CBR)	X – 182-254	
	F - Flexible	C – Low (>4 but ≤ 8 CBR)	Y – 74-181	U – Using Aircraft
		D – Ultralow (≤ 4 CBR)	Z – 0-73	
Expressed as follows: ### / R or F / A, B, C or D / W, X, Y or Z / T or U				

PCN for Rapid City Regional Airport Runways		
	Runway 14/32	**Runway 5/23**
Pavement Classification Number (PCN)	65/R/C/W/T[2]	15/F/C/X/T[3]

[1] Refer to FAA Advisory Circular 150/5335-5C "Standardized Method of Reporting Airport Pavement Strength – PCN" for additional background.
[2] The calculations are based on a mixture of aircraft including: MD-83 (500 Annual Departures), CRJ-200 (2,000 Annual Departures), ERJ-145 (2,500 Annual Departures) and A319/A320 (150 Annual Departures)
[3] The calculations are based on a mixture of aircraft including PC-12 (3,500 Annual Departures), Citation VI/VII (24,500 Annual Departures)

Markings

Pavement marking is an important aspect of pavement development. Not only does it give the pilot vital information on where they are located on the airfield, but it also can affect the surface friction of the pavement.

More specifically for runway markings, there are two types of paint applications; striated or solid. Striated markings are stripe-like patterns, while solid runway pavement markings do not have any spacing. Pavement heats quicker than paint and, as a result, any exposed pavement will melt any frozen contaminants quicker than what is on a painted surface. By striating the pavement, gaps of exposed pavement can help melt frozen contaminants quicker than if the pavement marking was solid. This increases friction and helps aircraft stop more consistently along the runway. As a result, striated pavement markings are more relevant in northern-climates, where weather contaminants can accumulate and freeze on runway surfaces. Furthermore, striated markings are only used for runway markings, as aircraft are operating at a higher speed. Additional details regarding pavement marking requirements can be found under *Appendix K – Navigational Aids*.

Maintenance

Maintenance is necessary throughout the useful life of the pavement. Moreover, per FAA Grant Assurance #11, federally-funded airports are required to implement a Pavement Preventative Maintenance program. This program assures an effective airport pavement maintenance-management program that will be used throughout the useful life of any pavement constructed, reconstructed, or repaired with federal funds. Pavement distress may include cracking, joint seal damage, disintegration, distortion, or loss of skid resistance. All of these distresses affect the aircraft's ability to maneuver around the airport safely. Moreover, these distresses can cause FOD (Foreign Object Debris) to accumulate on the pavement surface which can damage aircraft and compromise safety.

Pavement maintenance can either be contracted out, or serviced by operations/maintenance personnel on the airfield. Some pavement maintenance methodologies include, but are not limited to, patching, crack seals, mill and overlays, rejuvenators, spall-repairs, or slurry seals. Sometimes fabrics are added to HMA pavements, either during initial construction or as a pavement maintenance method (sometimes called pre-pave fabric), and add resistance to typical HMA pavement wear. Typical repair methods for flexible pavement (HMA) can include any of the above, but rigid pavement (PCC) typically is repaired by crack sealing. In the event that pavement has failed or reached the end of its useful life, a complete reconstruction is necessary.

To monitor the distress of pavement at airports, Pavement Condition Index (PCI) Reports are completed periodically. These reports can sometimes be completed on a state-wide basis, and are updated every few years. PCI reports tell the airport owner how distressed their pavement is based on a percentage value from 100 to 0. The ranges of pavement condition are as follows:

From this evaluation, each category of pavement distress requires a certain level of pavement maintenance. Although it may vary from state to state, a graphic depiction of the typical maintenance required for each category is shown below. In addition the most recent analysis from Rapid City Regional Airport's pavements, conducted in 2010 is shown in **Table G-1**. Please note, most airport PCI reports include an estimate of costs to maintain or rehabilitate airfield pavements. With this information airport owners can plan for the financial needs of pavement management accordingly. The map of the findings from the 2010 PCI Report are provided in **Exhibit G-1**.

Generally, preventative maintenance is most cost effective when the pavement is still in very good to excellent condition. Pavement rehabilitation is generally required with a range in PCI values between 70 and 50. As PCI decreases, rehabilitation costs generally increase. When the PCI value drops below 40 or 50, rehabilitative actions such as thin asphalt mill and inlay no longer provide the desired performance, and complete reconstruction often becomes the most cost-effective means of repairing the pavement.

PCI Number and Typical Maintenance Requirements

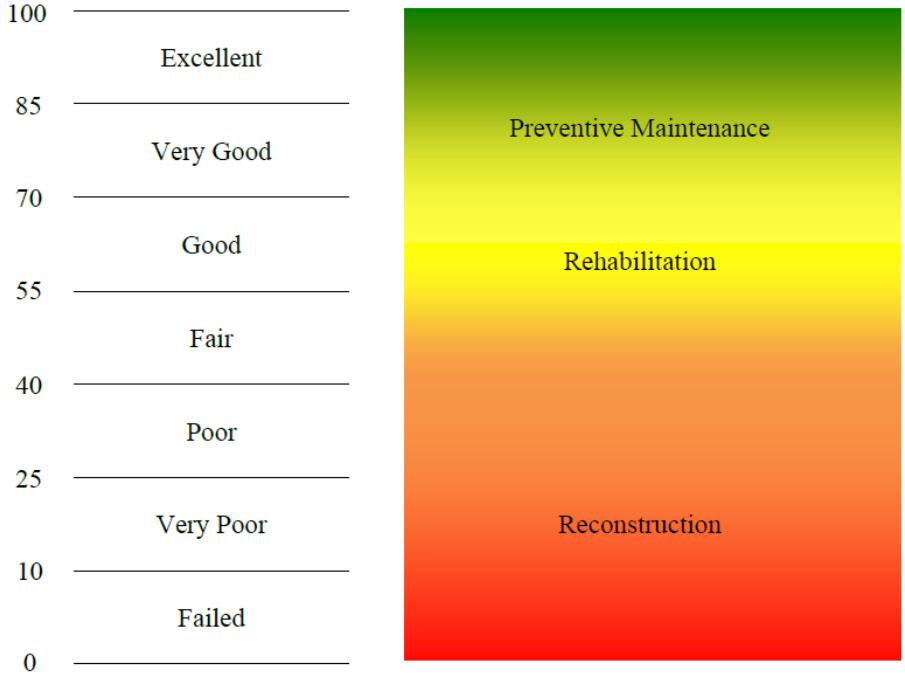


Table G-1 – Pavement Condition Summary

Airside Pavement Condition Summary (2010)				
Component	**Minimum Service Level**	**Lowest Area PCI**	**Weighted Average PCI**	**Highest Area PCI**
Runway 14/32 *	75	80	87	95
Runway 5/23	75	83	87	94
Taxiway A, A1-A7 *	70	75	95	98
Taxiway B	70	87	89	99
Taxiways T1, T2	70	53	85	98
Airline Terminal Apron	60	71	76	90
North GA Apron (AP1)	60	67	67	67
Center GA Apron (AP2) *	60	94	95	96
South GA Apron (AP3) **	60	73	73	73
Old Terminal GA (AP4) **	60	54	73	81
GA Apron by T1 (AP5)	60	73	84	88
GA Apron (AP6)	60	98	99	100
Taxilanes	60	37	74	100
SDARNG	No Ratings			
USFS	No Ratings			

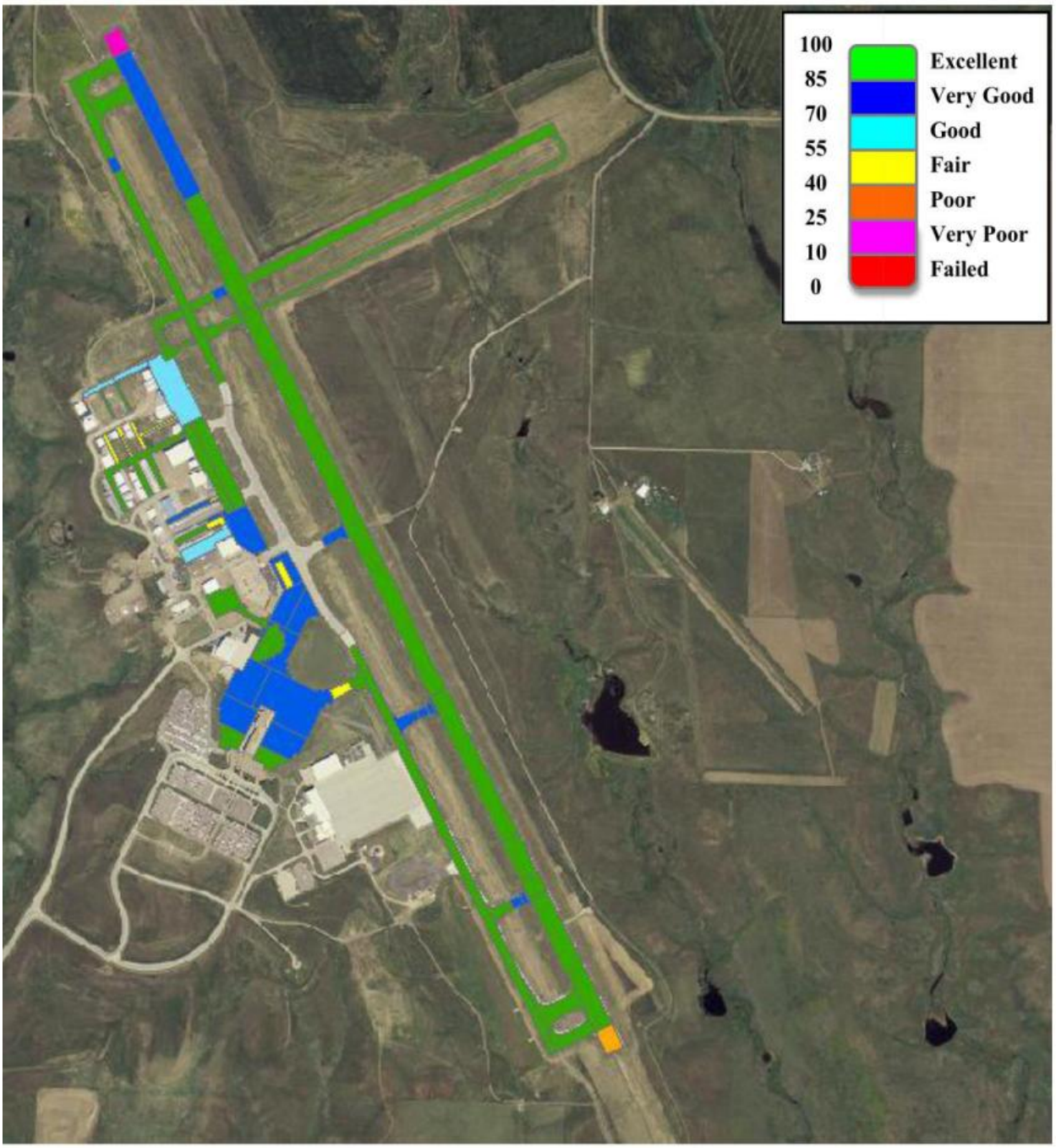
PCI = Pavement Condition Index rating. Taxiway designation includes connecting taxiways; Color code represents overall maintenance requirements

** Pavement Reconstructed/Expanded since 2010*

*** Scheduled for Reconstruction/Expansion in 2014 or 2015*

Source: Pavement Condition Report (August, 2010)

Exhibit G-1 - 2010 Pavement Condition Index



Source: Pavement Condition Report (August, 2010)

Pavement Work Since 2010

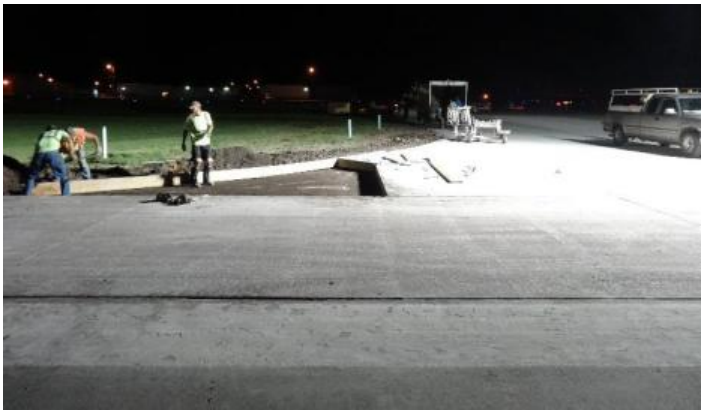
Since the 2010 PCI Report, there have been several pavement projects which have been completed at Rapid City. The areas that have been worked on, are indicated on **Exhibit G-2**. The pavement work has included:

Runways

The Runway 14 blast pad was reconstructed and several panels in the first 1,500 feet of Runway 14 were replaced in summer of 2013. All joints for the runways were resealed in 2014. There are no other major pavement maintenance for the Runways scheduled in the short term.

Taxiways

Taxiway A was realigned in the summer of 2011. This was done from Taxiway T2 north to Taxiway B. The remaining portions of taxiway connecting from Taxiway A to Runway 14-32 were reconstructed in the summer of 2014. This include portions of Taxiway B, A3, A4, and A5 that are all within the runway safety area.



General Aviation Aprons

Two portions of the general aviation apron, AP2 and AP3 were expanded with the Taxiway A realignment in the summer of 2011. There is rehabilitation and expansion of two portions of general aviation apron, AP4 and AP6 scheduled for 2014-2015. When the old terminal building is demolished in 2014-2015, apron AP4 will be reconstructed and expanded to the west to connect with apron AP6. In the summer of 2015, as a part of the old terminal demolition project the asphalt portion of apron AP3 will be reconstructed.

Legend

- Full Pavement Reconstruction
- New Pavement
- Partial Pavement Rehibilitation
- Scheduled 2014 and 2015 Reconstruction

N

0 500 1,000 2,000 Feet

*Intended for Planning Purposes Only

KLJ

Rapid City Regional Airport Pavement Rehabilitation/ Replacement since 2010 Map Exhibit G-2

Appendix H - Airfield Design Requirements

Introduction

This Appendix discusses runway and taxiway design standards and runway length requirements.

FAA Design Guidelines

Guidance on airport design standards is found in FAA Advisory Circular 150/5300-13A, *Airport Design*. 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.

Design Aircraft

Planning a new airport or improvements to an existing airport requires the selection of one or more "design 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 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] The FAA typically only provides funding for the airport to be designed to existing and forecasted critical aircraft that are expected to exceed 500 annual operations.

Airport and Runway Classifications

The FAA has established aircraft classification systems that group aircraft types based on their performance and geometric characteristics. These classification systems, described below and illustrated in **Table H-1** and **Exhibit H-1**, are used to determine the appropriate

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

airport design standards for specific runway, taxiway, apron, or other facilities, as described in FAA AC 150/5300-13A *Airport Design*.

- **Aircraft Approach Category (AAC)**: a grouping of aircraft based on approach speed.
- **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.
- **Approach Visibility Minimums**: relates to the visibility minimums expressed by Runway Visual Range (RVR) values in feet of 1200, 1600, 2400, 4000, and 5000 (corresponding to lower than 1/4 mile, lower than 1/2 mile but not lower than 1/4 mile, lower than 3/4 mile but not lower than 1/2 mile, lower than 1 mile but not lower than 3/4 mile, and not lower than 1 mile, respectively).
- **Taxiway Design Group (TDG)**: A classification of airplanes based on outer to outer Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance.

Table H-1 Classification Systems

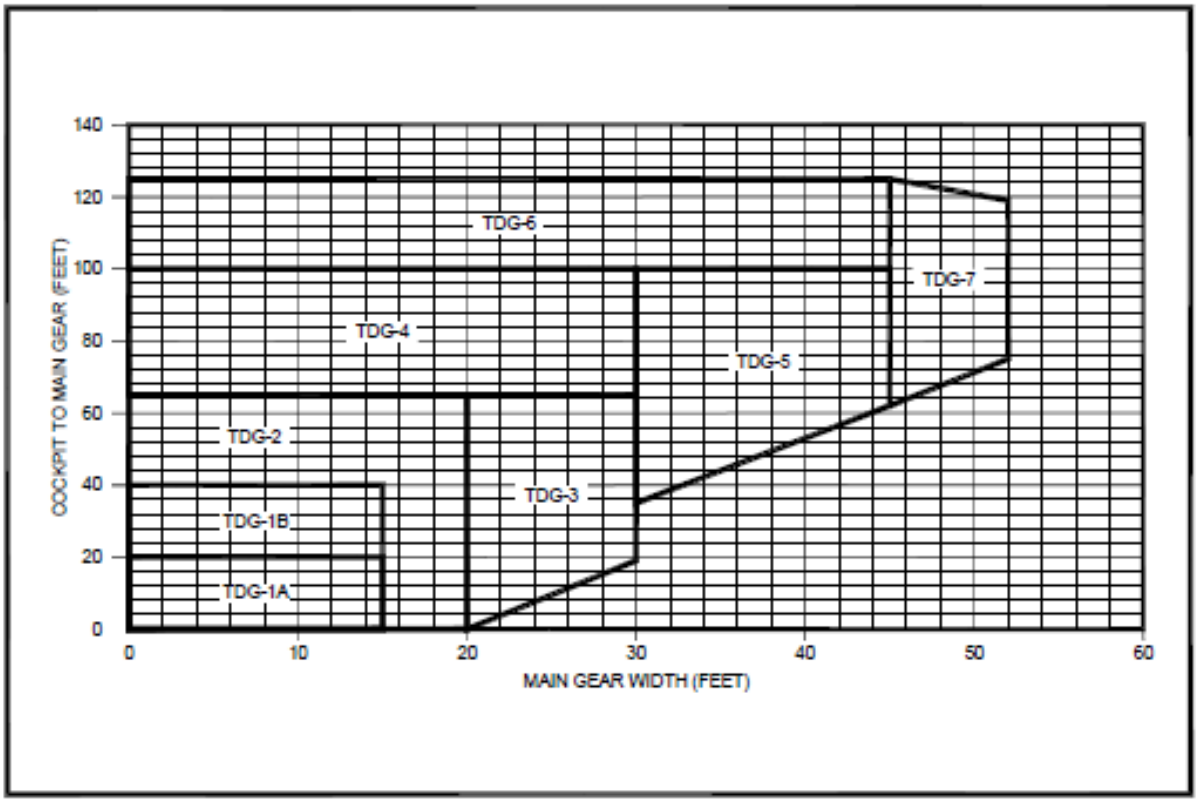
Aircraft Approach Categories	
Aircraft Approach Category	**Approach Speed**
A	Less than 91 knots
B	91 knots or more but less than 121 knots
C	121 knots or more but less than 141 knots
D	141 knots or more but less than 166 knots
E	166 knots or more

Airplane Design Group		
Airplane Design Group	**Wingspan**	**Tail Height**
I	Less than 49 feet	Less than 20 feet
II	49 feet or more but less than 79 feet	20 feet or more but less than 30 feet
III	79 feet or more but less than 118 feet	30 feet or more but less than 45 feet
IV	118 feet or more but less than 171 feet	45 feet or more but less than 60 feet
V	171 feet or more but less than 214 feet	45 feet or more but less than 60 feet
VI	214 feet or more but less than 262 feet	66 feet or more but less than 80 feet

Visibility Minimums	
RVR (feet)	**Instrument Flight Visibility Category (statute miles)**
5000	Not lower than 1 mile
4000	Lower than 1 mile but not lower than 3/4 mile
2400	Lower than 3/4 mile but not lower than 1/2 mile (CAT-I PA)
1600	Lower than 1/2 mile but not lower than 1/4 mile (CAT-II PA)
1200	Lower than 1/4 mile (CAT-III PA)

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

Exhibit H-1 Taxiway Design Group



TDG categories range from TDG-1A to TDG-7, with specific standards found in AC 150/5300-13A. Pavement width requirements for taxiing aircraft are based on the TDG. The TDG is also used to determine standards for taxiway safety areas, clearances and the geometry of taxiway intersections. **Table H-2** shows a sample of some basic taxiway dimensions as related to the TDG. However, please see AC 150/5300-13A for complete details.

Table H-2 TDG Groups and Select Design Standards

Taxiway Design Group								
TDG Number	**1A**	**1B**	**2**	**3**	**4**	**5**	**6**	**7**
Taxiway Width	25 ft	25 ft	35 ft	50 ft	50 ft	75 ft	75 ft	82 ft
Taxiway Shoulder	10 ft	10 ft	15 ft	20 ft	20 ft	30 ft	30 ft	40 ft

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

Design Codes

Using the codes from **Table H-1**, there are several ways in which the codes are used. This includes codes that recognize existing conditions, codes that identify planned capabilities,

codes that are for specific runways and codes for the airport as a whole. In summary these codes are:

- Airport Reference Code (ARC) – an airport designation that signifies the airport's highest Runway Design Code (RDC), minus the third (visibility) component of the RDC.
- Runway Design Code (RDC) – a code signifying the design standards to which the runway is to be built.
- Approach Reference Code (APRC) – a code signifying the current operational capabilities of a runway and associated parallel taxiway with regard to landing operations.
- Departure Reference Code (DPRC) – a code signifying the current operational capabilities of a runway with regard to takeoff operations.

Airport Reference Code (ARC)

The Airport Reference Code (ARC) is an airport designation that represents the AAC and ADG of the aircraft that the 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)

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 FAAAC 150/5325-4. 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.

APRC and DPRC (formerly Runway Reference Codes)

The APRC and DPRC were previously known jointly as the Runway Reference Code (RRC) and was defined as **the current operational capabilities of a runway and its associated parallel taxiway**. The RRC described the operational capabilities of the runway where no special procedures are necessary. In an effort to develop a code more indicative of a runway's operational capabilities, Change 1 to FAA AC 150/5300-13A replaced RRC with two new codes: Approach Reference Code (APRC) and Departure Reference Code (DPRC). **Table H-3** and H-4 summarize the data for APRC and DPRC but refer to FAA AC 150/5300-13A for more specific information on the use of these codes.

Like the RDC, the APRC is composed of three components: the AAC, the ADG, and the visibility minimums. In contrast, the RDC is composed of the same three components, but is based on planned development and has no operational application. APRC signifies the current operational capabilities of a runway and associated parallel taxiway with regard to landing operations. The visibility minimums are linked to critical standards that determine which

aircraft can operate on taxiways adjacent to a runway under particular meteorological conditions with no special operational procedures necessary.

DPRC signifies the runway's operational capabilities with regard to takeoff operations. The DPRC code is the similar to 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 particular meteorological condition with no special procedures necessary.

Table H-3 Approach Reference Code (APRC)

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

Table H-4 Departure Reference Code (DPRC)

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]

Generally, runway standards are related to aircraft approach speed, aircraft wingspan, and designated or planned approach visibility minimums. Runway to taxiway and taxiway/taxilane to taxiway/taxilane separation standards are related to ADG, TDG, and approach visibility minimums. **Table H-5** summarizes aircraft classifications and their related design components. This information will be covered in greater detail later in this appendix.

Table H-5 Classification and Design Components

Classification & Design Components	
Aircraft Classification	**Related Design Components**
Aircraft Approach Category (AAC) Approach Speed	Runway Safety Area (RSA), Runway Object Free Area (ROFA), Runway Protection Zone (RPZ), runway width, runway-to- taxiway separation, runway-to-fixed object
Airplane Design Group (ADG) Aircraft Width/Height	Taxiway and apron Object Free Areas (OFAs), parking configuration, hangar locations, taxiway-to-taxiway separation, runway-to-taxiway separation

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

Code Context

It's critical to determine the context in which the specific code is being used. Depending where the code is being used, a C-II-2400 code could have the following meanings:

- Critical or design aircraft. A C-II aircraft is what the runway was either built for, or is the aircraft that the runway is being designed for. Looking at **Table H-1** above or FAA AC 150/5300-13A, 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 for a CAT-1 Precision Instrument Approach.
- Approach Reference Code (APRC). The runway currently meets the FAA runway design standards for a C-II aircraft with a visibility minimum for a CAT-1 Precision Instrument Approach 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.

Summary

All codes discussed in this section consist of at least two, and sometimes three, characters: a letter, a roman numeral and sometimes a number. As discussed above, the same code can represent planned or actual characteristics of aircraft, runways or airports in a number of different situations. Like many other acronyms, these codes have become a type of "shorthand" in discussions regarding airport design. To avoid confusion, it is important to understand the context in which a code is being used and the specific standards associated

with it. This section is a summary of airport design standards found in FAA AC 150/5300-13A and the AC should be referred to for more detailed information.

As an example, a runway designed to accommodate C-II aircraft with minimums lower than ¾ mile but not lower than ½ mile, or CAT-I, would have a RDC code of C-II-2400. For general discussions, an RDC designation, such as C-II, is normally sufficient to identify the critical or design aircraft, as well as the specific standards used as the basis for the runway design.

Rapid City Regional Airport Codes

In accordance with FAA AC 150/5300-13A, the information in **Table H-6** describe the runways and airfield at the Rapid City Regional Airport:

Table H-6 Rapid City Regional Airport Design Codes

Rapid City Regional Airport Design Codes				
Runway	**RDC**	**APRC**	**DPRC**	**TDG**
14	D-IV-2400	C-III-5000	C-III	4
32	D-IV-2400	C-III-2400	C-III	4
5	A-I-NPI	A-I	A-I	1
23	A-I-VIS	A-I	A-I	1
Airport ARC	Current C-III-2400		Ultimate C-III-2400	

Source: KLJ

Runway Design Standards

The FAA design and safety standards related to runways are described below.

- **Runway Width** – The physical width of the runway pavement.
- **Runway Safety Area (RSA)** – Graded surface centered on the runway centerline. The RSA shall be free of objects and capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.
- **Runway Object Free Area (ROFA)** – The ROFA is also centered on the runway centerline and requires the clearing of all above ground objects protruding above the RSA edge elevation (unless objects need to be located in the OFA for air navigation or aircraft ground maneuvering purposes).
- **Runway Object Free Zone (OFZ)** – The OFZ is a defined volume of airspace centered above the runway centerline that extends 200 feet beyond each end of the runway surface that precludes taxiing or parked airplanes and object penetrations, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function.
- **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. With special application of declared distances, separate approach and departure RPZs are required.

- **Runway Obstacle Free Zone (OFZ)** – The OFZ is a defined volume of airspace centered above the runway centerline that extends 200 feet beyond each end of the runway surface that precludes taxing or parked airplanes and object penetrations, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function.

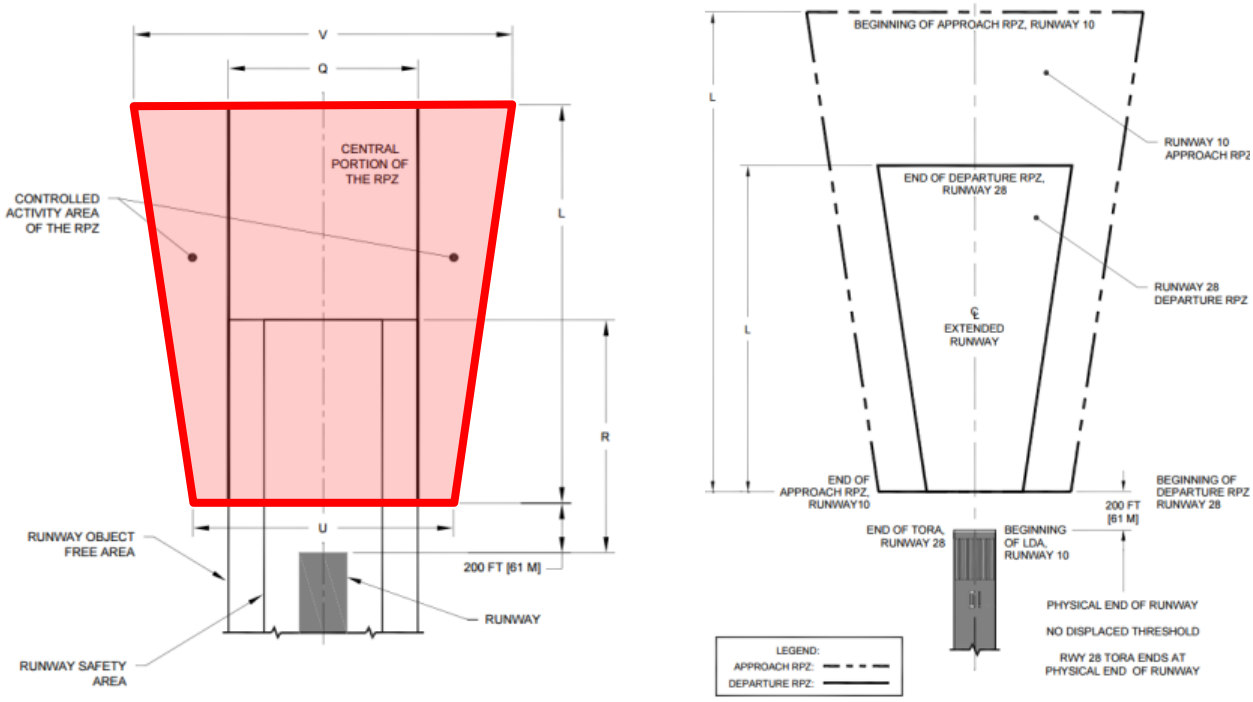
Runway Protection Zones

The RPZ's are addressed specifically at this point due to recent changes in how FAA is handling land use in these areas. The RPZ is intended to protect people and property on the ground for approach and departure areas beyond the runway end. It also mitigates the risk of an aircraft collision with an object on the ground. According to FAA, the function of the RPZ is as follows:

> *"The RPZ function is to enhance the protection of people and property on the ground. Where practical, airport owners should own the property under the runway approach and departure areas to at least the limits of the RPZ. It is desirable to clear the entire RPZ of all above-ground objects. Where this is impractical, airport owners, as a minimum, should maintain the RPZ clear of all facilities supporting incompatible activities."*

Formerly known as clear zones, there are two components of RPZs that are evaluated and analyzed in the master planning process. One component is the required dimensions of the RPZ, which are functions of the design aircraft, type of operation and visibility minimums. There are separate approach and departure RPZs however the most stringent RPZ will control which is usually the approach RPZ. The second component is the use of the land within the boundaries of the RPZ, which must meet FAA criteria and regulations, and is commonly discussed as an element of compatible land use. FAA desires a clear RPZ and airport control within its limits. **Figure H-1** identifies the shape of a typical approach and departure RPZ.

Figure H-1 Runway Protection Zone



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

RPZs and the effort to ensure compatible land use within them are currently a high priority for the FAA. 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 published *Interim Guidance on Land Uses Within a Runway Protection Zone* providing airports with guidance on land use compatibility standards. In some cases, a separate RPZ Alternatives Analysis must be prepared to meet these requirements. 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 as a result of an airfield project, change in RPZ dimensions or local development proposal.
- **Land Uses Requiring FAA Coordination:** Building and structures, residential 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. As of the writing of this Master Plan, the document has not yet been released by FAA in draft form.

Existing and Future Conditions

The standards for the existing, future and ultimate runway configurations at the Rapid City Regional Airport are identified in **Table H-7**. The size of the approach RPZ will increase for Runway 14 in the future. When approach visibility minimums reduce from 1 mile to ½ mile in the future, the inner width and outer width increases by 500 feet.

Table H-7 FAA RPZ Dimensional Standards

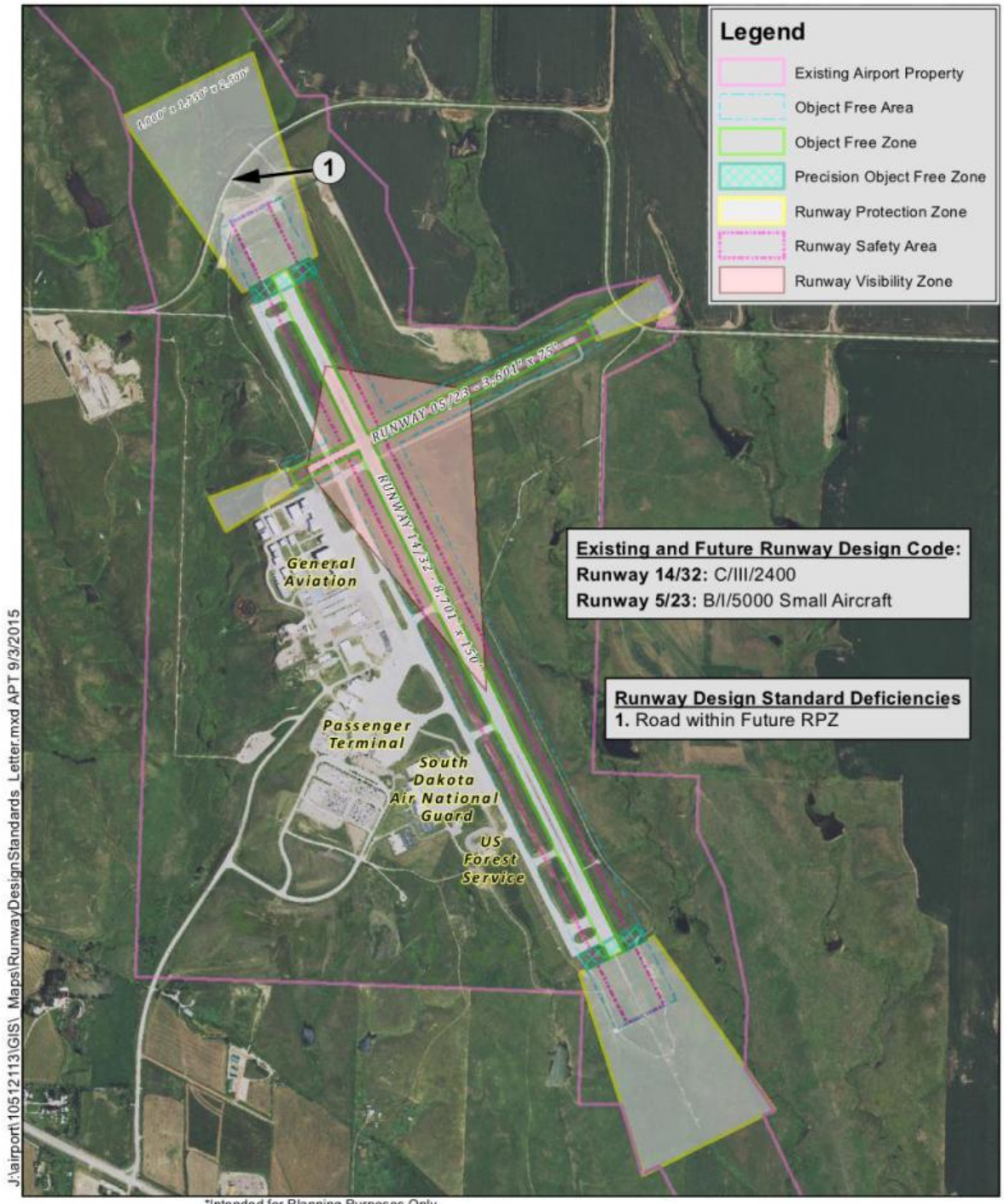
Runway End(s)	Operation	Phase	Design Code	Distance from End	Inner Width	Outer Width	Length	Acres
14	Approach	Existing	C/III/5000	200’	500’	1,010’	1,700’	29.465
14	Approach	Future-Ultimate	C/III/2400	200’	1,000’	1,750’	2,500’	78.914
32	Approach	Existing-Ultimate	C/III/2400	200’	1,000’	1,750’	2,500’	78.914
14-32	Departure	Existing-Ultimate	C-III	200’	500’	1,010’	1,700’	29.465
9-27	Approach	Existing-Ultimate	A/I/5000	200’	250’	450’	1,000’	8.035
9-27	Departure	Existing-Ultimate	A-I	200’	250’	450’	1,000’	8.035

Source: FAA AC 150/5300-13A, KLJ Analysis

The existing and future RPZs were evaluated to determine existing land uses and airport control. A graphical illustration of the RPZs is identified in **Exhibit H-2**. As can be seen from the exhibit the Airport owns land underneath the RPZ. There is one incompatible land use under Runway 14 RPZ (existing and future). ***It is recommended that Long View Road be relocated outside of the RPZ***.

The RPZ land use alternative analysis is expected to be required by the FAA for Runway 14 to upgrade visibility minimums to ½ mile. This would increase the size of the RPZ. The project is proposed beyond the initial planning period of 0-5 years as identified in **Chapter 6: Implementation Plan**. Therefore, a simple planning-level alternatives review was completed in **Chapter 5: Alternatives Analysis**. A formal FAA RPZ analysis will be completed at a later time when the project is in the planning stage and within five years of implementing.

Exhibit H-2 – Runway Design Standards



*Intended for Planning Purposes Only

N

0 1,000 2,000 4,000 Feet

Rapid City Regional Airport
Runway Design Standards
Exhibit H-2

Rapid City Regional Airport Runway Design Standards

Table H-8 provides a summary of existing, future and ultimate design standards for the airport's runways and associated taxiways. The runway design standards matrix from FAA AC 150/5300-13A Change 1 for each runway is included in **Figure H-2 Runway 14-32 Existing/Future/Ultimate**, and **Figure H-3 Runway 5-23 Existing/Future/Ultimate**. In addition the notes to these figures are provided in **Figure H-4 Runway Design Standards Matrix Footnotes**.

Table H-8 Rapid City Regional Airport Design Standards

Runway & Associated Taxiway Design Standards			
	Existing	**Future**	**Ultimate**
Primary Runway 14-32			
AAC and ADG	C-III	C-III	C-III
Design Aircraft	Airbus 319	Airbus 319	Airbus 319
Dimensions	8,701' x 150'	8,701' x 150'	8,701' x 150'
Visibility Minimums	½ mile	½ mile	½ mile
TDG/Design Aircraft	5	5	5
Primary Taxiway Width	75'	75'	75'
Crosswind Runway 05-23			
AAC and ADG	B-I Small	B-I Small	B-I Small
Design Aircraft	Single Piston	Single Piston	Single Piston
Dimensions	3,601' x 75'	3,601' x 60'	3,601' x 60'
Visibility Minimums	1 mile	1 mile	1 mile
TDG/Design Aircraft	2	2	1A
Crosswind Taxiway Width	35'	35'	25'

Source: KLJ

Figure H-2 Runway 14-32 Existing/Future/Ultimate

Table A7-8. Runway design standards matrix, C/D/E - III

Aircraft Approach Category (AAC) and Airplane Design Group (ADG):		C/D/E - III			
ITEM	**DIM** [1]	VISIBILITY MINIMUMS			
		Visual	Not Lower than 1 mile	Not Lower than 3/4 mile	Lower than 3/4 mile
RUNWAY DESIGN					
Runway Length	A	*Refer to paragraphs 302 and 304*			
Runway Width [13]	B	150 ft	150 ft	150 ft	150 ft
Shoulder Width [13]		25 ft	25 ft	25 ft	25 ft
Blast Pad Width [13]		200 ft	200 ft	200 ft	200 ft
Blast Pad Length		200 ft	200 ft	200 ft	200 ft
Crosswind Component		16 knots	16 knots	16 knots	16 knots
RUNWAY PROTECTION					
Runway Safety Area (RSA)					
Length beyond departure end [10, 11]	R	1,000 ft	1,000 ft	1,000 ft	1,000 ft
Length prior to threshold [12]	P	600 ft	600 ft	600 ft	600 ft
Width	C	500 ft	500 ft	500 ft	500 ft
Runway Object Free Area (ROFA)					
Length beyond runway end	R	1,000 ft	1,000 ft	1,000 ft	1,000 ft
Length prior to threshold [12]	P	600 ft	600 ft	600 ft	600 ft
Width	Q	800 ft	800 ft	800 ft	800 ft
Runway Obstacle Free Zone (ROFZ)					
Length		*Refer to paragraph 308*			
Width		*Refer to paragraph 308*			
Precision Obstacle Free Zone (POFZ)					
Length		N/A	N/A	N/A	200 ft
Width		N/A	N/A	N/A	800 ft
Approach Runway Protection Zone (RPZ)					
Length	L	1,700 ft	1,700 ft	1,700 ft	2,500 ft
Inner Width	U	500 ft	500 ft	1,000 ft	1,000 ft
Outer Width	V	1,010 ft	1,010 ft	1,510 ft	1,750 ft
Acres		29.465	29.465	48.978	78.914
Departure Runway Protection Zone (RPZ)					
Length	L	1,700 ft	1,700 ft	1,700 ft	1,700 ft
Inner Width	U	500 ft	500 ft	500 ft	500 ft
Outer Width	V	1,010 ft	1,010 ft	1,010 ft	1,010 ft
Acres		29.465	29.465	29.465	29.465
RUNWAY SEPARATION					
Runway centerline to:					
Parallel runway centerline	H	*Refer to paragraph 316*			
Holding Position [7]		250 ft	250 ft	250 ft	250 ft
Parallel taxiway/taxilane centerline [2]	D	400 ft	400 ft	400 ft	400 ft
Aircraft parking area	G	500 ft	500 ft	500 ft	500 ft
Helicopter touchdown pad		*Refer to AC 150/5390-2*			

Note:

- Values in the table are rounded to the nearest foot. 1 foot = 0.305 meters.

Figure H-3 Runway 5-23 Existing/Future/Ultimate

Appendix 7. Runway Design Standards Matrix

Table A7-1. Runway design standards matrix, A/B-I Small Aircraft

Aircraft Approach Category (AAC) and Airplane Design Group (ADG):		A/B - I Small Aircraft			
ITEM	**DIM** [1]	VISIBILITY MINIMUMS			
		Visual	Not Lower than 1 mile	Not Lower than 3/4 mile	Lower than 3/4 mile
RUNWAY DESIGN					
Runway Length	A	*Refer to paragraphs 302 and 304*			
Runway Width	B	60 ft	60 ft	60 ft	75 ft
Shoulder Width		10 ft	10 ft	10 ft	10 ft
Blast Pad Width		80 ft	80 ft	80 ft	95 ft
Blast Pad Length		60 ft	60 ft	60 ft	60 ft
Crosswind Component		10.5 knots	10.5 knots	10.5 knots	10.5 knots
RUNWAY PROTECTION					
Runway Safety Area (RSA)					
Length beyond departure end [10]	R	240 ft	240 ft	240 ft	600 ft
Length prior to threshold	P	240 ft	240 ft	240 ft	600 ft
Width	C	120 ft	120 ft	120 ft	300 ft
Runway Object Free Area (ROFA)					
Length beyond runway end	R	240 ft	240 ft	240 ft	600 ft
Length prior to threshold	P	240 ft	240 ft	240 ft	600 ft
Width	Q	250 ft	250 ft	250 ft	800 ft
Runway Obstacle Free Zone (ROFZ)					
Length		*Refer to paragraph 308*			
Width		*Refer to paragraph 308*			
Precision Obstacle Free Zone (POFZ)					
Length		N/A	N/A	N/A	N/A
Width		N/A	N/A	N/A	N/A
Approach Runway Protection Zone (RPZ)					
Length	L	1,000 ft	1,000 ft	1,700 ft	2,500 ft
Inner Width	U	250 ft	250 ft	1,000 ft	1,000 ft
Outer Width	V	450 ft	450 ft	1,510 ft	1,750 ft
Acres		8.035	8.035	48.978	79.000
Departure Runway Protection Zone (RPZ)					
Length	L	1,000 ft	1,000 ft	1,000 ft	1,000 ft
Inner Width	U	250 ft	250 ft	250 ft	250 ft
Outer Width	V	450 ft	450 ft	450 ft	450 ft
Acres		8.035	8.035	8.035	8.035
RUNWAY SEPARATION					
Runway centerline to:					
Parallel runway centerline	H	*Refer to paragraph 316*			
Holding Position [15]		125 ft	125 ft	125 ft	175 ft
Parallel taxiway/taxilane centerline [2, 4]	D	150 ft	150 ft	150 ft	200 ft
Aircraft parking area	G	125 ft	125 ft	125 ft	400 ft

Note:

- Values in the table are rounded to the nearest foot. 1 foot = 0.305 meters.

Figure H-4 Runway Design Standards Matrix Footnotes

Footnotes:

1. Letters correspond to the dimensions in Figure 3-26.
2. The runway to taxiway/taxilane centerline separation standards are for sea level. At higher elevations, an increase to these separation distances may be required to keep taxiing and holding aircraft clear of the inner-transitional OFZ (refer to paragraph 308.c). Using this standard to justify a decrease in runway to taxiway/taxilane separation is not permitted.
3. For Airplane Design Group (ADG) V, the standard runway centerline to parallel taxiway centerline separation distance is 400 feet for airports at or below an elevation of 1,345 feet; 450 feet for airports between elevations of 1,345 feet and 6,560 feet; and 500 feet for airports above an elevation of 6,560 feet.
4. For aircraft approach categories A/B, approaches with visibility less than ½-statute miles, runway centerline to taxiway/taxilane centerline separation increases to 400 feet.
5. For ADG-V, approaches with visibility less than ½-statute mile, the separation distance increases to 500 feet. See footnote 7.
6. For ADG-VI, approaches with visibility less than 3/4 statute mile, the separation distance increases to 500 feet plus elevation adjustment. For approaches with visibility less than ½-statute mile, the separation distance increases to 550 feet. See footnote 7.
7. For ADG-III, this distance is increased 1 foot for each 100 feet above 5,100 feet above sea level.
8. For ADG-IV, V, and VI, this distance is increased 1 foot for each 100 feet above sea level.
9. For all ADGs that are aircraft approach categories D and E, this distance is increased 1 foot for each 100 feet above sea level.
10. The RSA length beyond the runway end begins at the runway end when a stopway is not provided. When a stopway is provided, the length begins at the stopway end.
11. The RSA length beyond the runway end may be reduced to that required to install an Engineered Materials Arresting System (EMAS) (the designed set-back of the EMAS included) designed to stop the design aircraft exiting the runway end at 70 knots.
12. This value only applies if that runway end is equipped with electronic or visual vertical guidance. If visual guidance is not provided, use the value for "length beyond departure end."
13. For Airplane Design Group III airplanes with maximum certificated takeoff weight of 150,000 lbs or less and approach visibility minimums of not less than 3/4 mile, the standard runway width is 100 feet, the shoulder width is 20 feet, and the runway blast pad width is 140 feet.
14. For RDC C-I and C-II, a RSA width of 400 feet is permissible.
15. The holding position dimension standards pertain to facilities for small airplanes exclusively, including airplane design groups I and II.

Taxiway Design Standards

Similar to runways, taxiways are subject to FAA design requirements such as pavement width, edge safety margins, shoulder width, and safety and object free area dimensions. The FAA standards in relation to taxiways (as defined in AC 150/5300-13A *Airport Design*) are described below.

- **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/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 located 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

The dimensions for each of these standards vary according to the group of aircraft the taxiways are intended to accommodate. **Figure H-6** shows AC 150/5300-13A taxiway design standards based on Airplane Design Group (ADG) and Taxiway Design Group (TDG).

Figure H-5 FAA Design Standards

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

Runway Length

Current Conditions

Runway 14-32 is the primary runway at Rapid City Regional Airport. It is 8,701 feet long by 150 feet wide. Runway 5-23, the crosswind runway, is 3,601 feet long by 75 feet wide.

Runway Length Requirements

FAA Advisory Circular (AC 150/5325-4B) provides guidance on runway length requirements. The AC uses a five-step process to determine recommended runway lengths for a selected list of critical design airplanes. The five steps are as follows:

- **Step #1.** Identify the list of critical design airplanes that will make regular use of the proposed runway for an established planning period of at least five years. Critical design airplanes are the listing of airplanes (or a single airplane) that results in the longest recommended runway length. Federally funded projects require that critical design airplanes have at least 500 or more annual itinerant operations at the airport (landings and takeoffs are considered as separate operations).
- **Step #2.** Identify the airplanes that will require the longest runway lengths at maximum certificated takeoff weight (MTOW). This will be used to determine the method for establishing the recommended runway length. Except for regional jets, when the MTOW of listed airplanes is 60,000 pounds or less, the recommended runway length is determined according to a *family grouping of airplanes* having similar performance characteristics and operating weights. Although a number of regional jets have a MTOW less than 60,000 pounds, the exception acknowledges the long range capability of the regional jets and the necessity to offer regional jet operators the flexibility to interchange regional jet models according to passenger demand without suffering operating weight restrictions. When the MTOW of listed airplanes is over 60,000 pounds, the recommended runway length is determined according to *individual airplanes*. The recommended runway length in the latter case is a function of the most critical individual airplane's takeoff and landing operating weights, which depend on wing flap settings, airport elevation and temperature, runway surface conditions (dry or wet), and effective runway gradient. The procedure assumes that there are no obstructions that would preclude the use of the full length of the runway.
- **Step #3.** Determine the method that will be used for establishing the recommended runway length. *Potential design airplanes* are categorized according to their MTOWs. MTOW is used because of the significant role played by airplane operating weights in determining runway lengths. Small airplanes, defined as airplanes with MTOW of 12,500 pounds or less, are further subdivided according to approach speeds and passenger seating. Regional jets are assigned to the same category as airplanes with a MTOW over 60,000 pounds. Airplane manufacturers' airport planning manuals (APM) provide the takeoff and landing runway lengths that an airport designer will in turn apply to the associated guidelines set forth by AC 150/5325-4B to obtain runway lengths.
- **Step #4.** Select the recommended runway length from among the various runway lengths generated by step #3 per the process identified in AC 150/5325-4B chapters 2, 3, or 4, as applicable.
- **Step #5.** Apply any necessary adjustment to the obtained runway length, when instructed by the applicable chapter of AC 150/5325-4B, to the runway length generated by step #4 to obtain a final recommended runway length. For instance, an adjustment to the length may be necessary for runways with non-zero effective gradients. Chapter 5 of AC 150/5325-4B provides the rationale for these length adjustments.

Determinations of Runway Length

The runway lengths for both Runway 14-32 and Runway 5-23 have been determined based on the criteria previously outlined. The summary of the runway length requirements for Runway 14-32 are included in **Table H-9 Design Aircraft Runway Length Requirements (Zero Gradient)** and **Table H-10 Design Aircraft Runway Length Requirements (49 Foot Gradient)**. The following figures are included with reference to either Runway 14-32 or Runway 5-23.

Aircraft	Figures
Small Aircraft less than 10 passengers	Figure H-6
Small Aircraft 10 plus passengers	Figure H-7
75% of Aircraft Fleet more than 12,500 pounds up to and including 60,000 pounds	Figure H-8
90% of Aircraft Fleet more than 12,500 pounds up to and including 60,000 pounds	Figure H-9

Aircraft	Airline	Destination Airport	Figures
CRJ200	Delta, United, American	ORD – Chicago O'Hare International DFW – Dallas/Fort Worth International DEN – Denver International MSP – Minneapolis - St. Paul International SLC – Salt Lake City International	Figure H-10 Figure H-11 Figure H-12 Figure H-13 Figure H-14
CRJ700	Alaska, Delta, United	ATL – Atlanta Hartsfield International MSP – Minneapolis - St. Paul International SLC – Salt Lake City International	Figure H-15 Figure H-16 Figure H-17
CRJ900	Delta, United, American	ATL – Atlanta Hartsfield International ORD – Chicago O'Hare International DFW – Dallas/Fort Worth International MSP – Minneapolis - St. Paul International SLC – Salt Lake City International	Figure H-18 Figure H-19 Figure H-20 Figure H-21 Figure H-22
Q400	United	DEN – Denver International	Figure H-23
E145	American, United	ORD – Chicago O'Hare International DFW – Dallas/Fort Worth International DEN – Denver International IAH – Houston Bush Intercontinental	Figure H-24 Figure H-25 Figure H-26 Figure H-27

Aircraft	Airline	Destination Airport	Figures
E175	American, United	ORD – Chicago O'Hare International DFW – Dallas/Fort Worth International DEN – Denver International IAH – Houston Bush Intercontinental	Figure H-28 Figure H-29 Figure H-30 Figure H-31
MD83	Allegiant	LAS – Las Vegas McCarran International SFB – Orlando Stanford International IWA – Phoenix-Mesa Gateway International	Figure H-32 Figure H-33 Figure H-34
A319	Allegiant, Delta	LAS – Las Vegas McCarran International MSP – Minneapolis - St. Paul International SFB – Orlando Stanford International IWA – Phoenix-Mesa Gateway International	Figure H-35 Figure H-36 Figure H-37 Figure H-38
A320	Allegiant	LAS – Las Vegas McCarran International SFB – Orlando Stanford International IWA – Phoenix-Mesa Gateway International	Figure H-39 Figure H-40 Figure H-41
B717	Delta	ATL – Atlanta Hartsfield International MSP – Minneapolis - St. Paul International SLC – Salt Lake City International	Figure H-42 Figure H-43 Figure H-44
B737-800	Alaska, Delta, United	MSP – Minneapolis - St. Paul International SEA – Seattle - Tacoma International	Figure H-45 Figure H-46
B757-200	Delta	MSP – Minneapolis - St. Paul International	Figure H-47

Table H-9 Design Aircraft Runway Length Requirements (Zero Gradient)

DESIGN AIRCRAFT ANALYSIS Zero Runway Gradient Adjustment														
			Aircraft and Engines											
			CRJ200	CRJ700	CRJ900	Q400	E145	E175	MD83	A319	A320	B717	B737-800	B757-200
		Engine	CF34-3B1	CF34-8C5B1	CF34-8C5	PW 150A	AE 3007-A1E	CF34-8E5	JT8D-219	CFM56-5B5/3	CFM56	BR715-A1-30	CFM56-7	PW 2037
		Maximum Takeoff Weight (lbs)	53,000	72,250	80,500	64,500	53,131	82,673	160,000	166,449	171,961	121,000	174,200	255,000
		Runway Design Code (RDC)	D-II	C-II	C-III	C-III	C-II	C-III	D-III	C-III	C-III	C-III	D-III	C-IV
		Taxiway Design Group (TDG	3	3	3	3	3	3	4	3	3	3	3	4
Airlines/Hubs		Distance (NM)	Runway Length (FT)											
United	DEN	260	6,900			5,700	5,700	5,000						
Delta	MSP	425	6,900	5,700	6,600					7,200		6,300	6,200	5,500
Delta	SLC	440	6,900	5,700	6,600							6,500		
American	ORD	675	7,000		7,400		6,300	5,200						
United	ORD	675	7,000				6,300	5,200						
American	DFW	725	7,200		7,500		6,400	5,300						
Allegiant	LAS	730							7,500	7,200	7,000			
Allegiant	IWA	760							7,500	7,200	7,000			
Alaska	SEA	830											6,800	
United	IAH	920					6,800	5,500						
Delta	ATL	1,070		6,600	7,700							7,300		
Allegiant	SFB	1,390							8,800	7,200	7,000			

FAA A/C 150/5325 - 4B Runway Length: 75% of Fleet (up to 60,000lb MTOW) at 90% Useful Load, Length = **8,050**

FAA A/C 150/5325 - 4B Runway Length: 100% of Fleet (up to 60,000lb MTOW) at 90% Useful Load, Length = **9,150**

- Runway lengths calculated based on specific aircraft manufacturer's manuals for ISA +15C temperatures
- Mean daily high temperature of 87 degrees F
- Runway difference in center line elevations N/A *Runway Gradient Adjustment* *0* *feet*
- Elevation 3,204 MSL

Table H-10 Design Aircraft Runway Length Requirements (49 Foot Gradient)

DESIGN AIRCRAFT ANALYSIS Adjusted for Runway Gradient: Maximum Difference between Runway Centerline Elevations 49' = 500' Takeoff Length Extension														
			Aircraft and Engines											
			CRJ200	CRJ700	CRJ900	Q400	E145	E175	MD83	A319	A320	B717	B737-800	B757-200
		Engine	CF34-3B1	CF34-8C5B1	CF34-8C5	PW 150A	AE 3007-A1E	CF34-8E5	JT8D-219	CFM56-5B5/3	CFM56	BR715-A1-30	CFM56-7	PW 2037
		Maximum Takeoff Weight (lbs)	53,000	72,250	80,500	64,500	53,131	82,673	160,000	166,449	171,961	121,000	174,200	255,000
		Runway Design Code (RDC)	D-II	C-II	C-II	C-III	C-II	C-III	D-III	C-III	C-III	C-III	D-III	C-IV
		Taxiway Design Group (TDG	3	3	3	3	3	3	4	3	3	3	3	4
Airlines/Hubs		Distance (NM)	Runway Length (FT)											
United	DEN	260	7,400			6,200	6,200	5,500						
Delta	MSP	425	7,400	6,200	7,100					7,700		6,800	6,700	6,000
Delta	SLC	440	7,400	6,200	7,100									
American	ORD	675	7,500		7,900		6,800	5,700						
United	ORD	675	7,500				6,800	5,700						
American	DFW	725	7,700		8,000		6,900	5,800						
Allegiant	LAS	730							8,000	7,700	7,500			
Allegiant	IWA	760							8,000	7,700	7,500			
Alaska	SEA	830											7,300	
United	IAH	920					7,300	6,000						
Delta	ATL	1,070		7,100	8,200							7,800		
Allegiant	SFB	1,390							9,300	7,700	7,500			

FAA A/C 150/5325 - 4B Runway Length: 75% of Fleet (up to 60,000lb MTOW) at 90% Useful Load, Length = **8,550**

FAA A/C 150/5325 - 4B Runway Length: 100% of Fleet (up to 60,000lb MTOW) at 90% Useful Load, Length = **9,650**

- Runway lengths calculated based on specific aircraft manufacturer's manuals for ISA +15C temperatures
- Mean daily high temperature of 87 degrees F
- Runway difference in center line elevations 49 feet *Runway Gradient Adjustment* *500* *feet*
- Elevation 3,204 MSL

Figure H-6 Small Aircraft less than 10 Passengers

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

Example:

Temperature (mean day max hot month): 59° F (15° C)
Airport Elevation: Mean Sea Level

Note: Dashed lines shown in the table are mid values of adjacent solid lines.

Recommended Runway Length:

For 95% = 2,700 feet (823 m)
For 100% = 3,200 feet (975 m)

Rapid City Regional Airport
86.9 degrees Avg Max
31 feet difference in runway centerline elevation
3,204 feet elevation

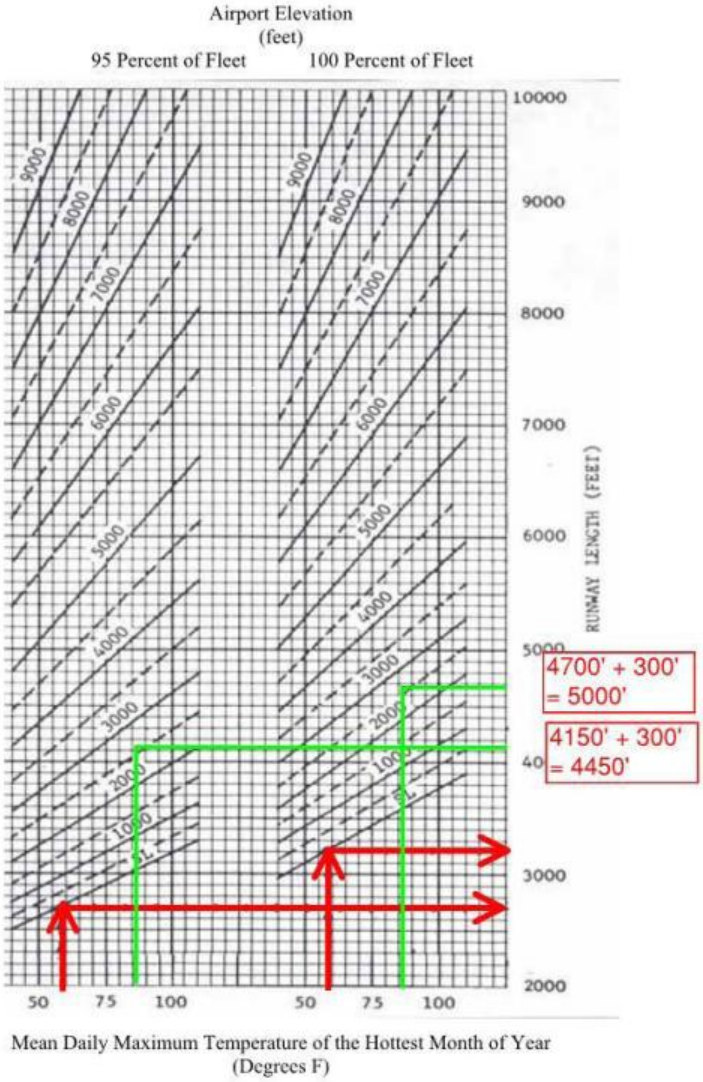


Figure H-7 Small Aircraft 10 plus Passengers

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

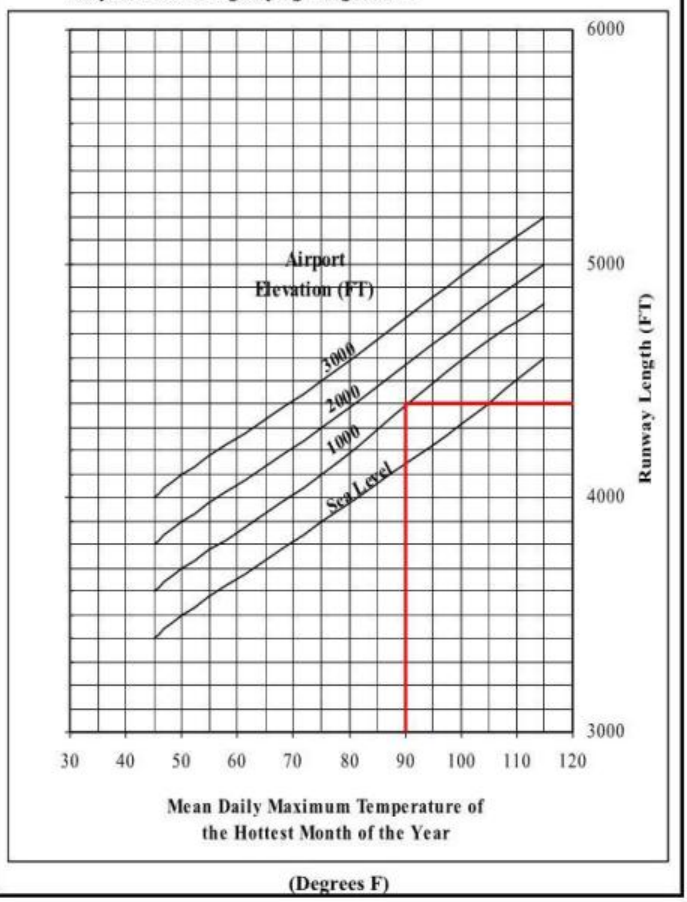
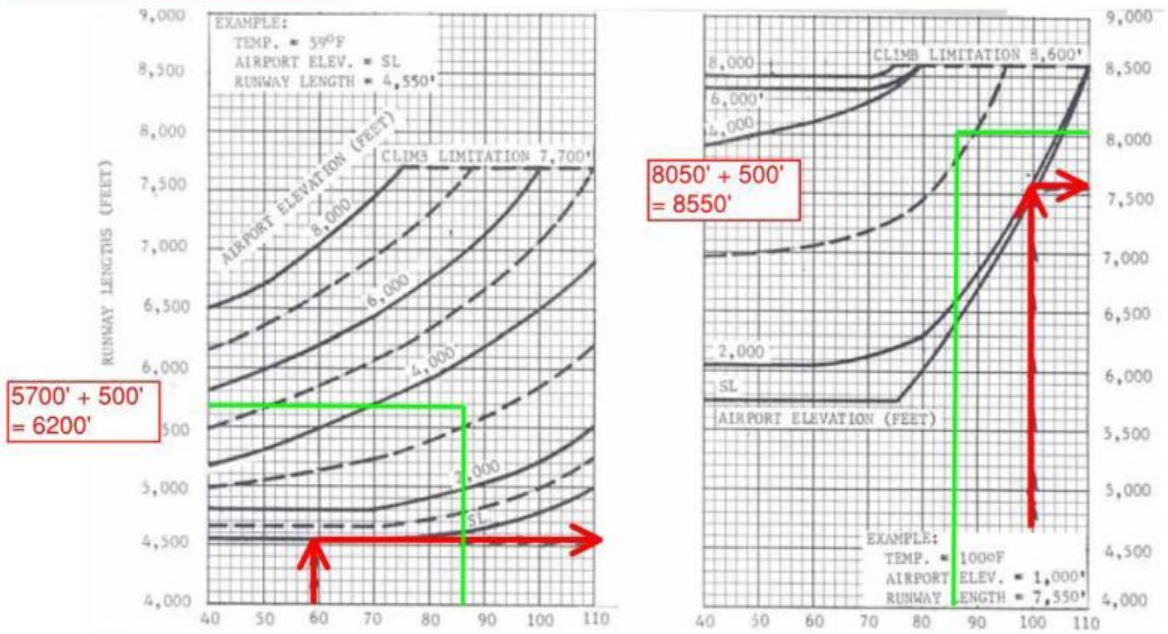
Representative Airplanes	Runway Length Curves
Raytheon B80 Queen Air **Raytheon** E90 King Air **Raytheon** B99 Airliner **Raytheon** A100 King Air (Raytheon formerly Beech Aircraft) **Britten-Norman** Mark III-I Trilander **Mitsubishi** MU-2L **Swearigen** Merlin III-A **Swearigen** Merlin IV-A **Swearigen** 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. 

Figure H-8 75% of Aircraft more than 12,500 lbs up to and including 60,000 lbs

Rapid City Regional Airport
86.9 degrees Avg Max
49 feet difference in runway centerline elevation
3,204 feet elevation

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

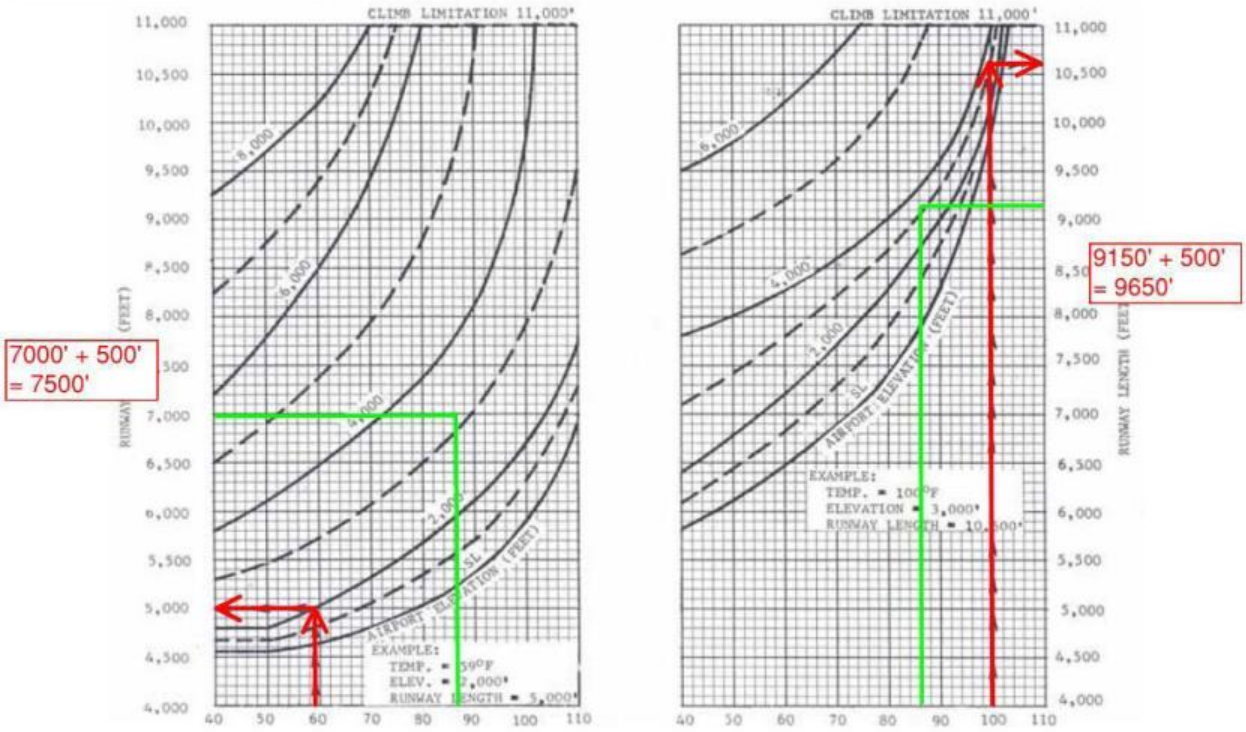
75 percent of feet at 60 percent useful load **75 percent of feet at 90 percent useful load**

12

Figure H-9 90% of Aircraft more than 12,500 lbs up to and including 60,000 lbs

Rapid City Regional Airport
86.9 degrees Avg Max
49 feet difference in runway centerline elevation
3,204 feet elevation

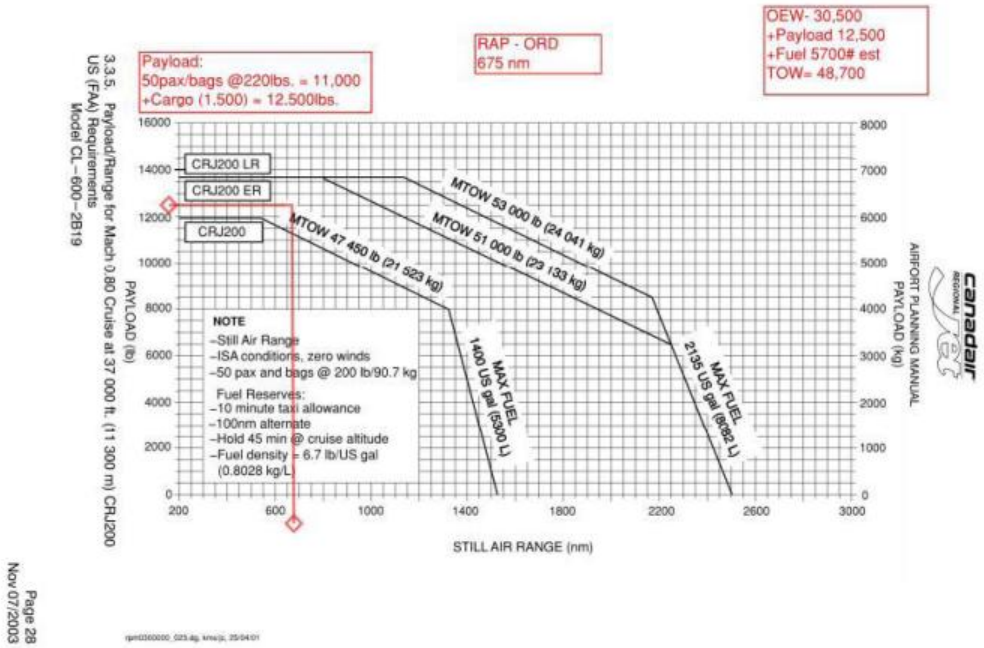
Figure 3-2. 100 Percent of Fleet at 60 or 90 Percent Useful Load



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

100 percent of feet at 60 percent useful load **100 percent of feet at 90 percent useful load**

Figure H-10 CRJ-200 to Chicago O'Hare



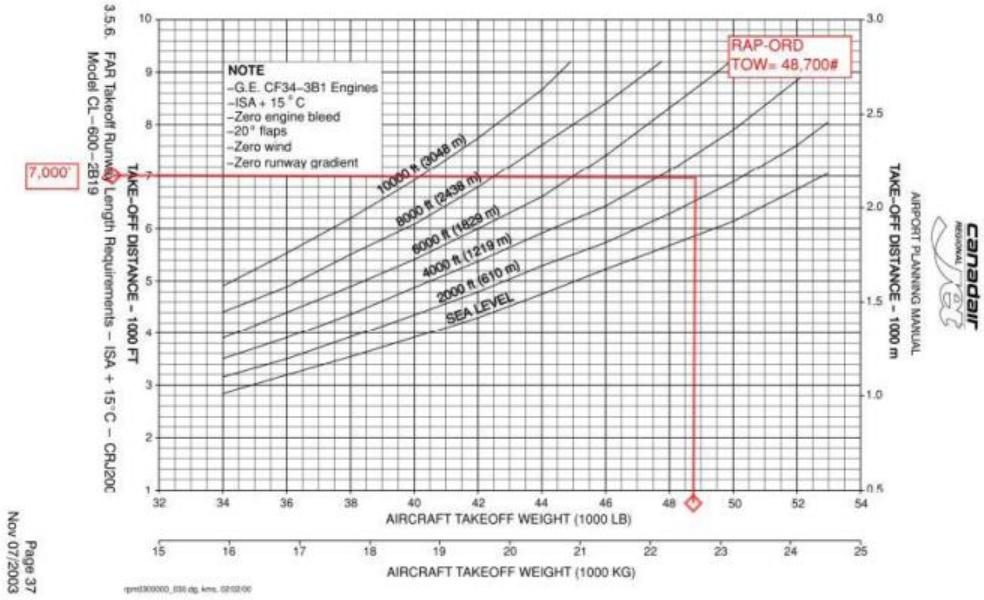
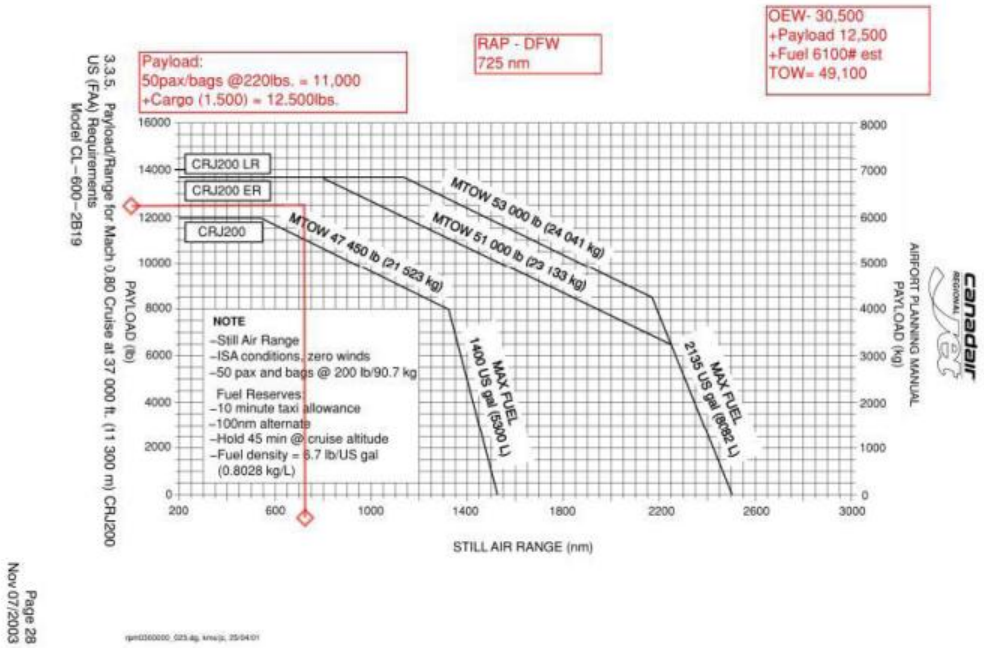


Figure H-11 CRJ-200 to DFW International



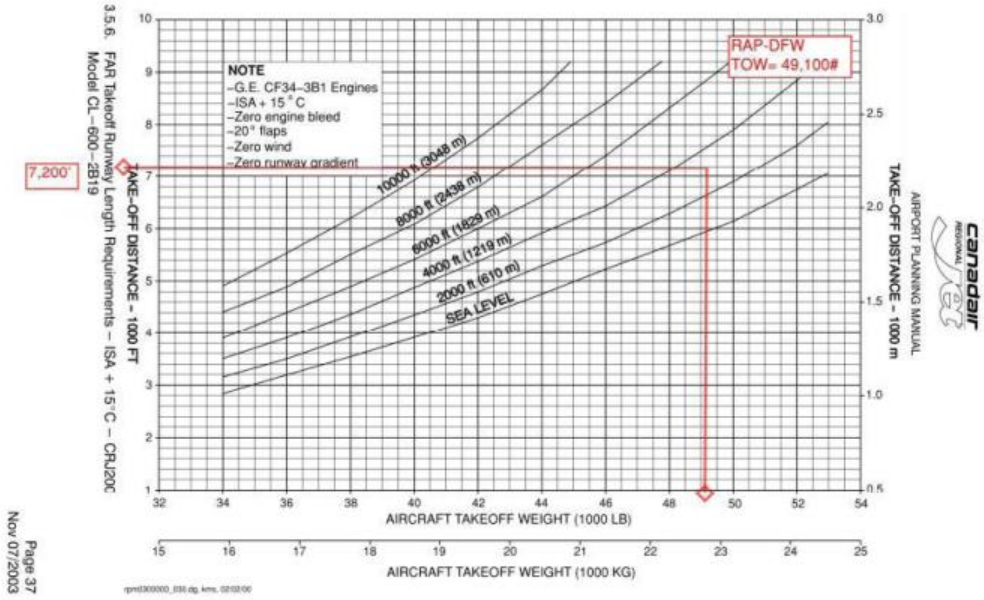
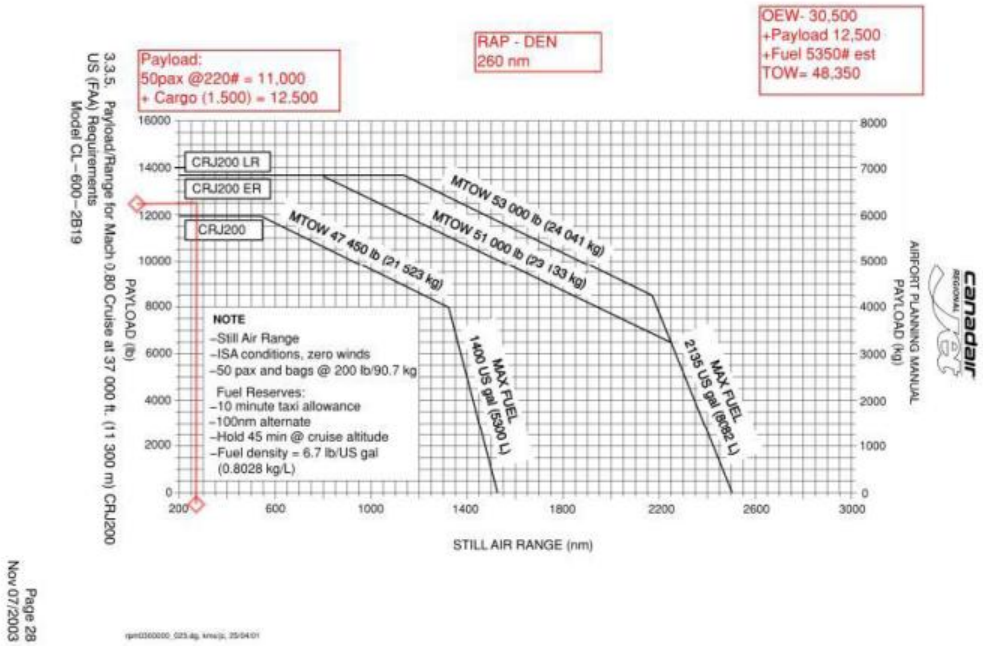


Figure H-12 CRJ-200 to Denver International



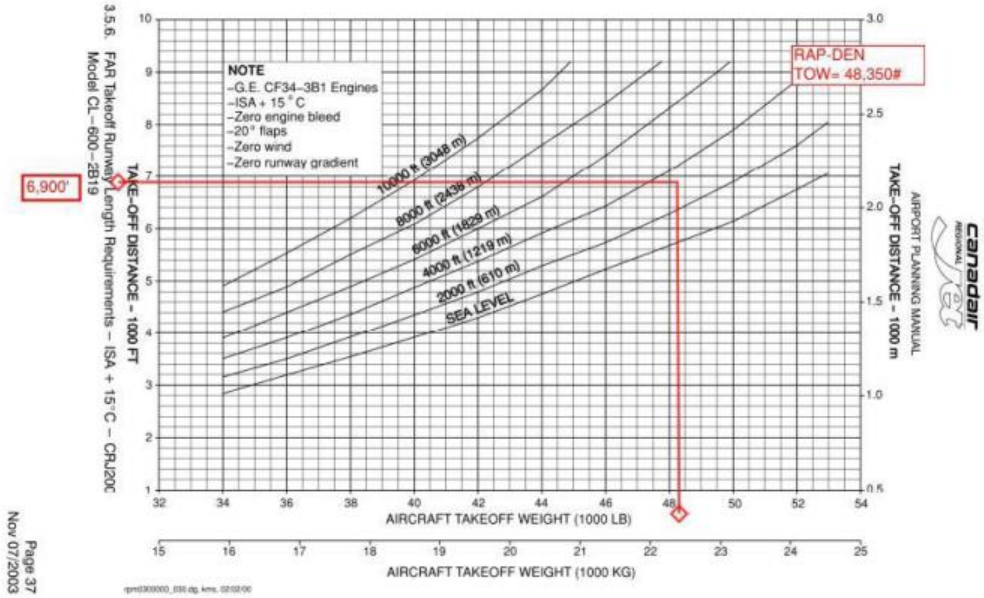
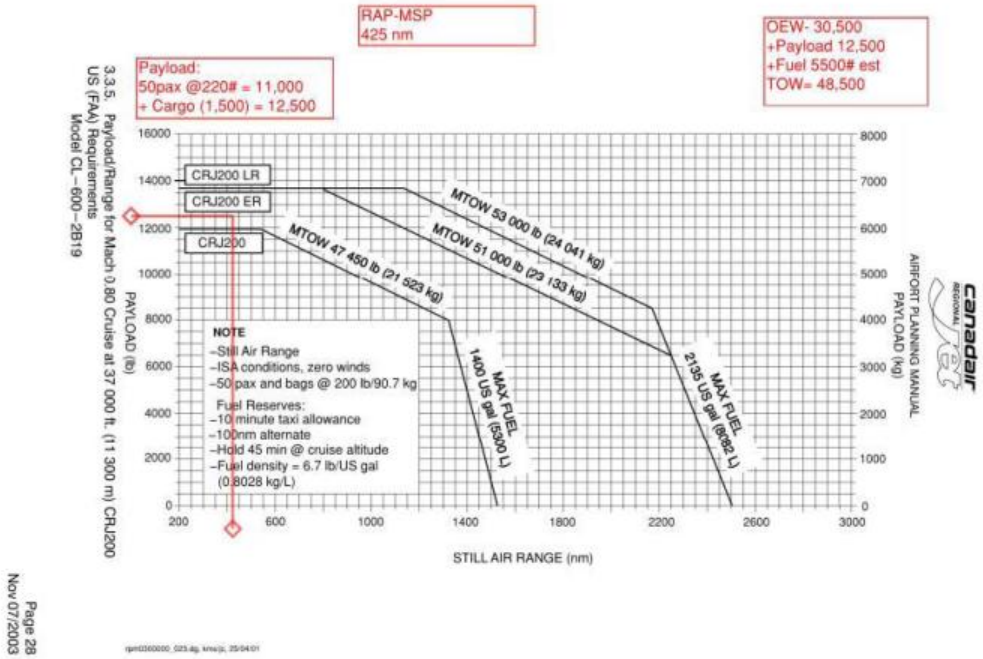


Figure H-13 CRJ-200 to Minneapolis - St. Paul International



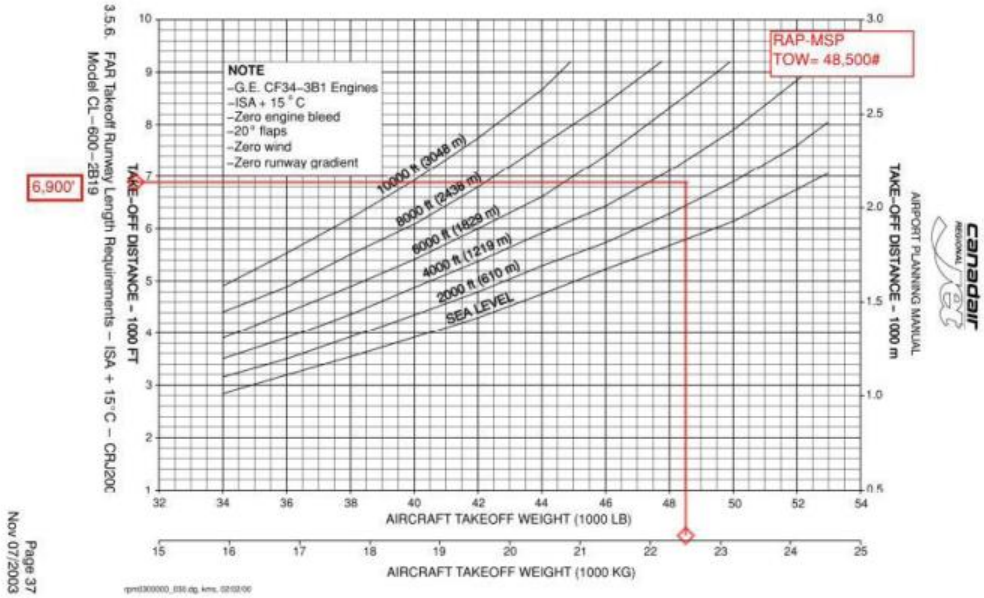
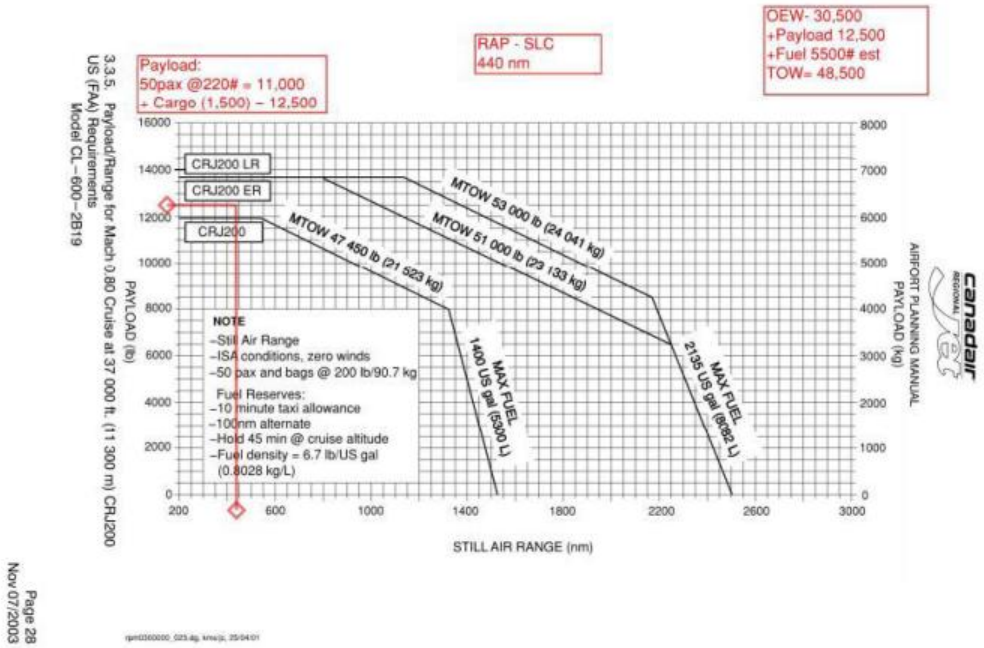


Figure H-14 CRJ-200 to Salt Lake City International



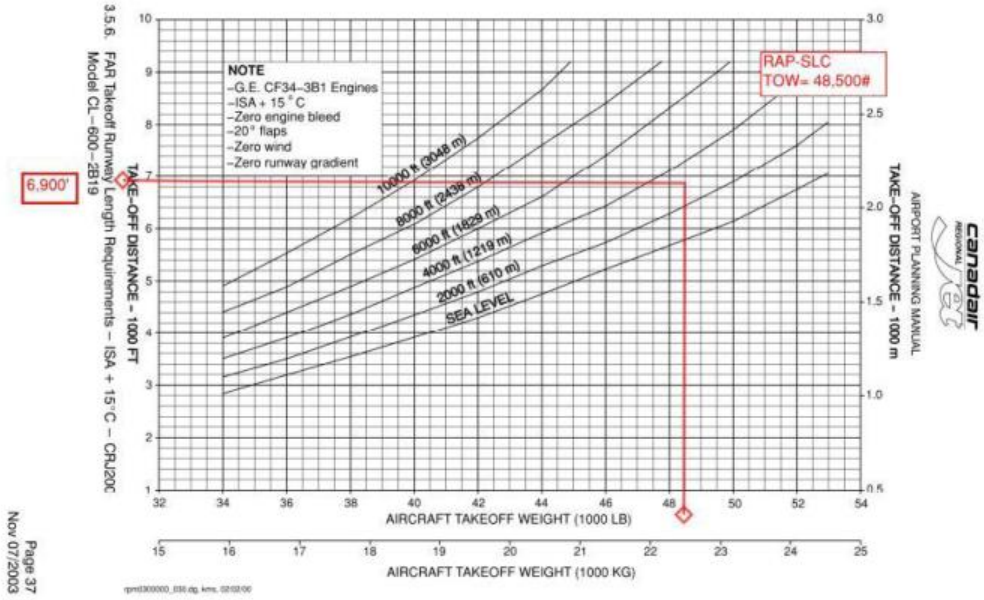


Figure H-15 CRJ-700 to Atlanta Hartsfield

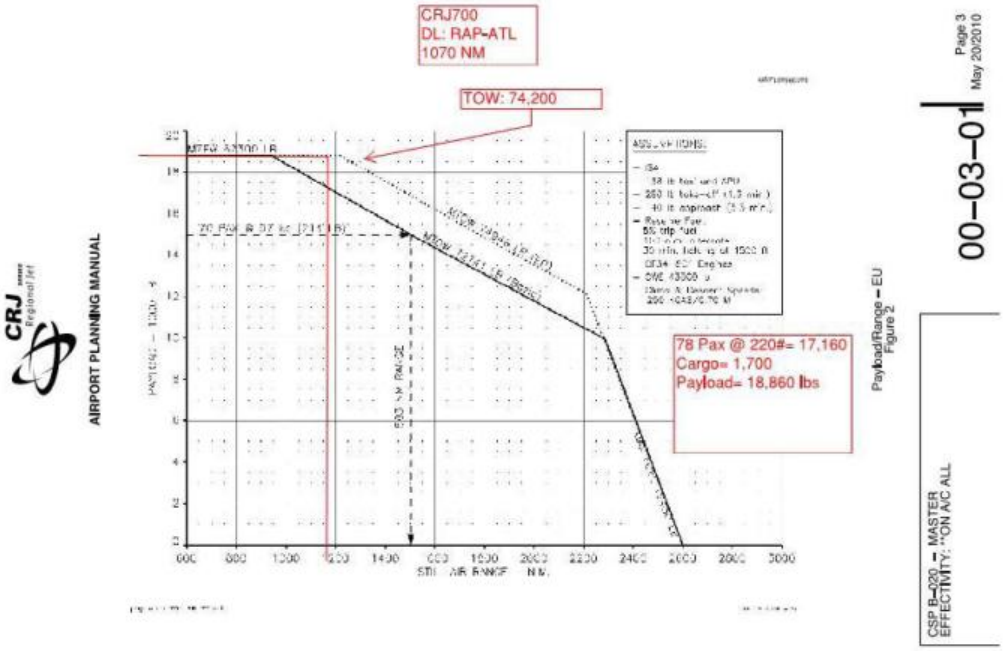
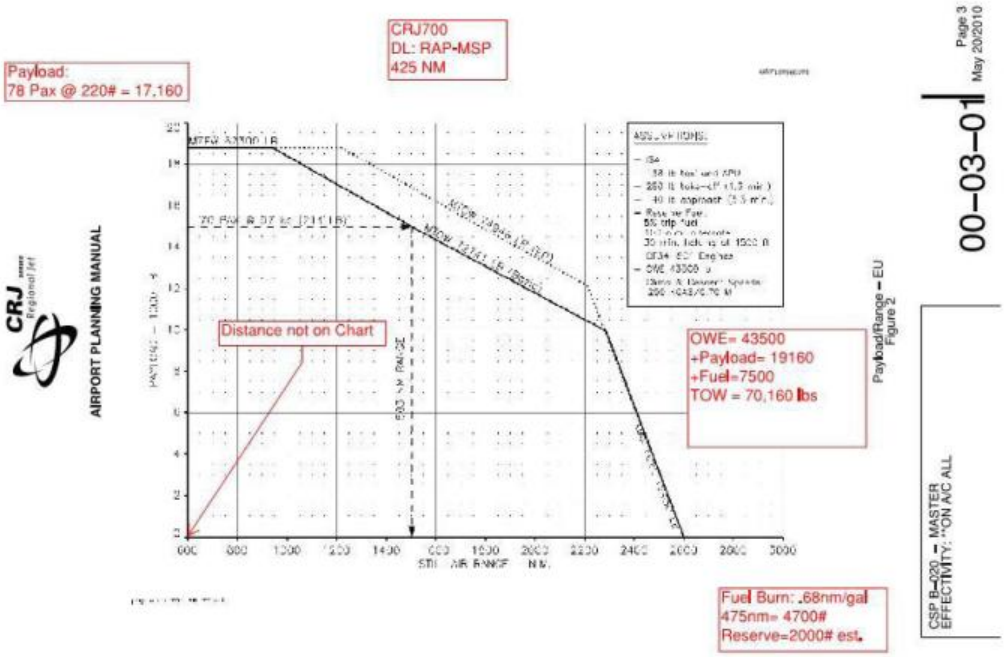


Figure H-16 CRJ-700 to Minneapolis – St. Paul International



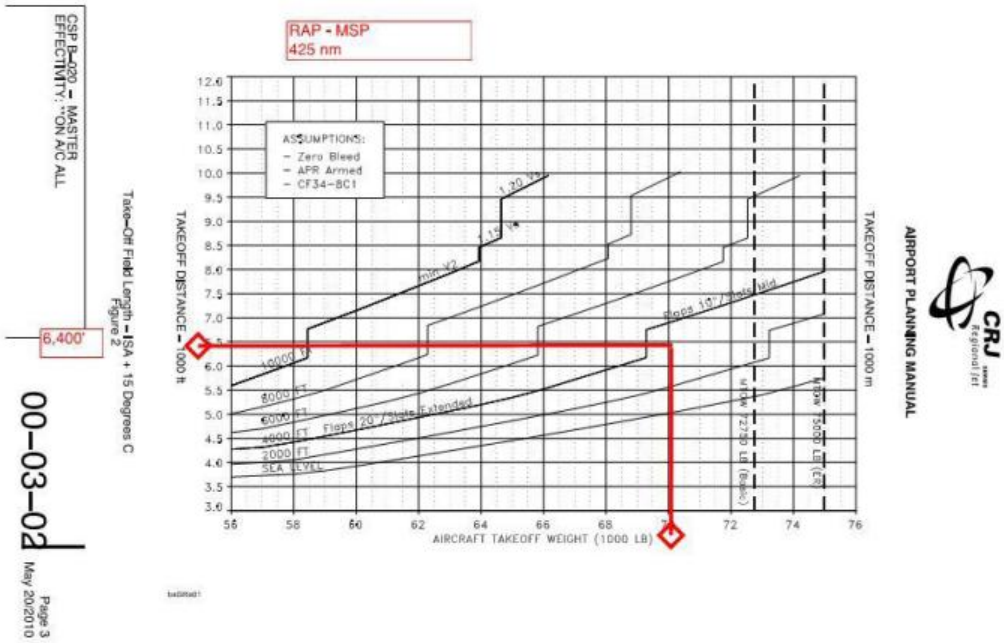
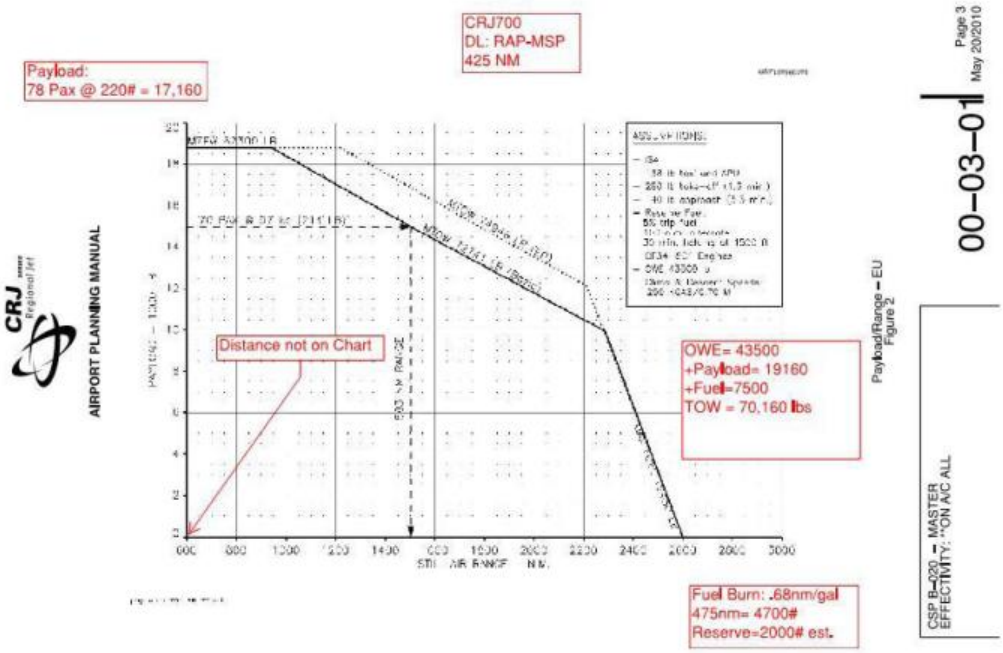


Figure H-17 CRJ-700 to Salt Lake City International



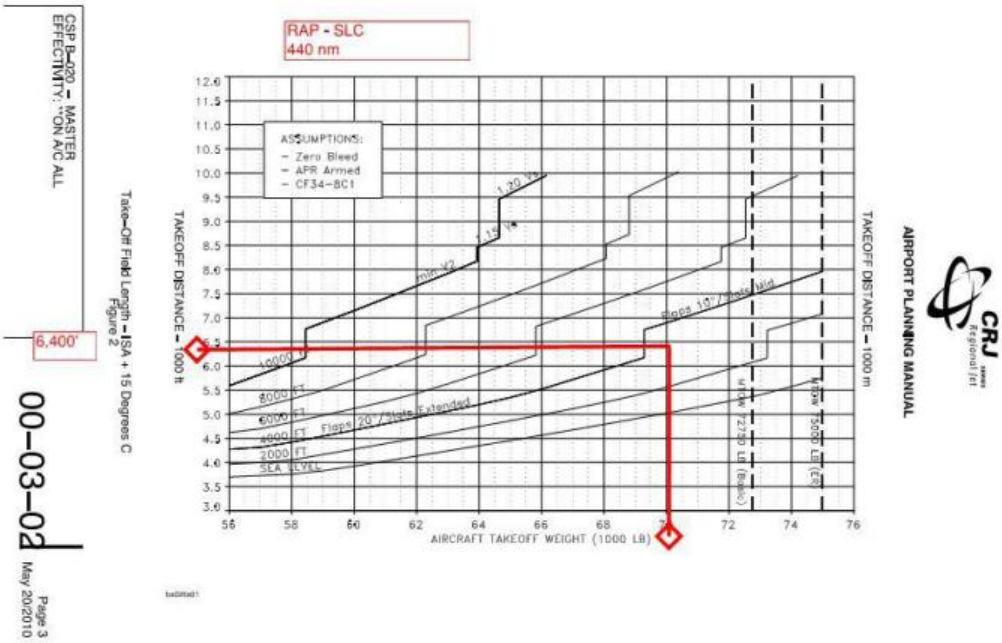
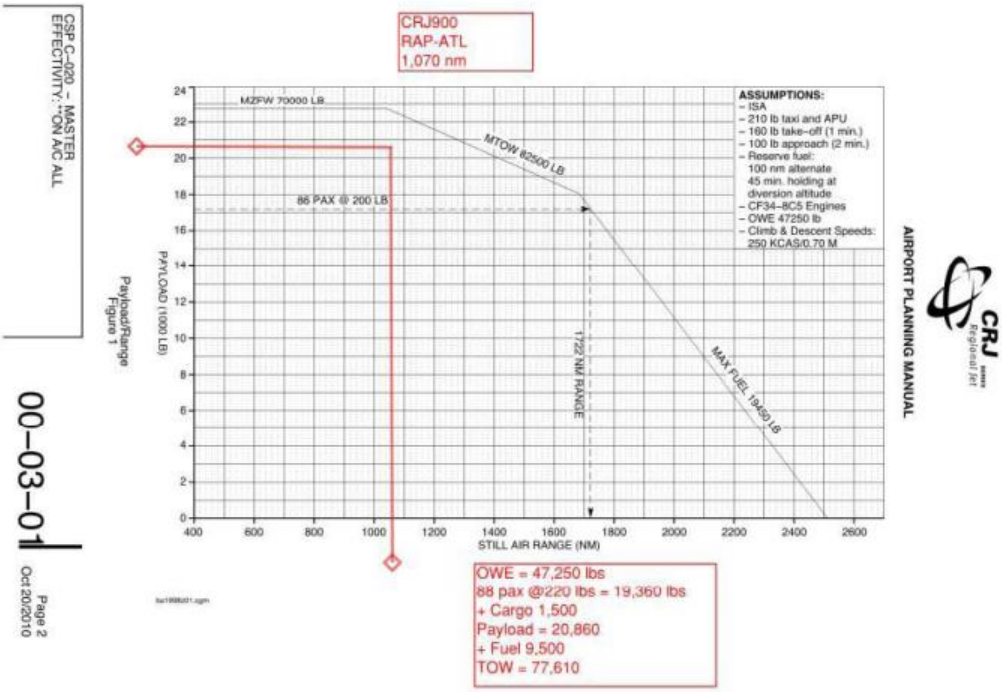


Figure H-18 CRJ-900 to Atlanta Hartsfield



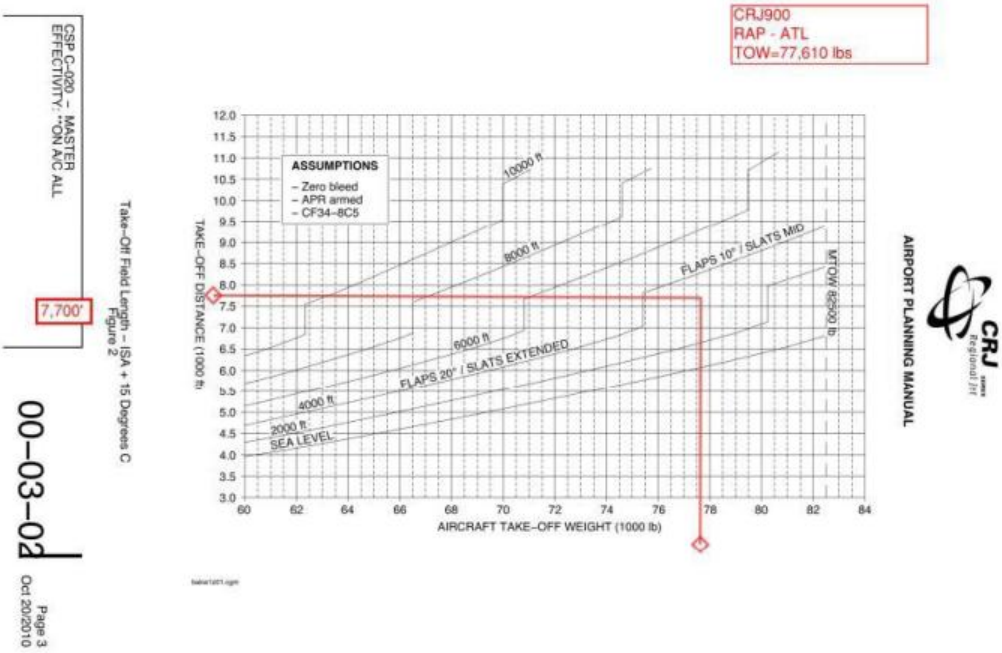
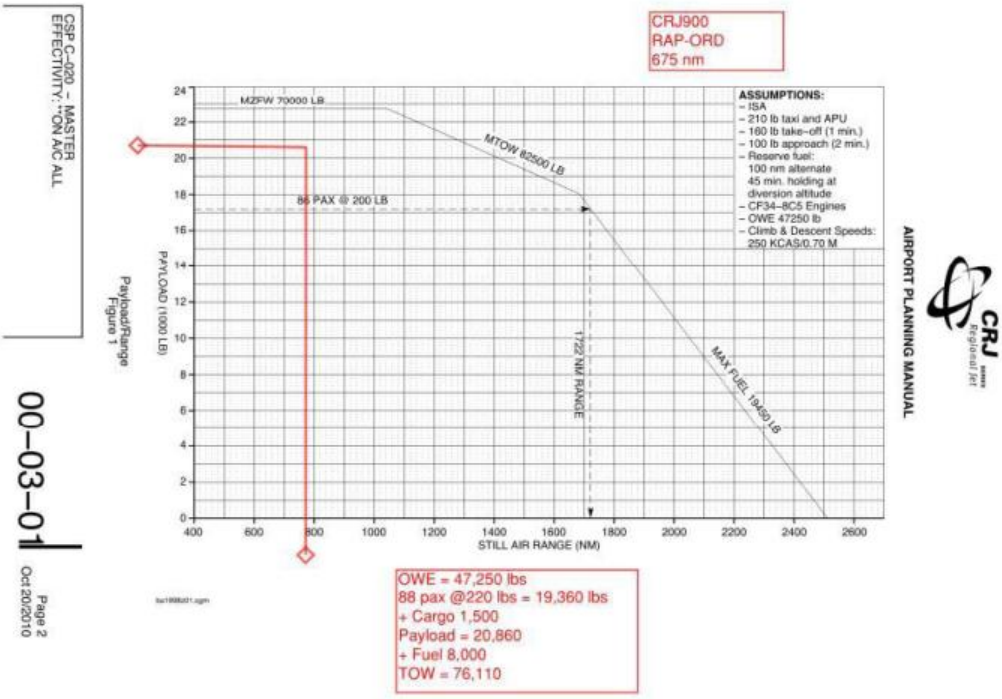


Figure H-19 CRJ-900 to Chicago O'Hare



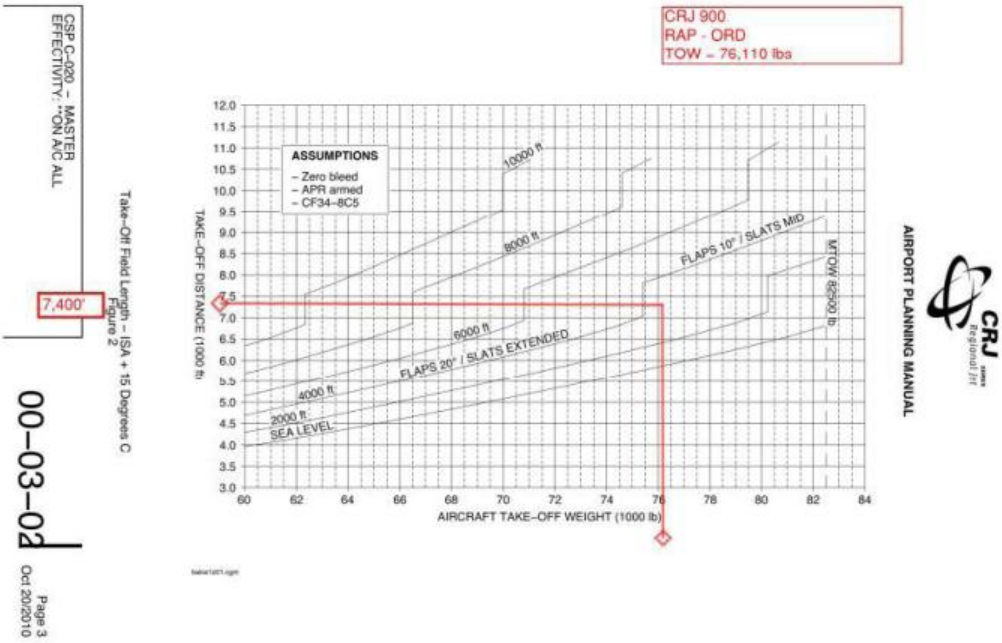
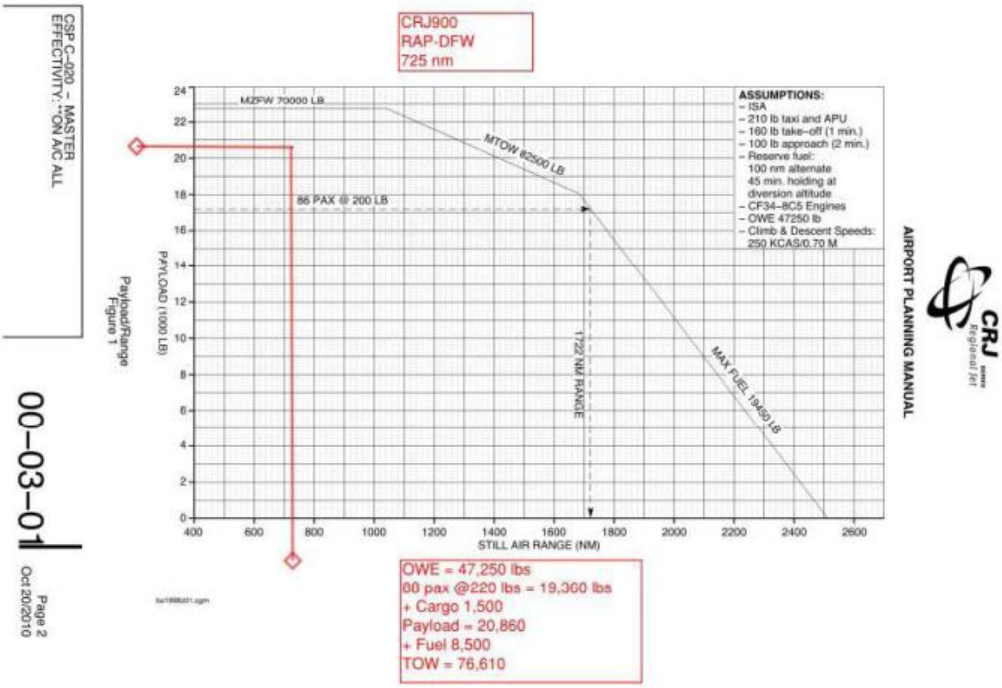


Figure H-20 CRJ-900 to DFW International



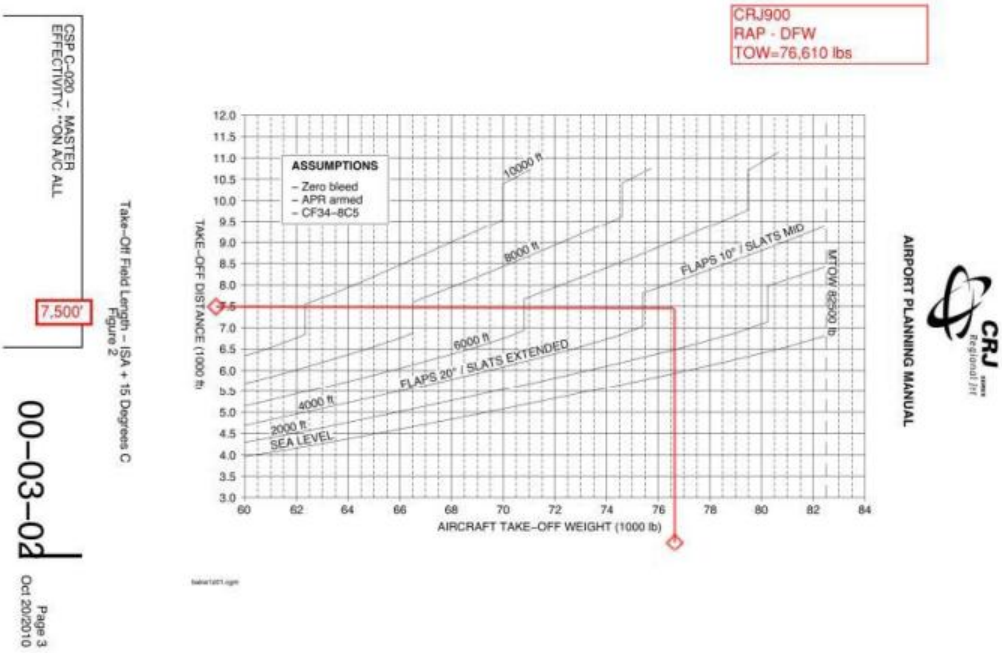
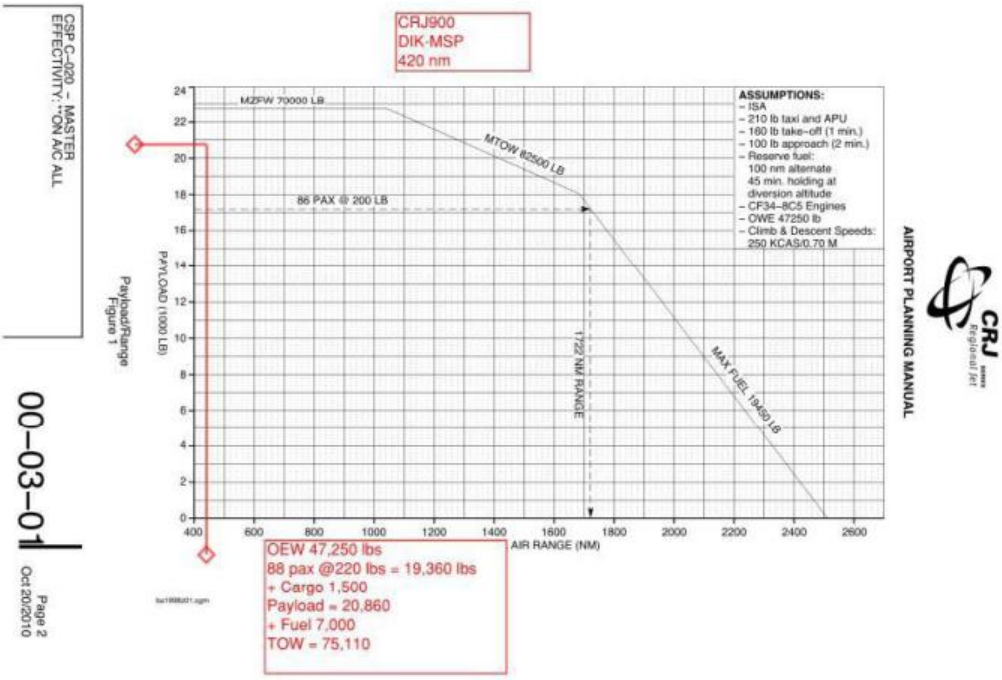


Figure H-21 CRJ-900 to Minneapolis – St. Paul International



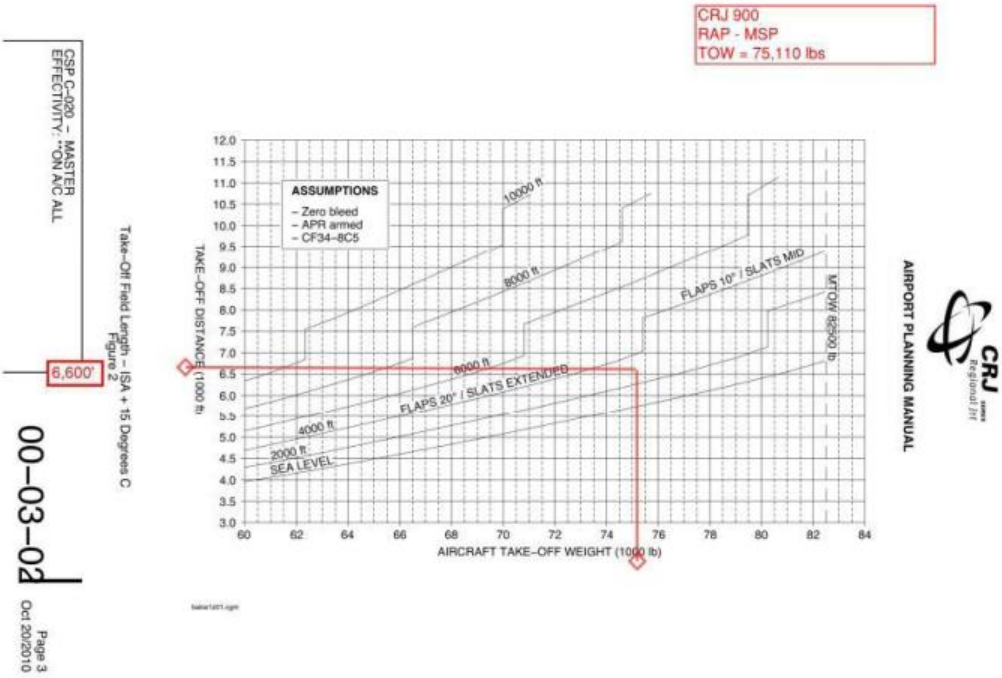
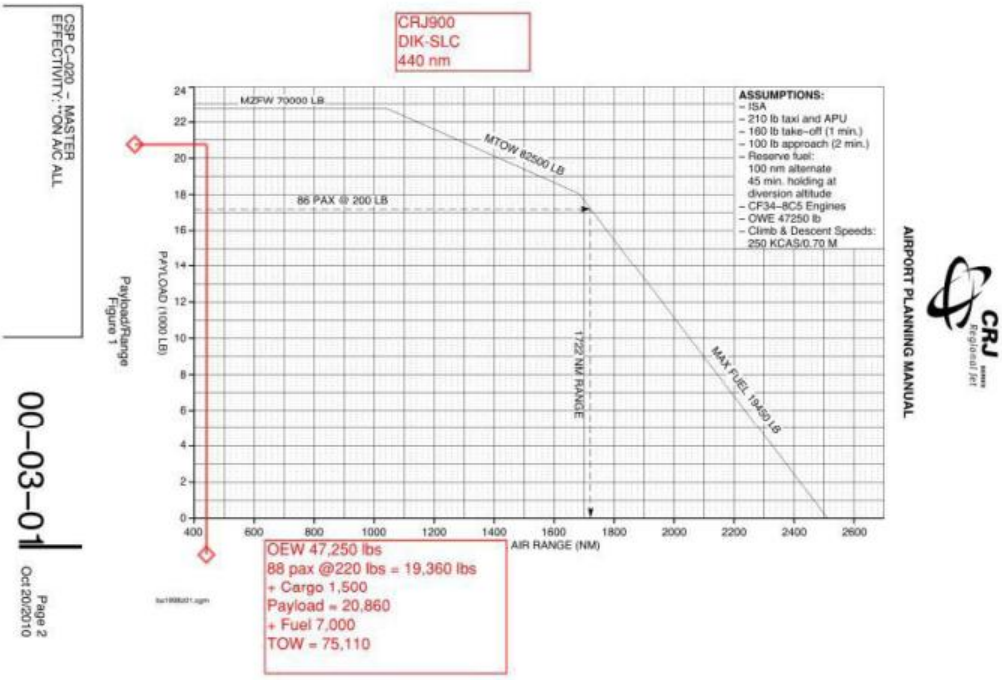


Figure H-22 CRJ-900 to Salt Lake City International



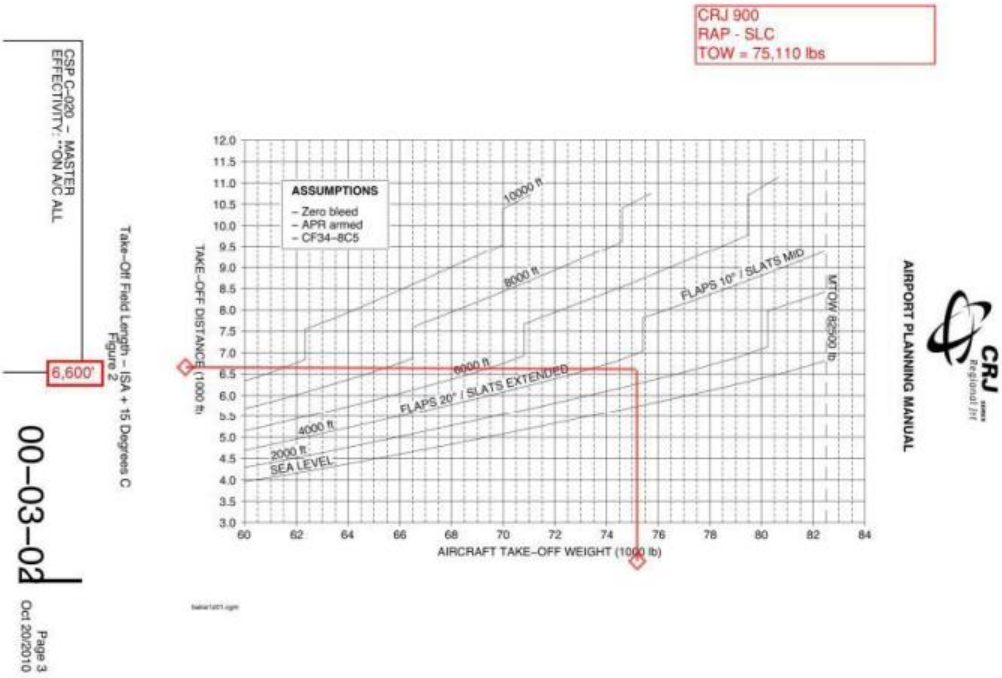
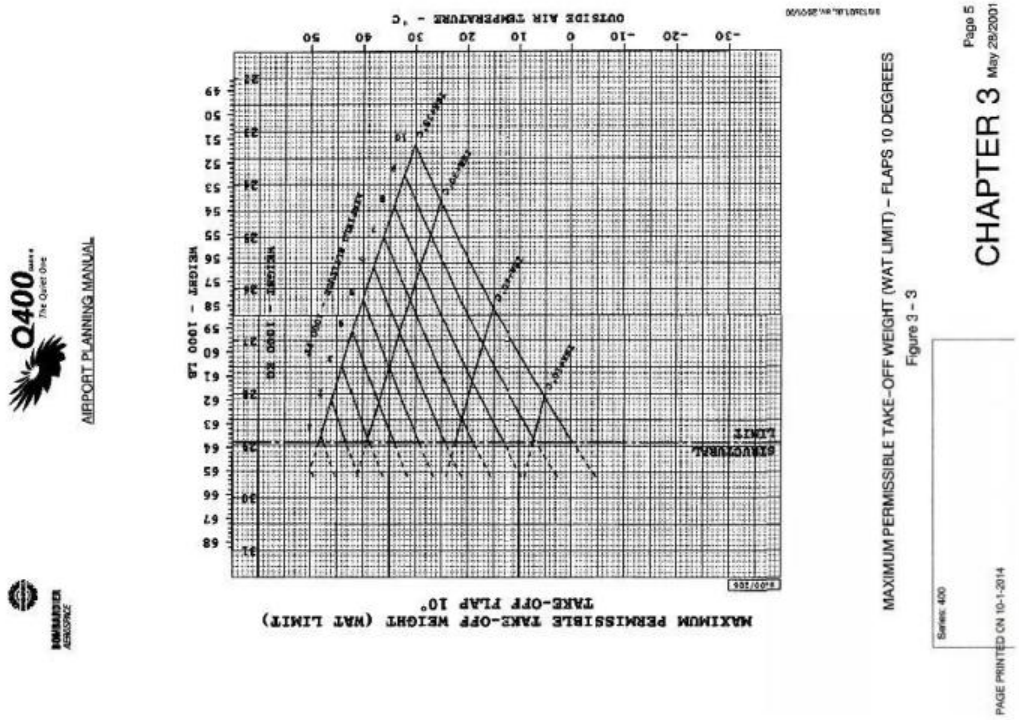


Figure H-23 Bombardier Q400 to Denver International (part 1)



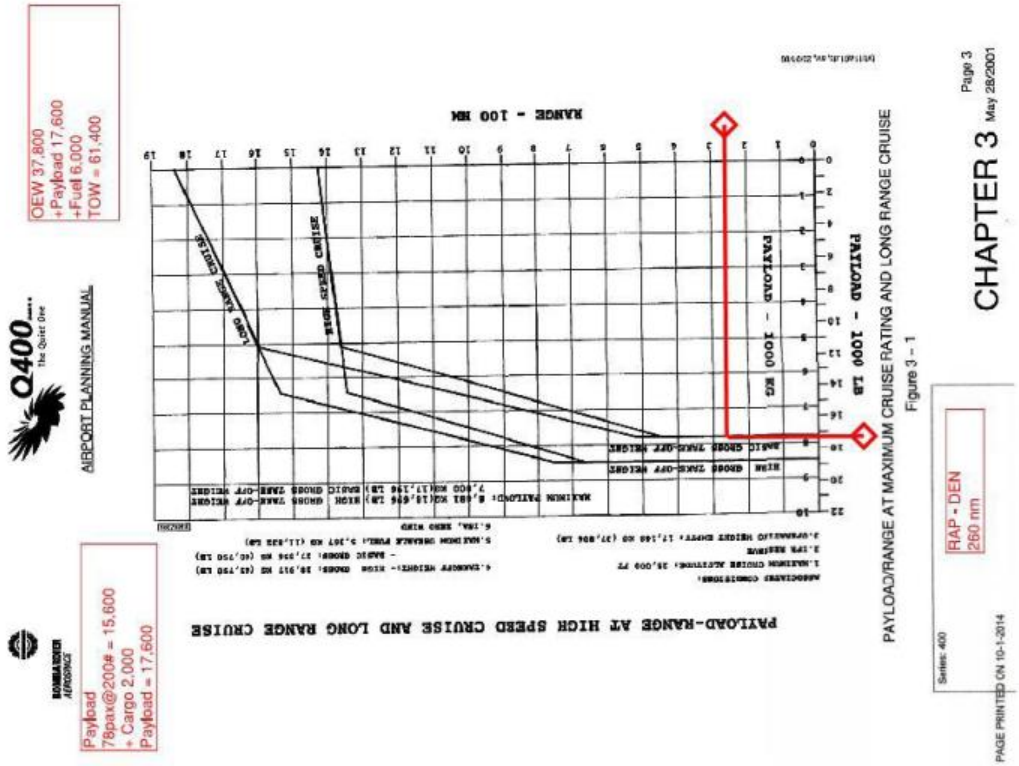


Figure H-23 Bombardier Q400 to Denver International (part 2)

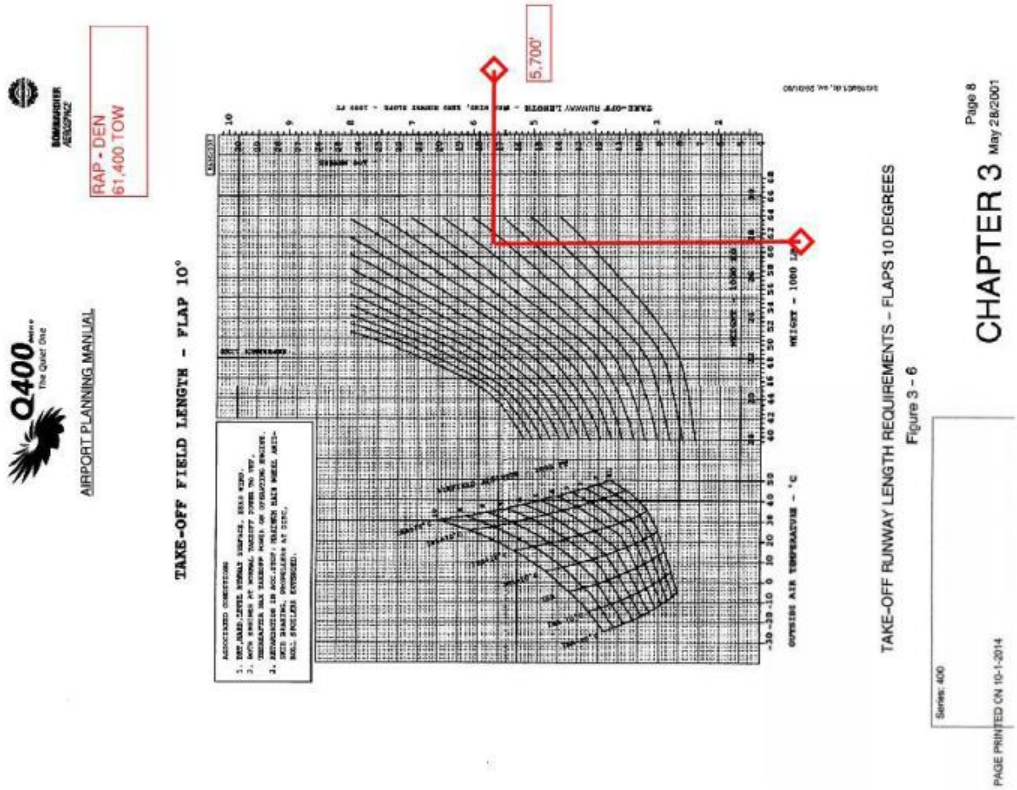


Figure H-24 Embraer 145 to Chicago O'Hare

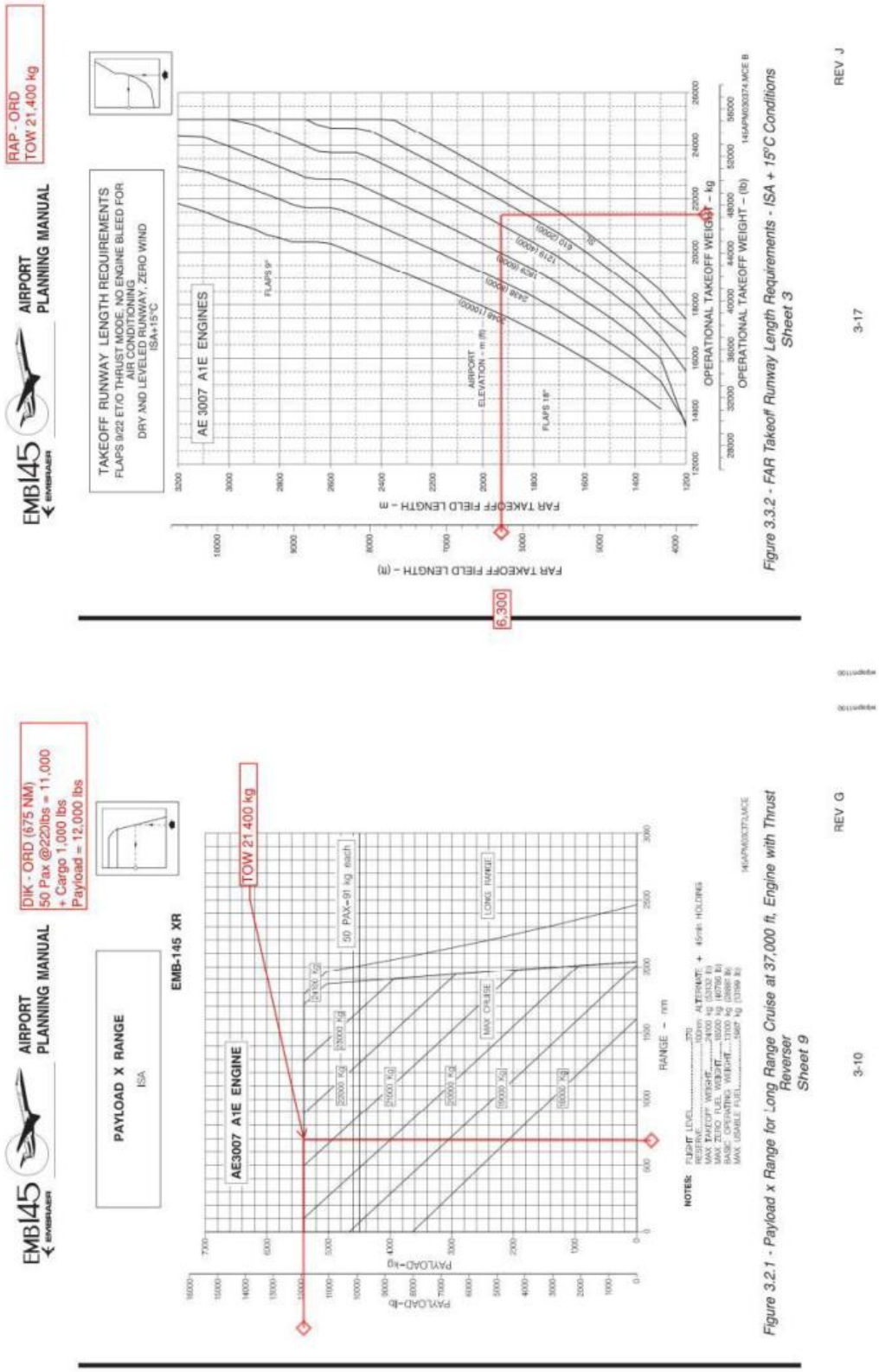


Figure H-25 Embraer 145 to DFW International

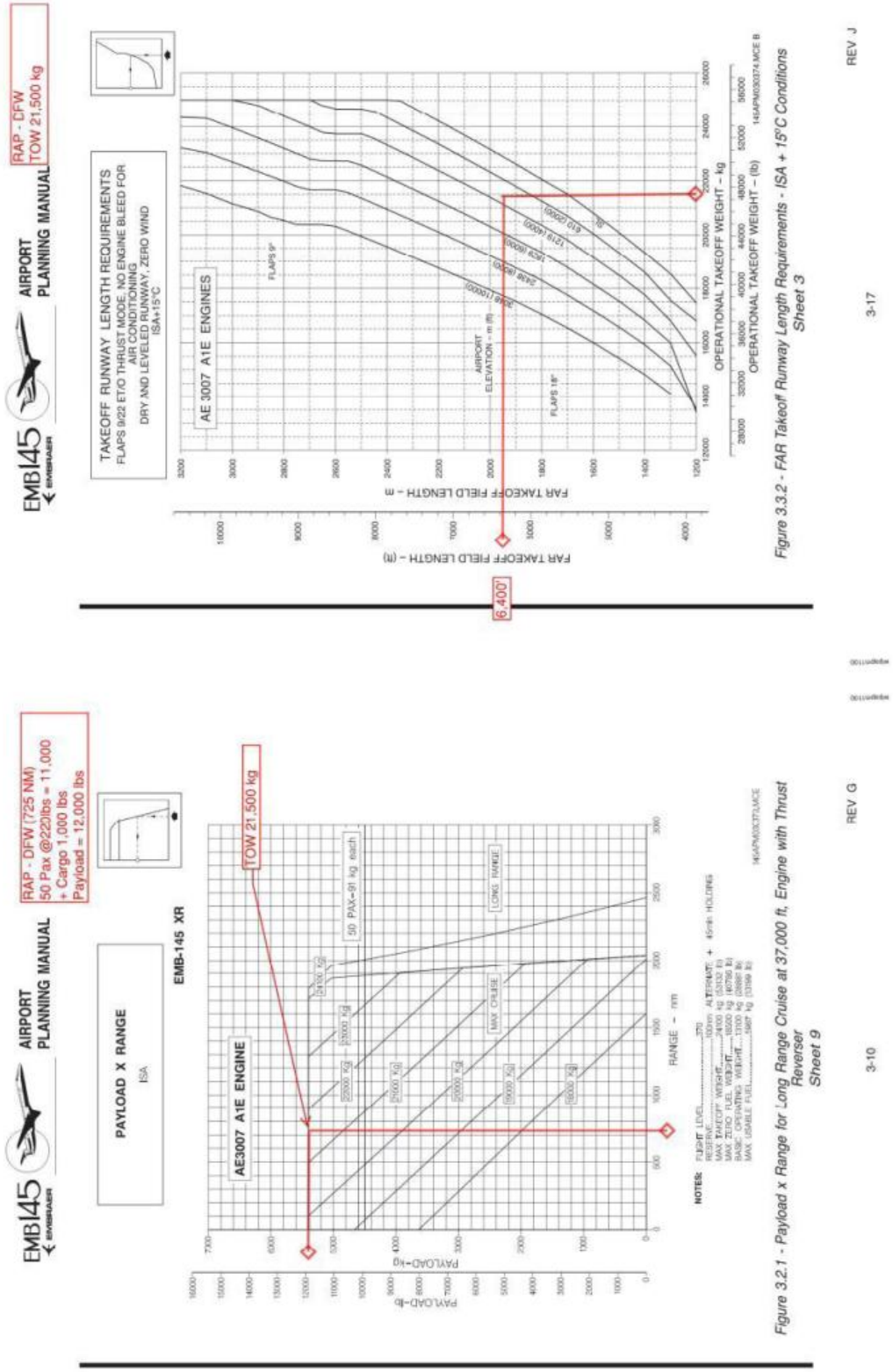


Figure H-26 Embraer 145 to Denver International

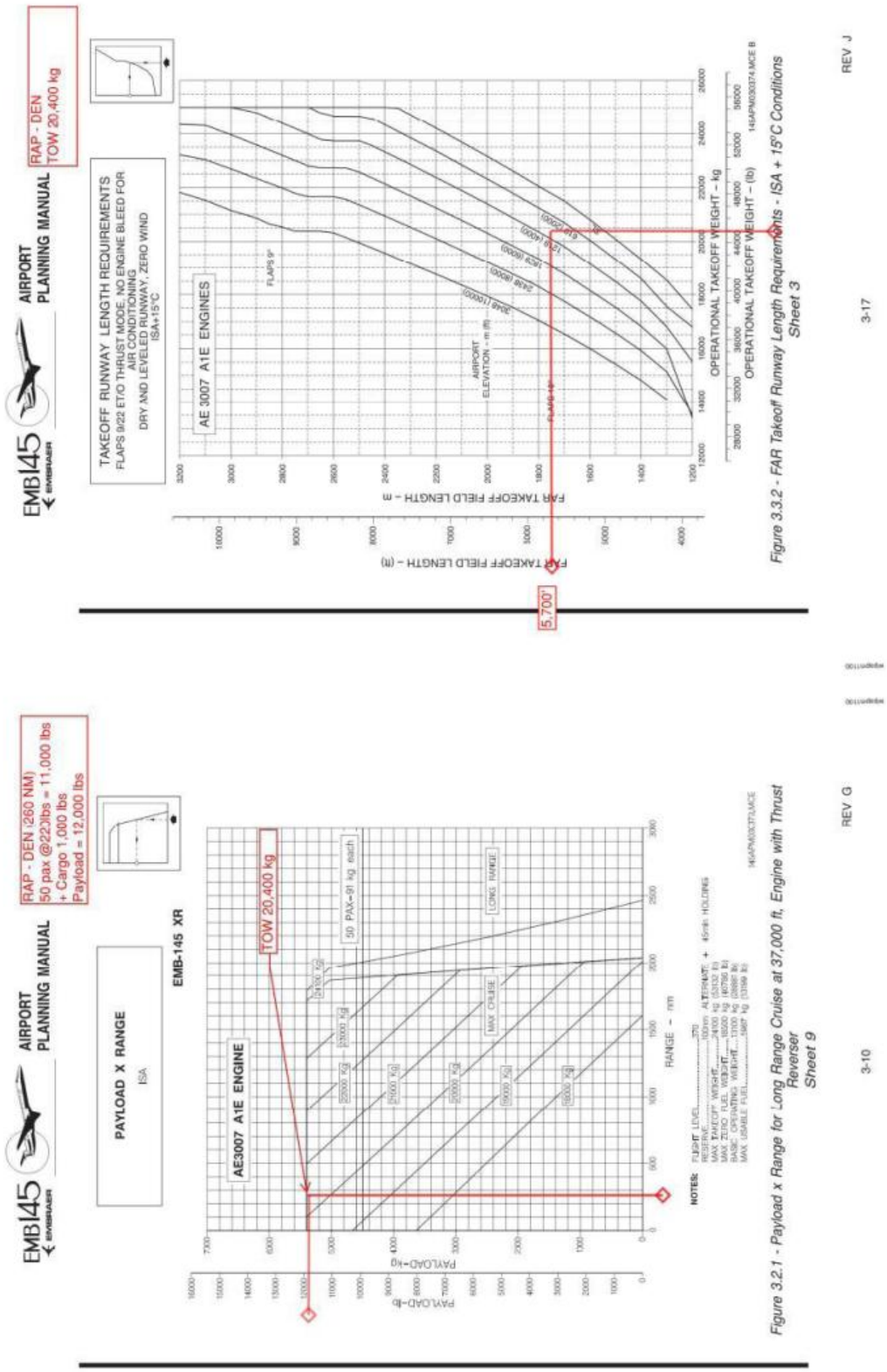


Figure H-27 Embraer 145 to Houston Intercontinental

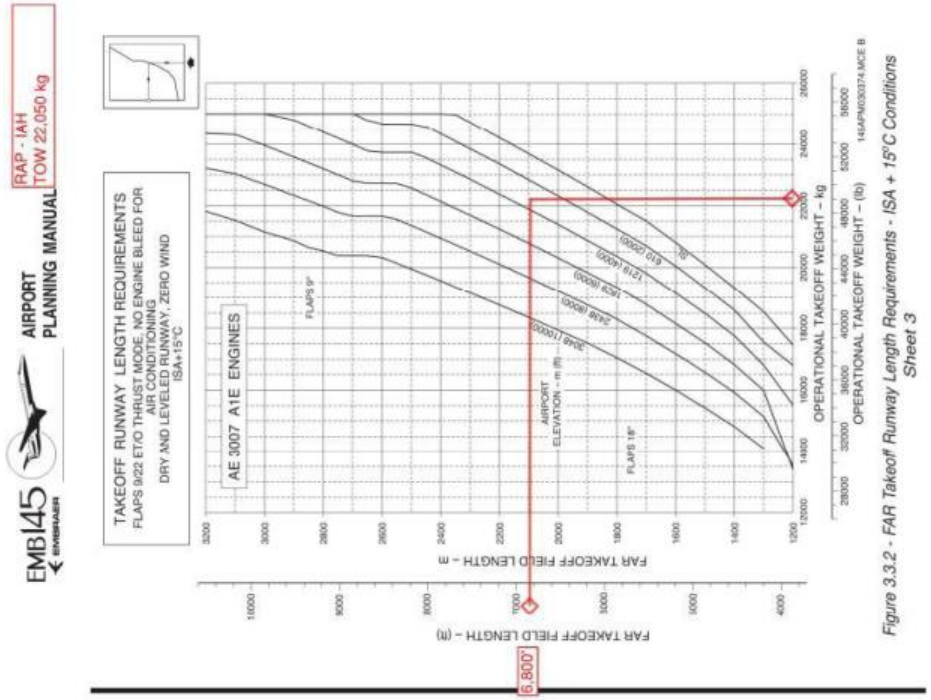


Figure 3.3.2 - FAR Takeoff Runway Length Requirements - ISA + 15°C Conditions
Sheet 3

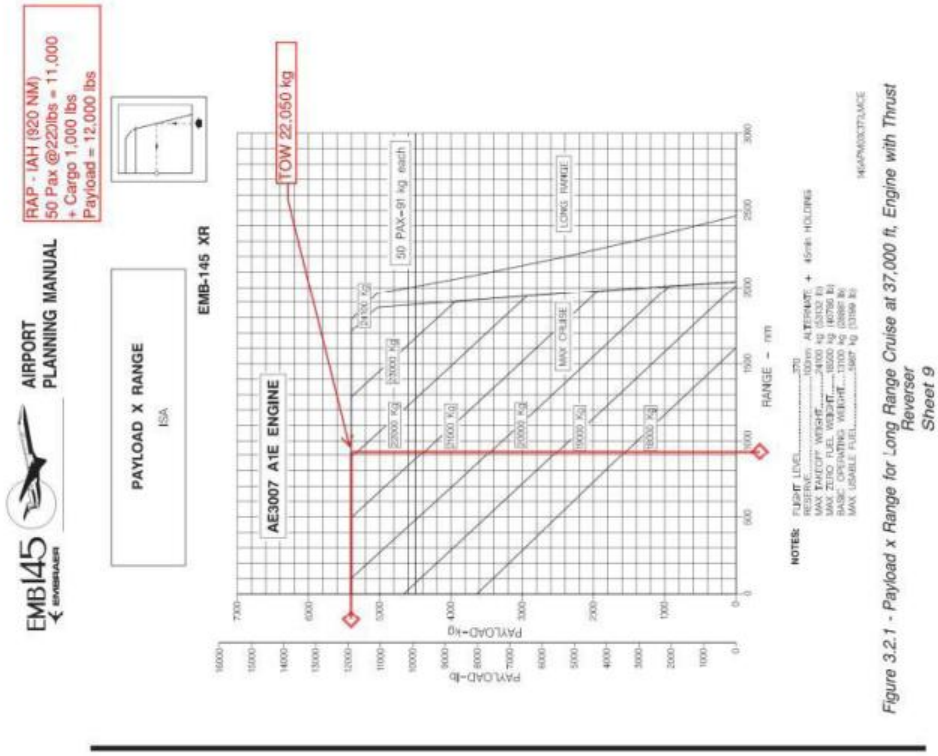
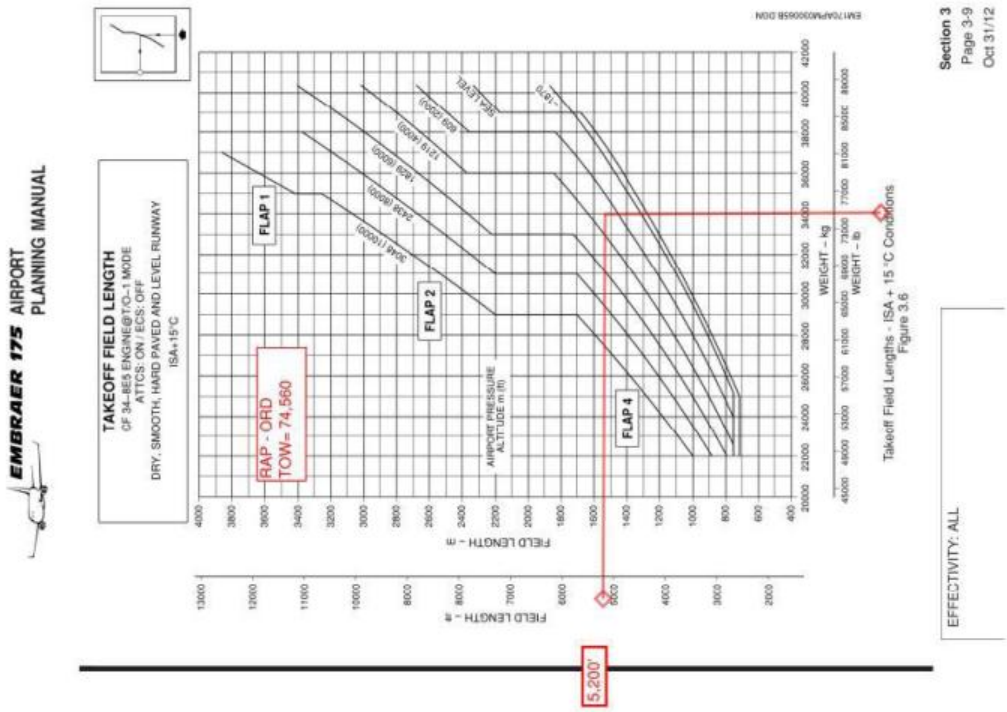


Figure 3.2.1 - Payload x Range for Long Range Cruise at 37,000 ft. Engine with Thrust Reverser
Sheet 9

Figure H-28 Embraer 175 to Chicago O'Hare



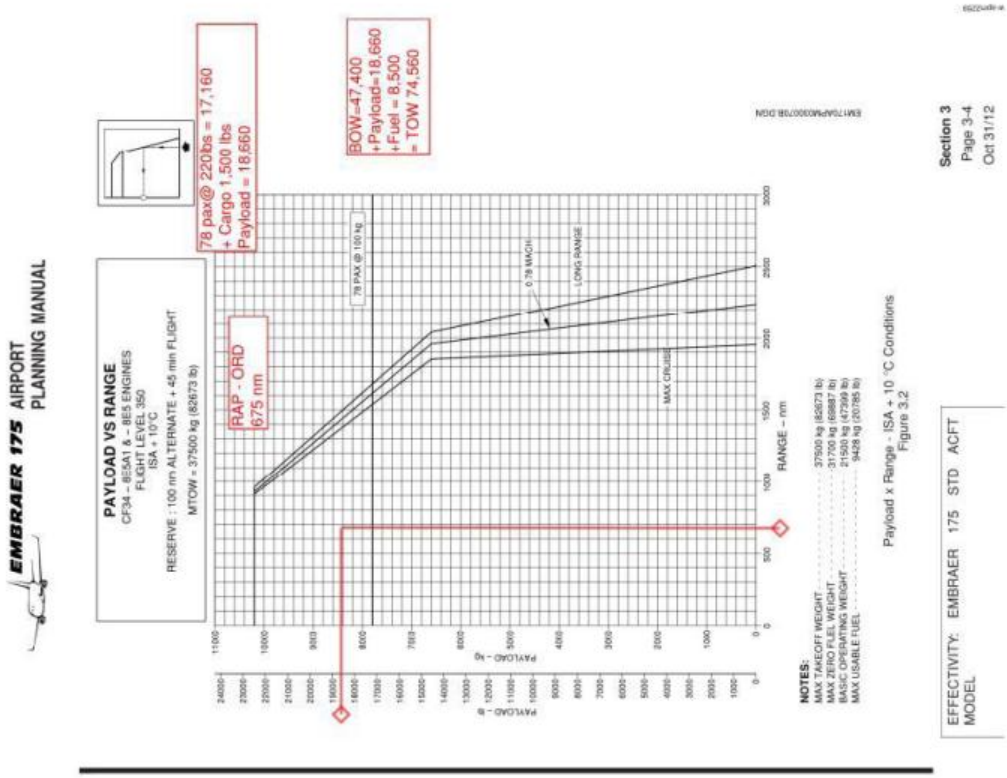


Figure H-29 Embraer 175 to DFW International

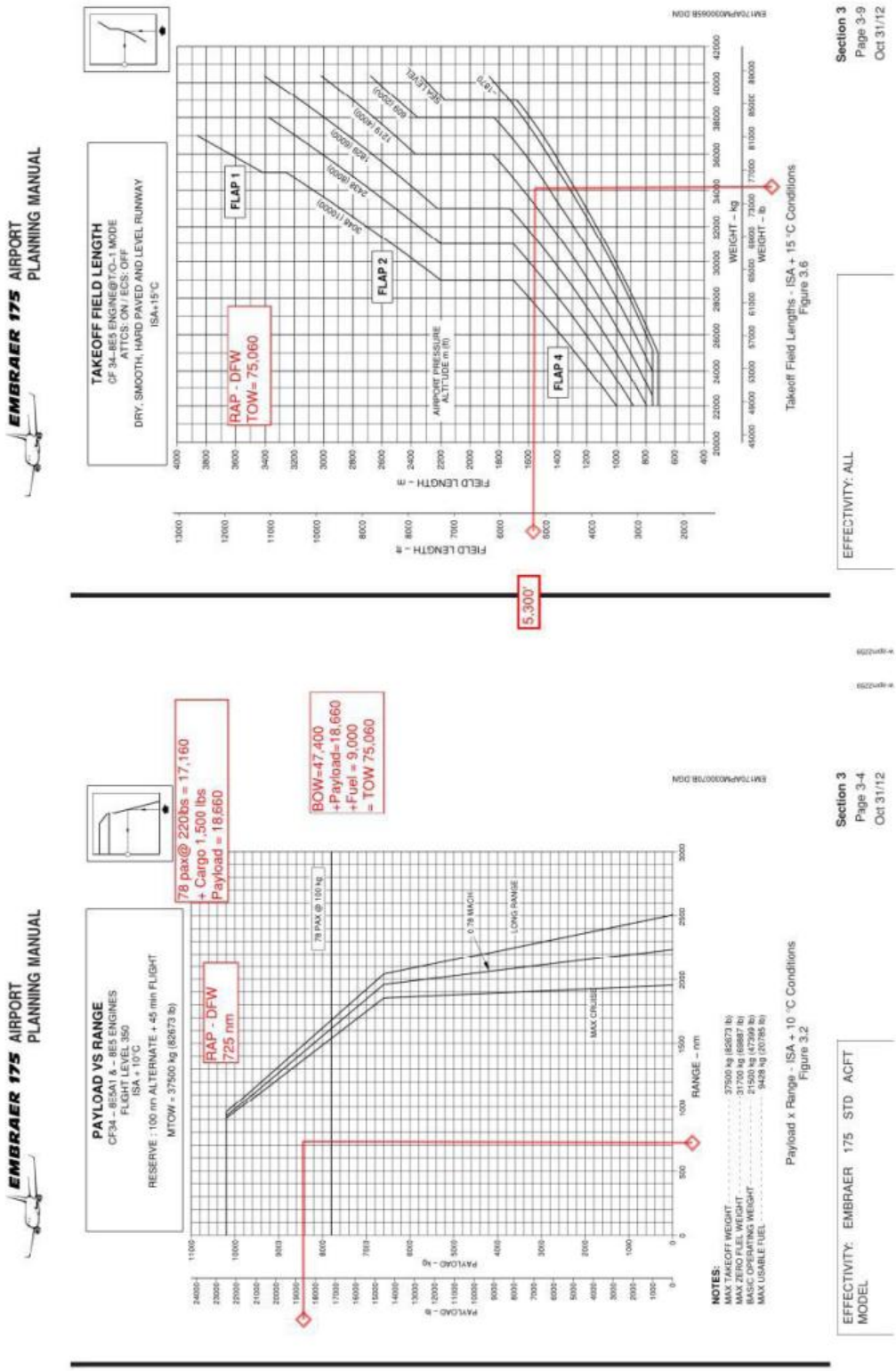
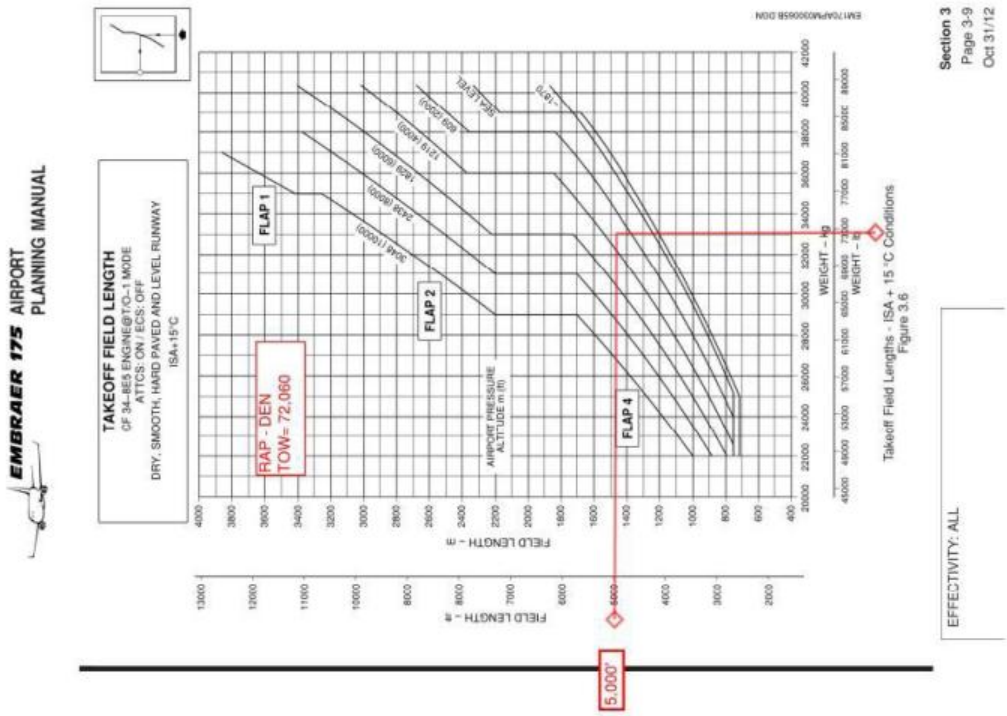


Figure H-30 Embraer 175 to Denver International



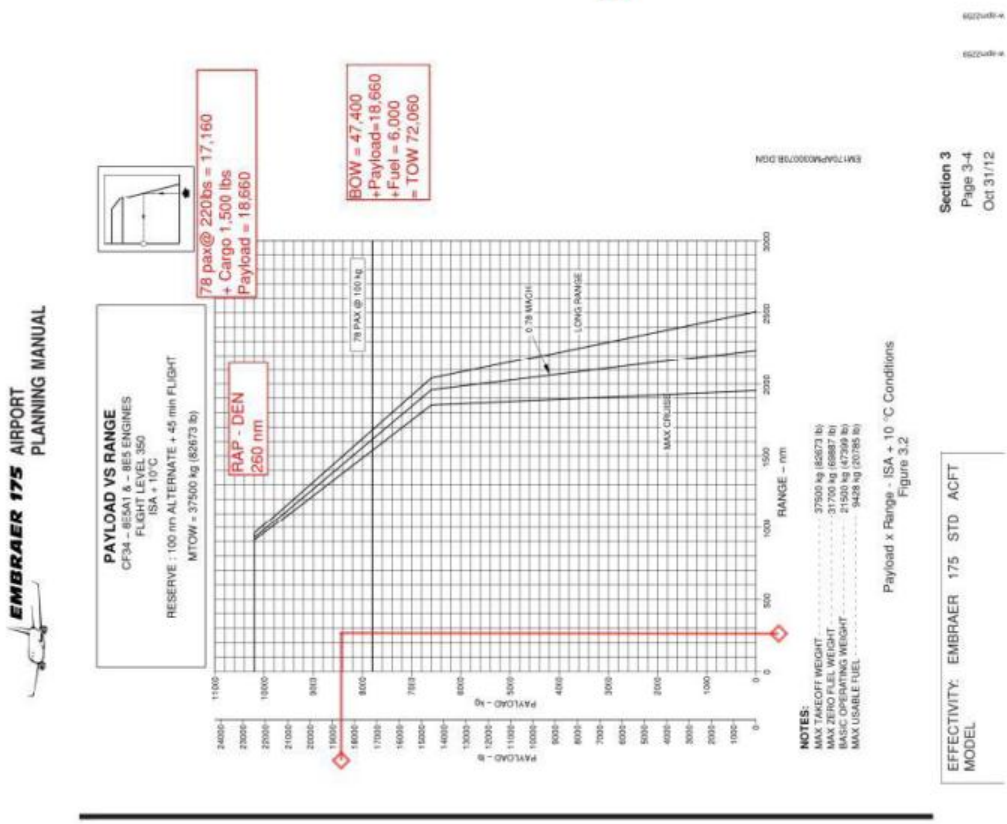
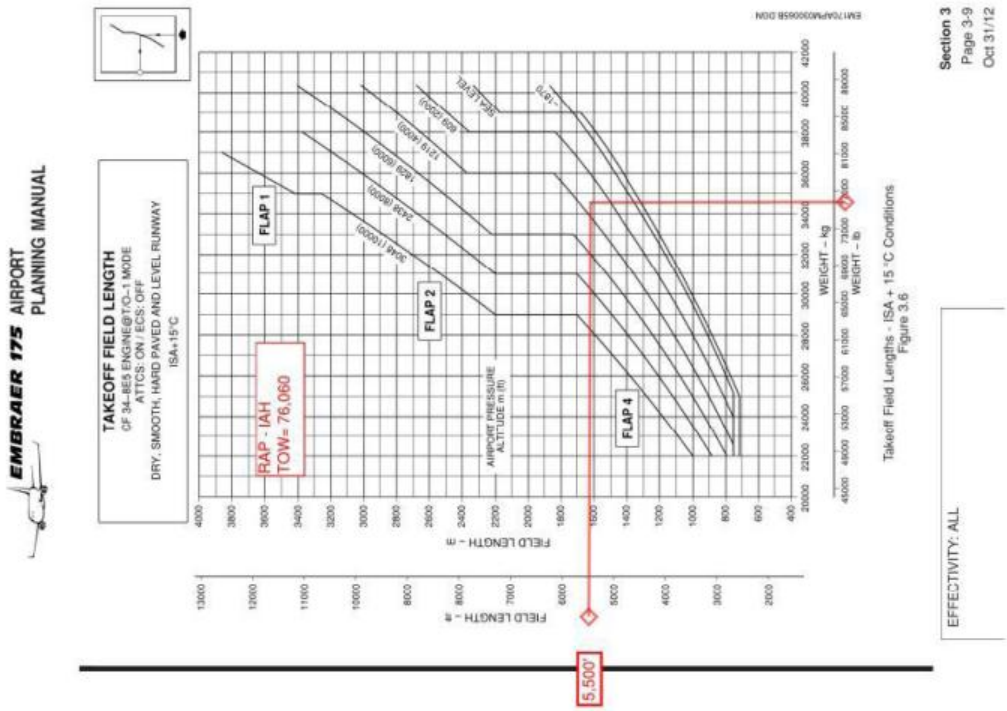


Figure H-31 Embraer 175 to Houston Intercontinental



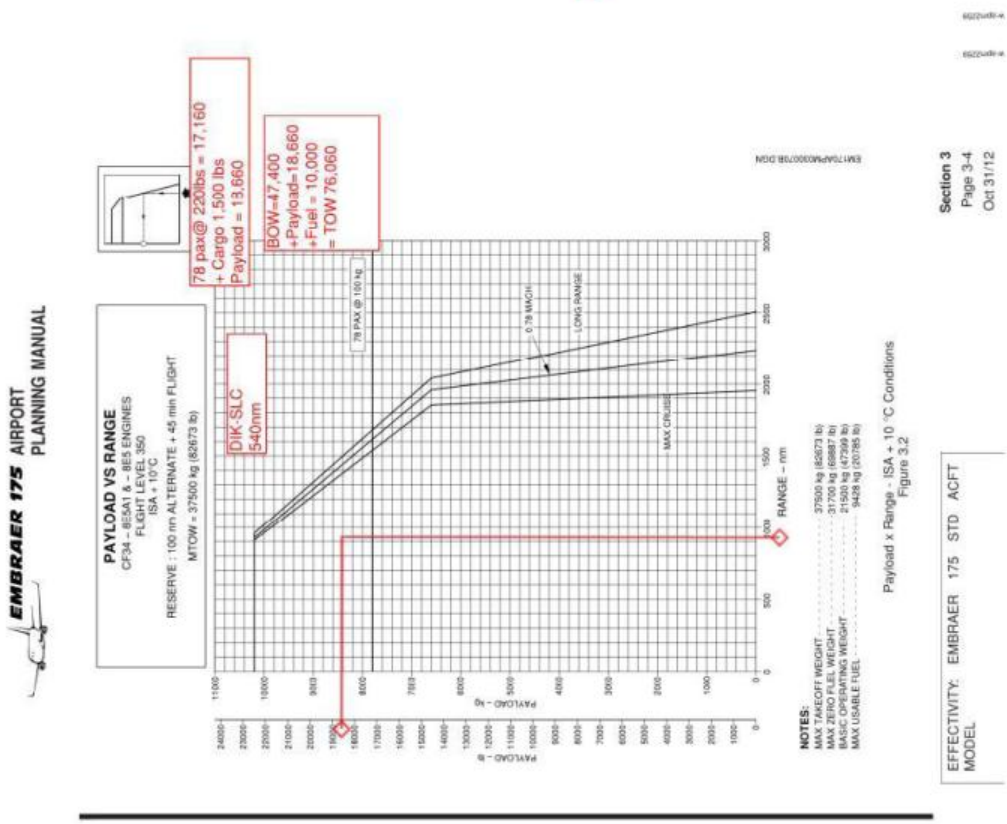
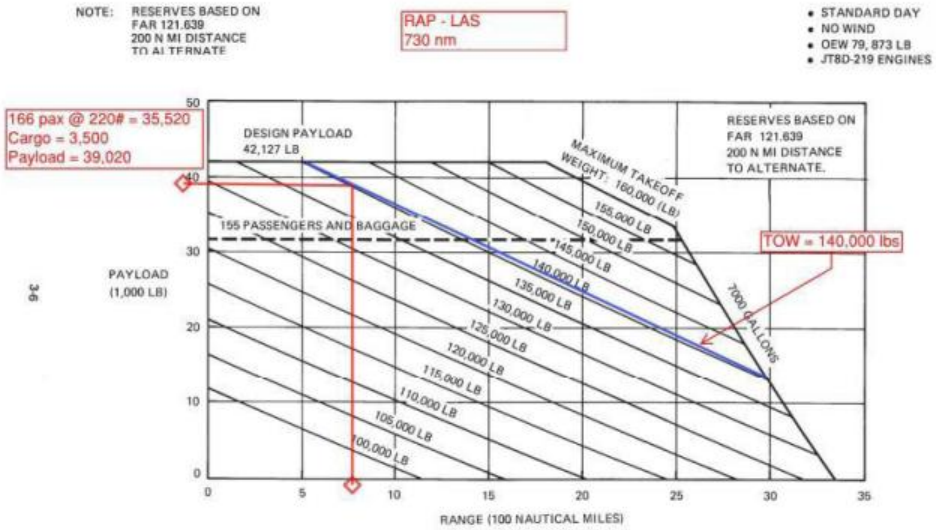
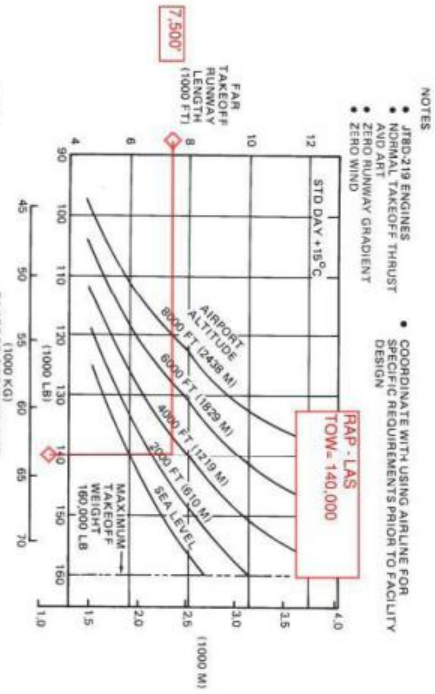


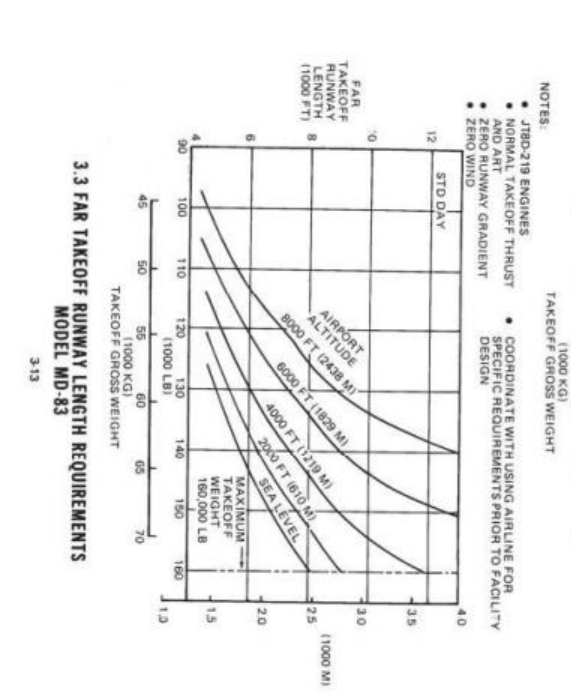
Figure H-32 MD 83 to Las Vegas International



3-6

3.2 PAYLOAD-RANGE
PAYLOAD-RANGE FOR TYPICAL LONG-RANGE CRUISE AT 31,000 FT/35,000 FT STEP
MODEL MD-83

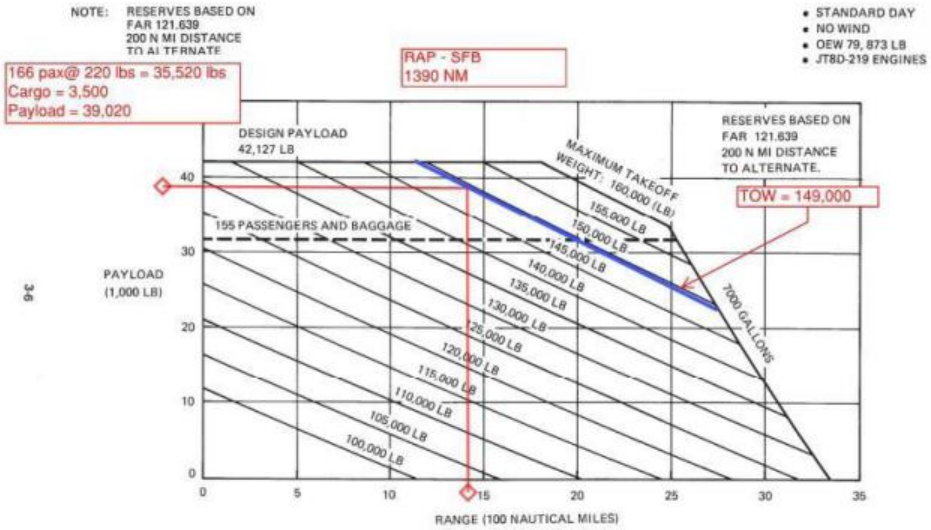




3-13

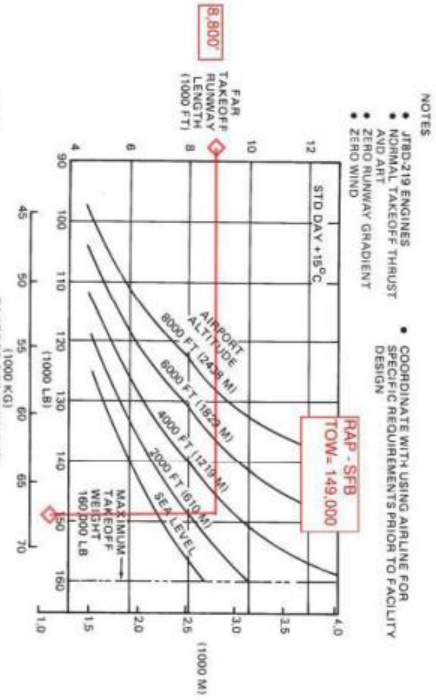
3.3 FAR TAKEOFF RUNWAY LENGTH REQUIREMENTS
MODEL MD-83

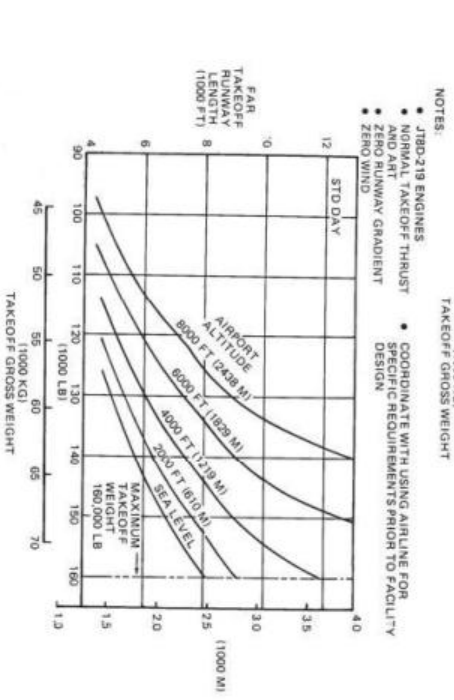
Figure H-33 MD 83 to Orlando Sanford



3-6

3.2 PAYLOAD-RANGE
PAYLOAD-RANGE FOR TYPICAL LONG-RANGE CRUISE AT 31,000 FT/35,000 FT STEP
MODEL MD-83

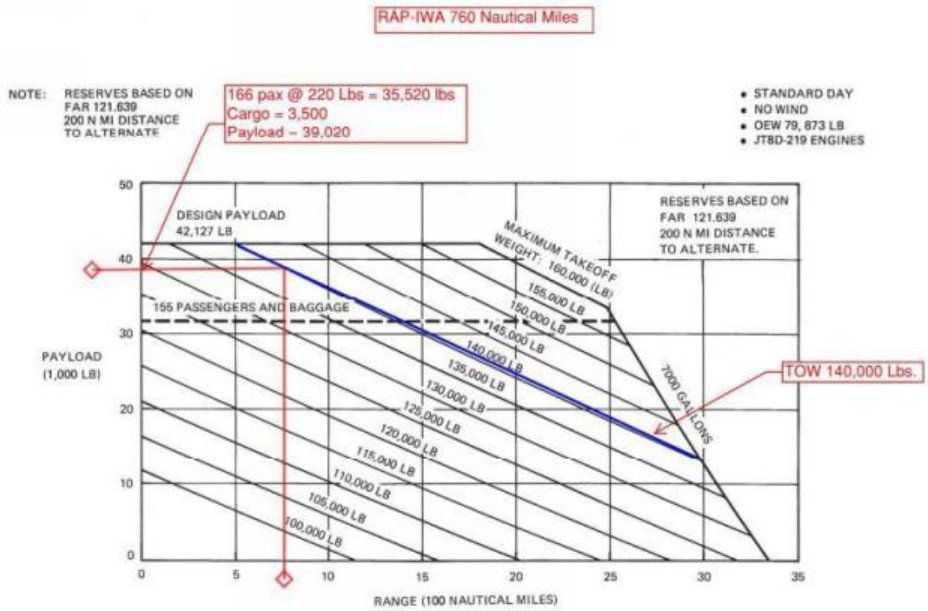




3-13

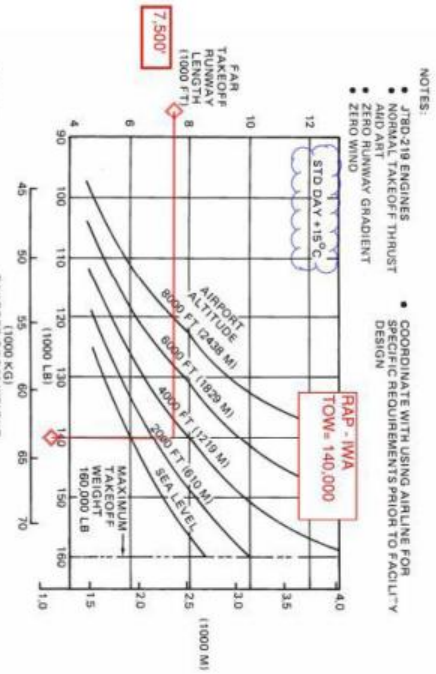
3.3 FAR TAKEOFF RUNWAY LENGTH REQUIREMENTS
MODEL MD-83

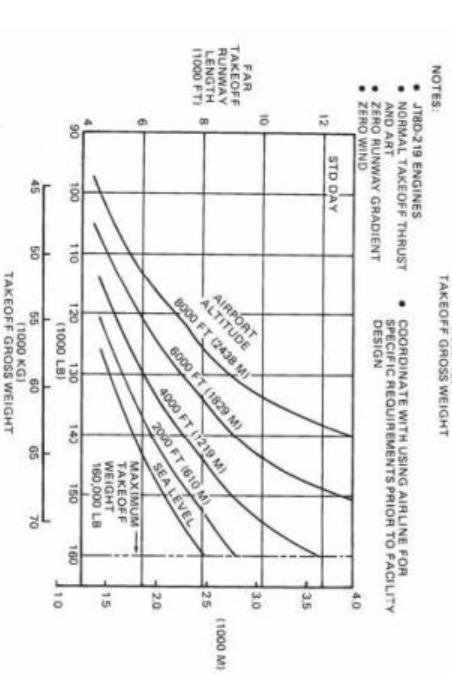
Figure H-34 MD 83 to Phoenix-Mesa Gateway



3.2 PAYLOAD-RANGE
PAYLOAD-RANGE FOR TYPICAL LONG-RANGE CRUISE AT 31,000 FT/35,000 FT STEP
MODEL MD-83

3-6

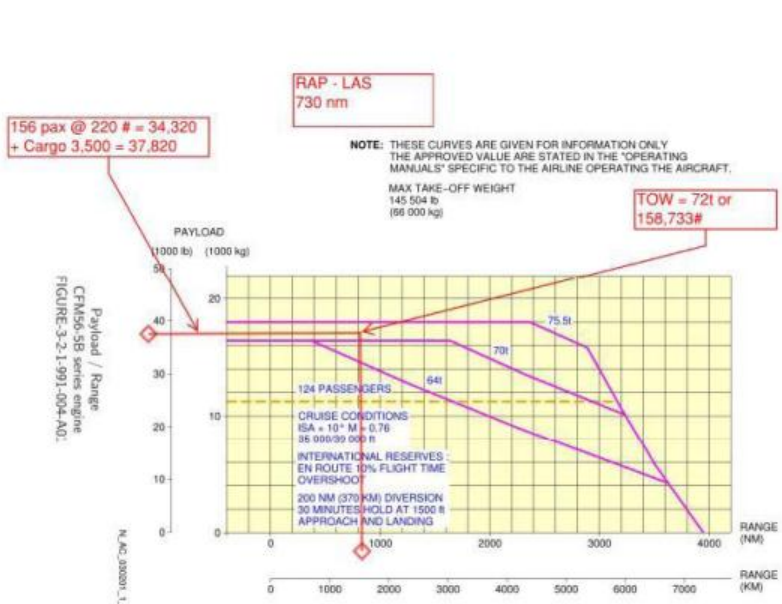




3.3 FAR TAKEOFF RUNWAY LENGTH REQUIREMENTS
MODEL MD-83

3-13

Figure H-35 Airbus A319 to Las Vegas International



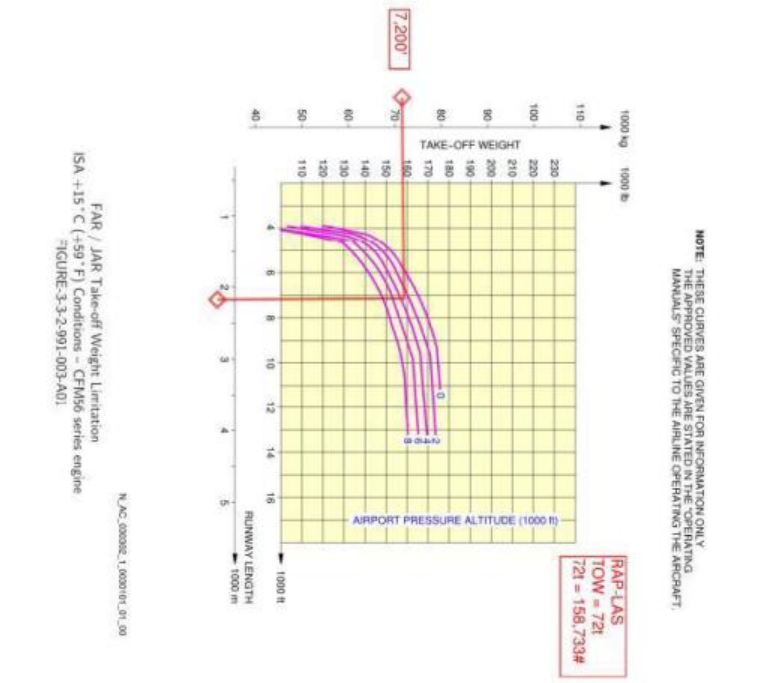
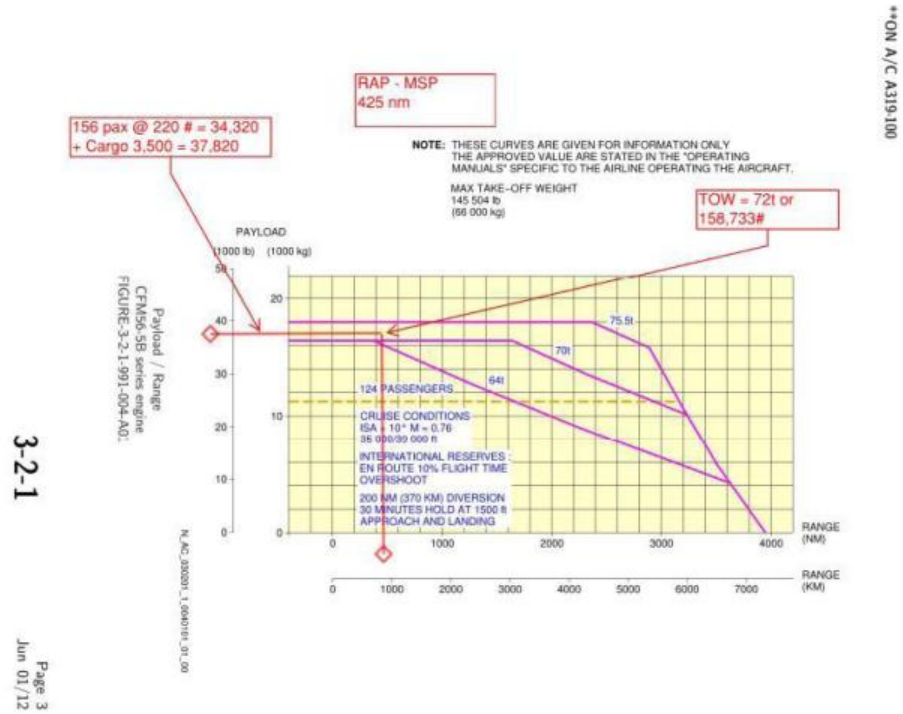


Figure H-36 Airbus A319 to Minneapolis - St. Paul International



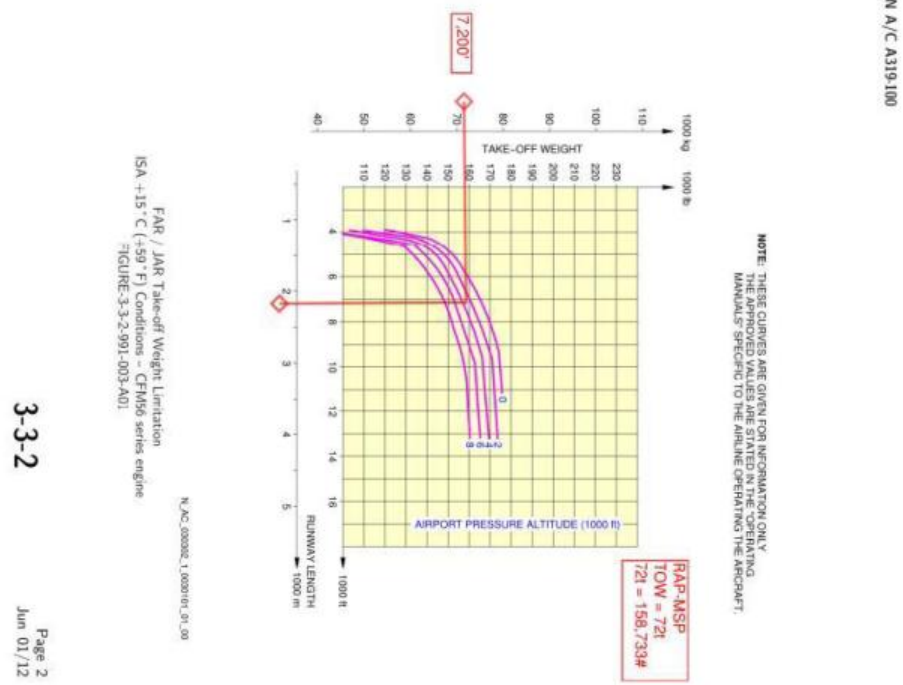
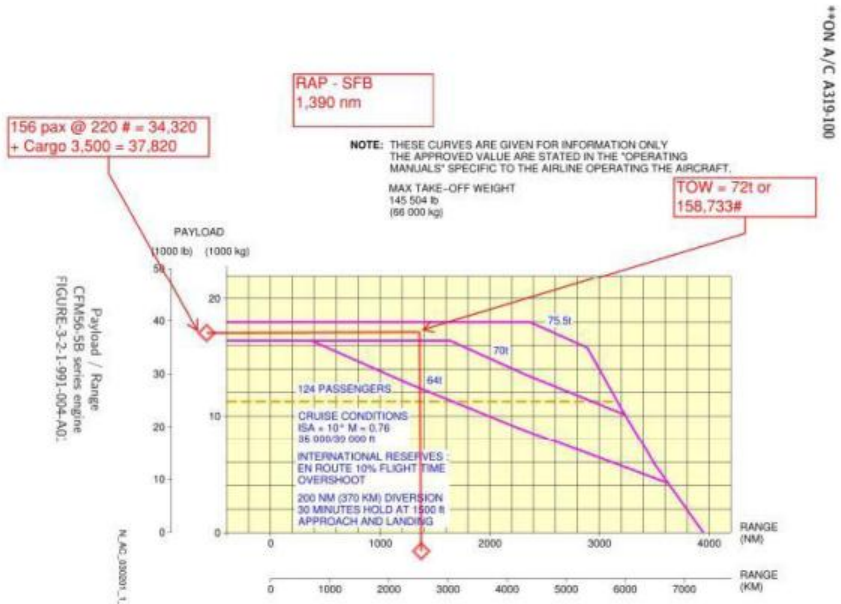


Figure H-37 Airbus A319 to Orlando Sanford



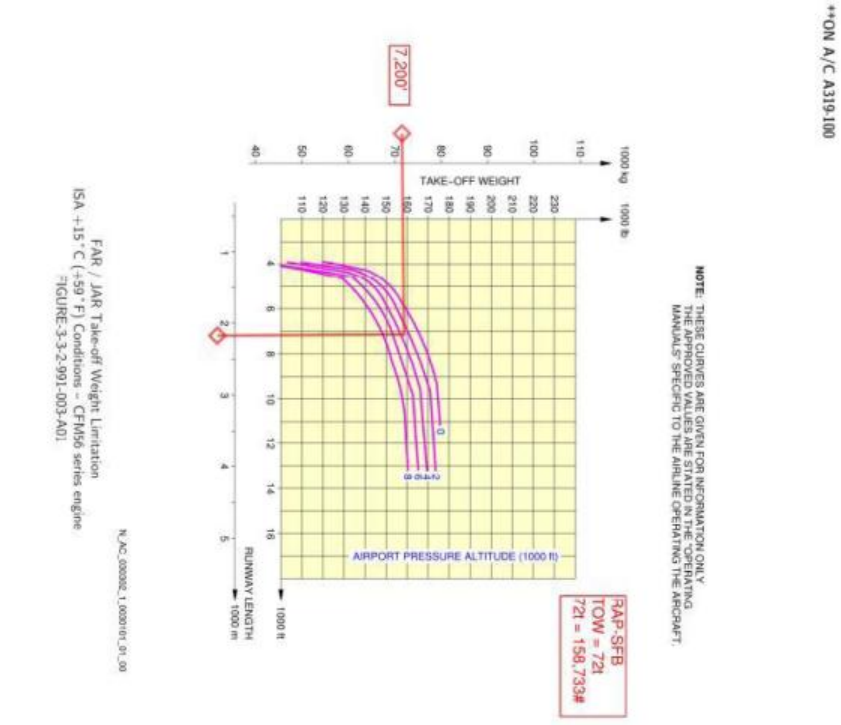
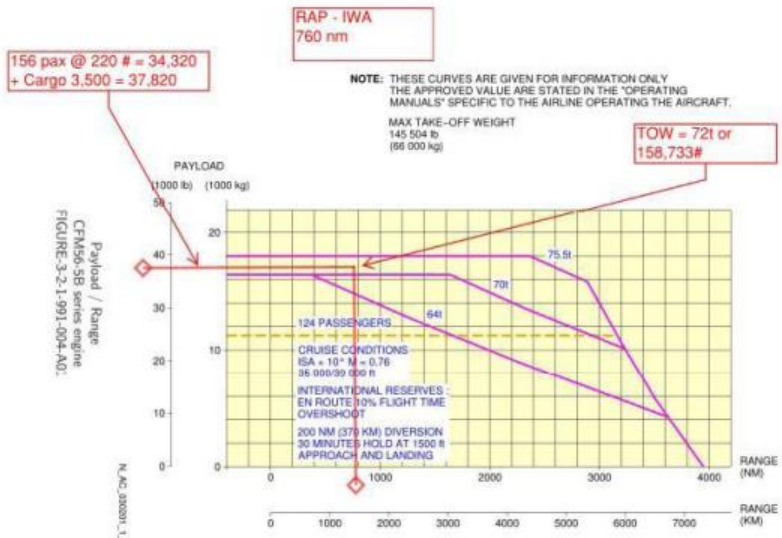


Figure H-38 Airbus A319 to Phoenix-Mesa Gateway



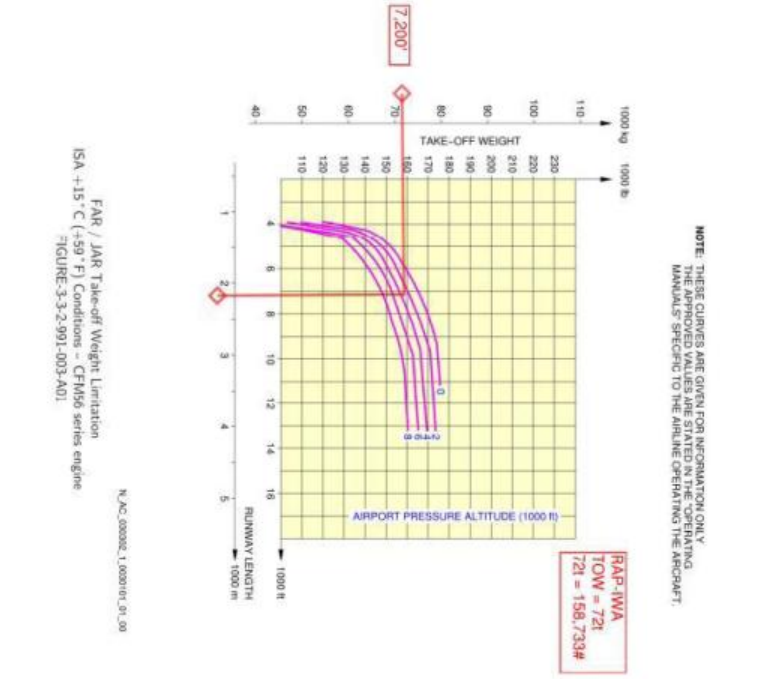


Figure H-39 Airbus A320 to Las Vegas International

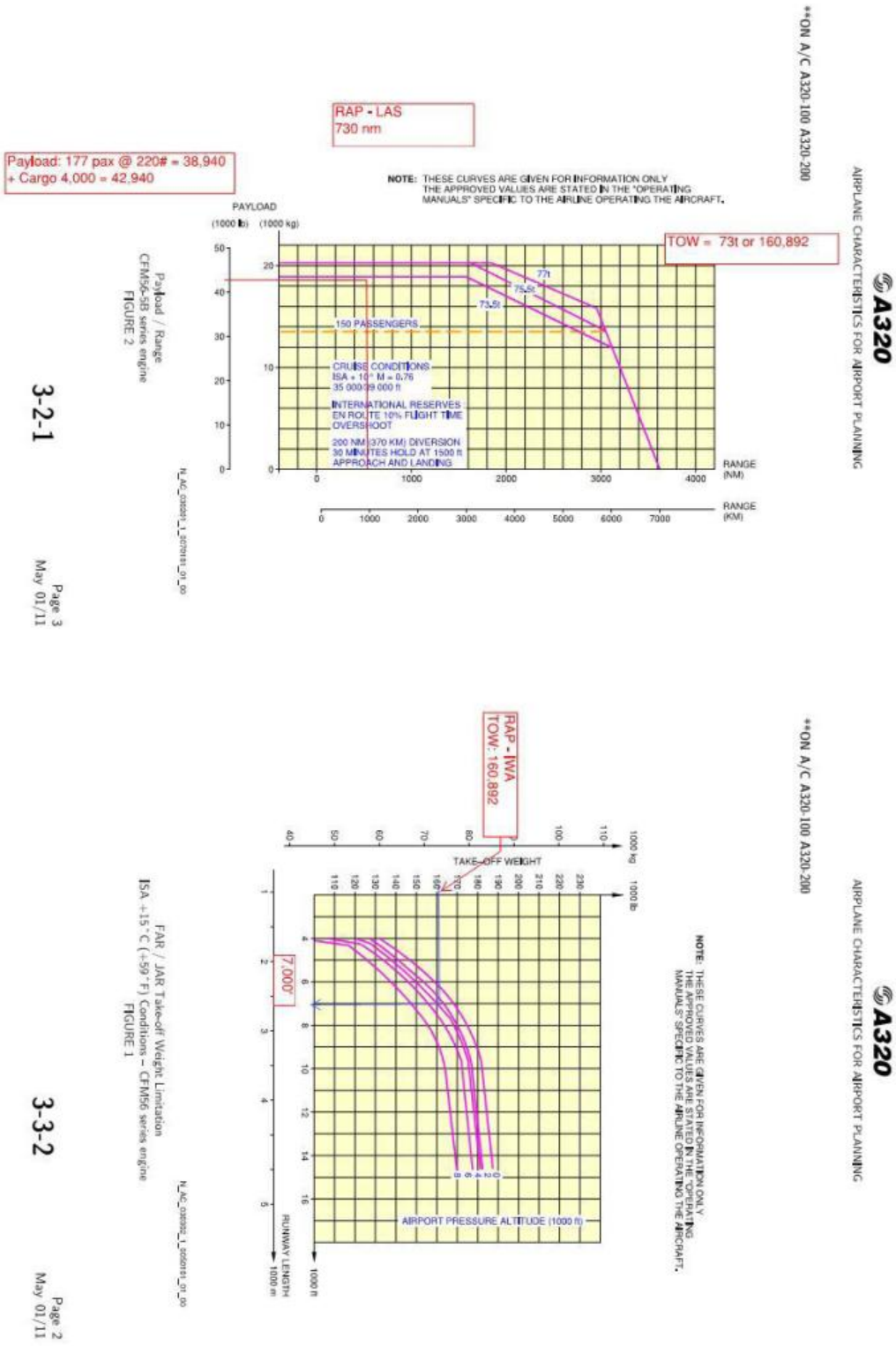
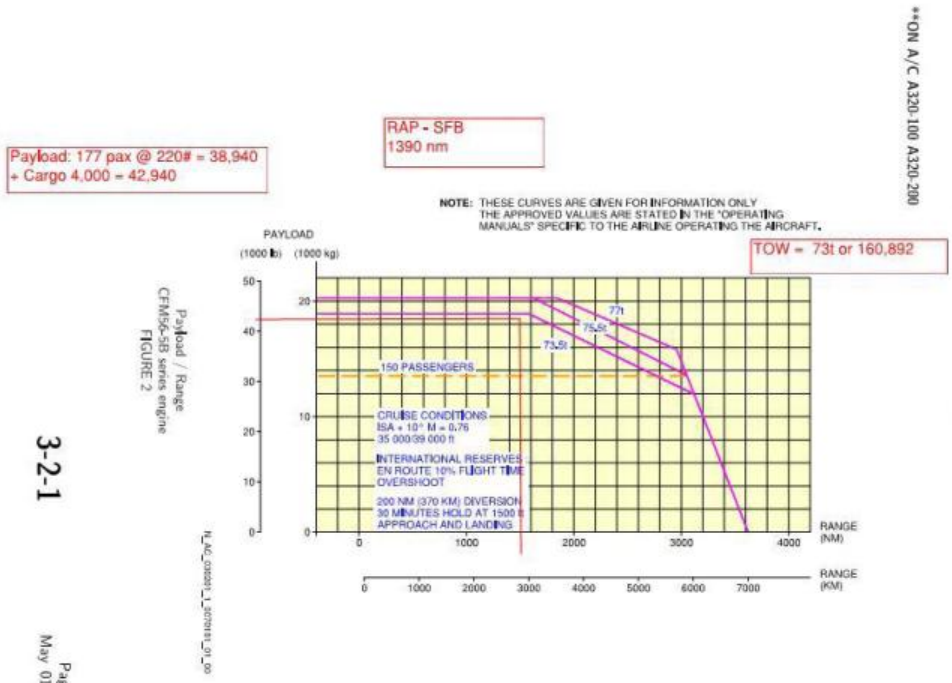


Figure H-40 Airbus A320 to Orlando Sanford



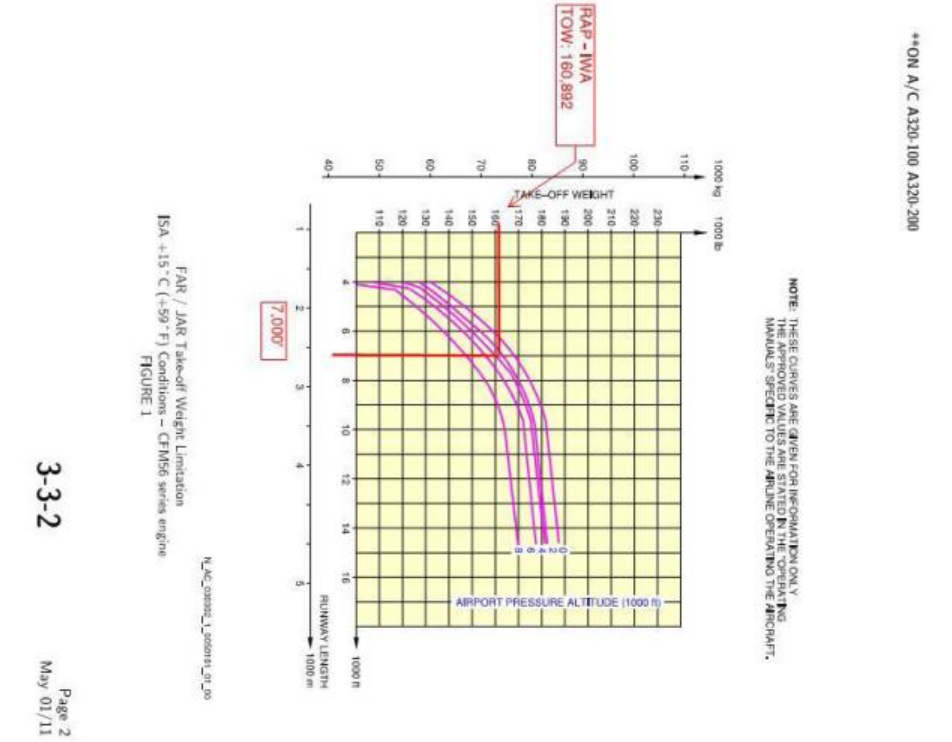
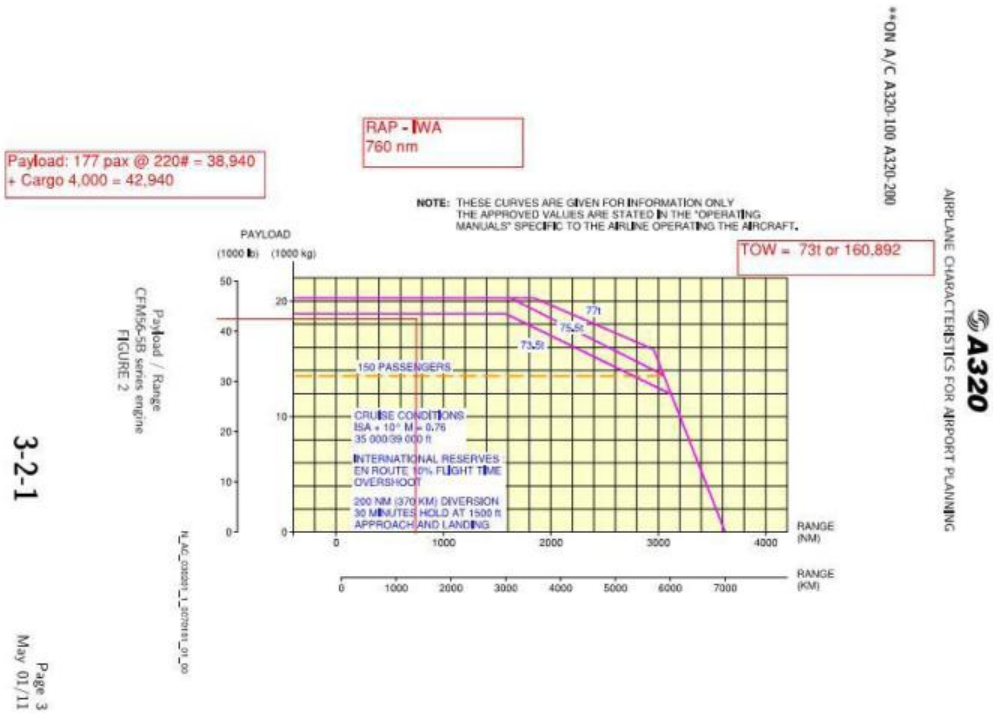


Figure H-41 Airbus A320 to Phoenix-Mesa Gateway



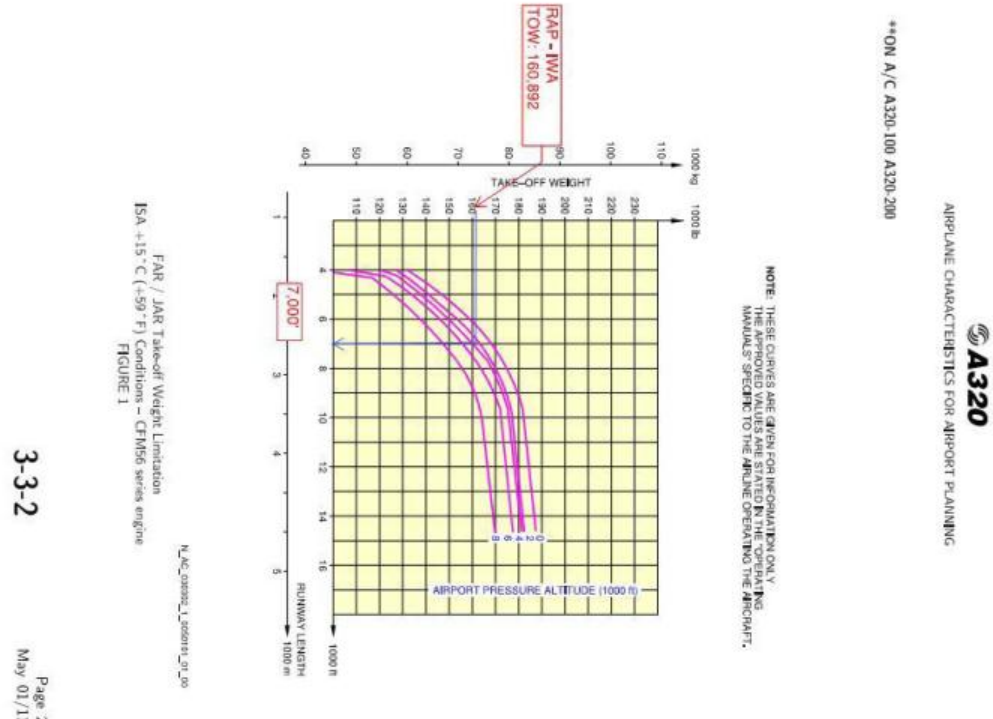
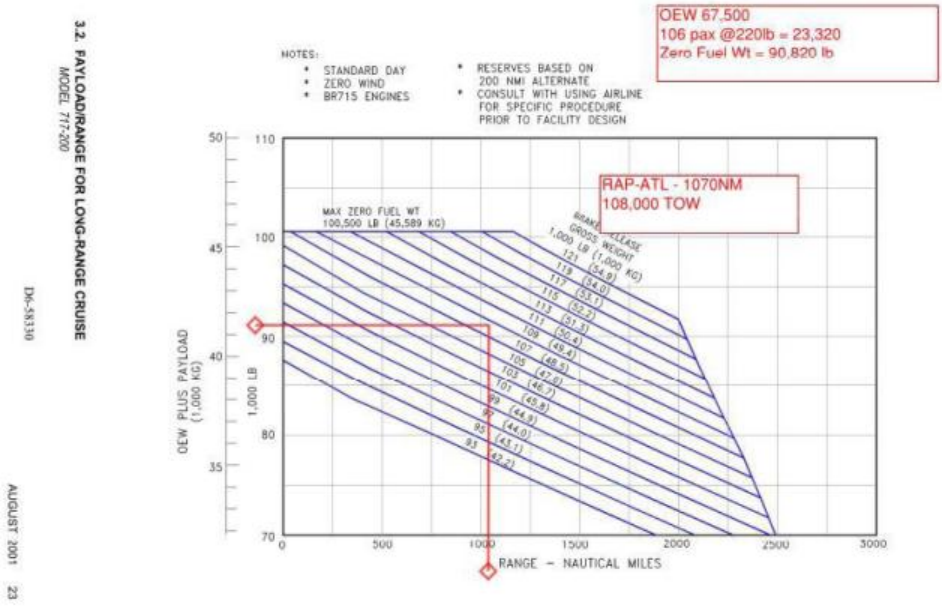


Figure H-42 Boeing B717 to Atlanta Hartsfield



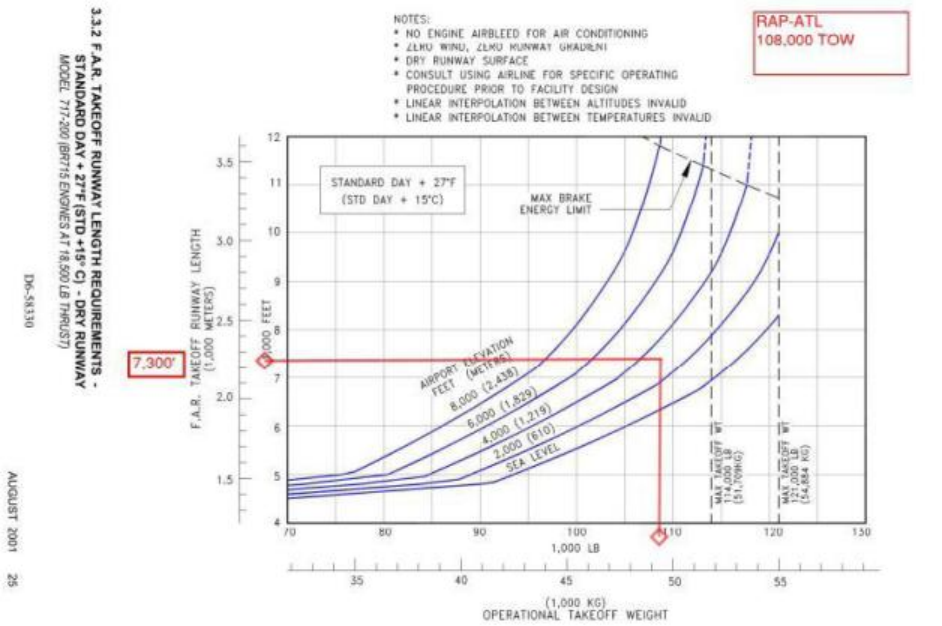
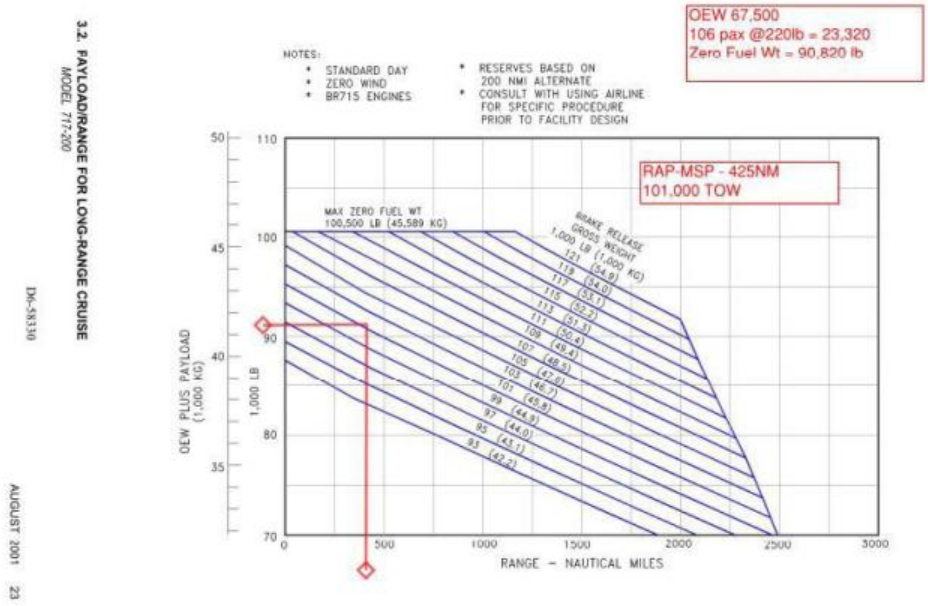


Figure H-43 Boeing B717 to Minneapolis – St. Paul International



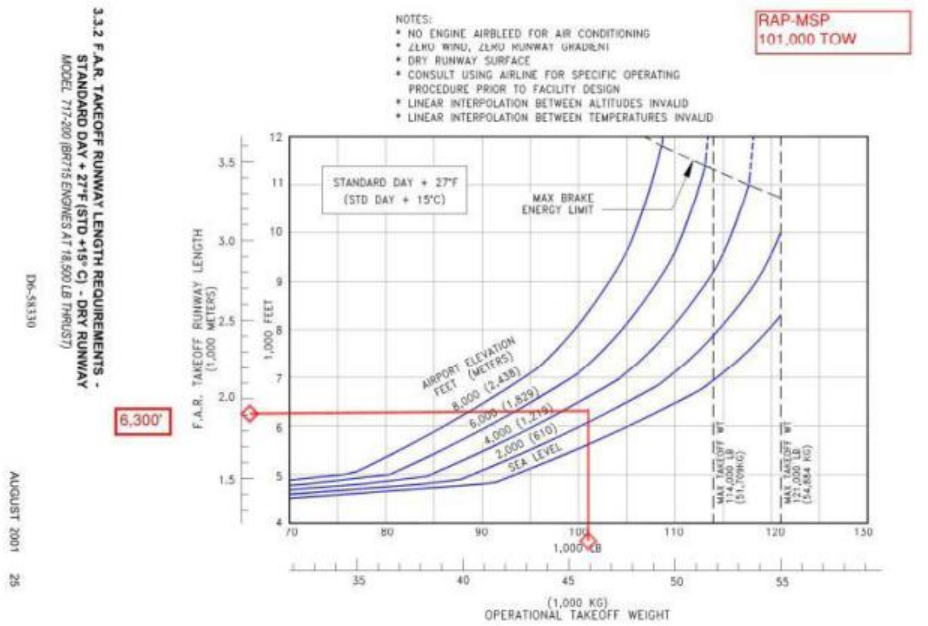
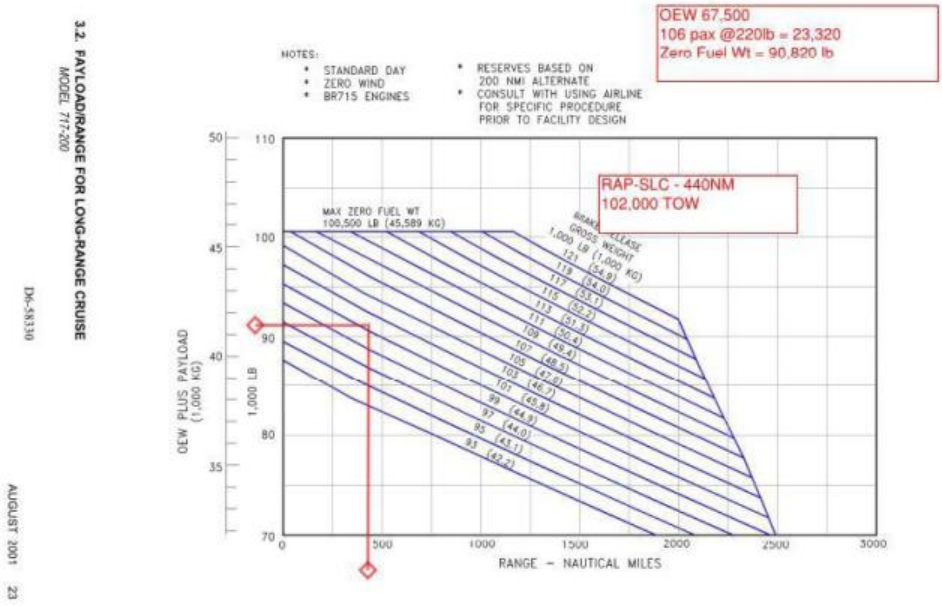


Figure H-44 Boeing B717 to Salt Lake City International



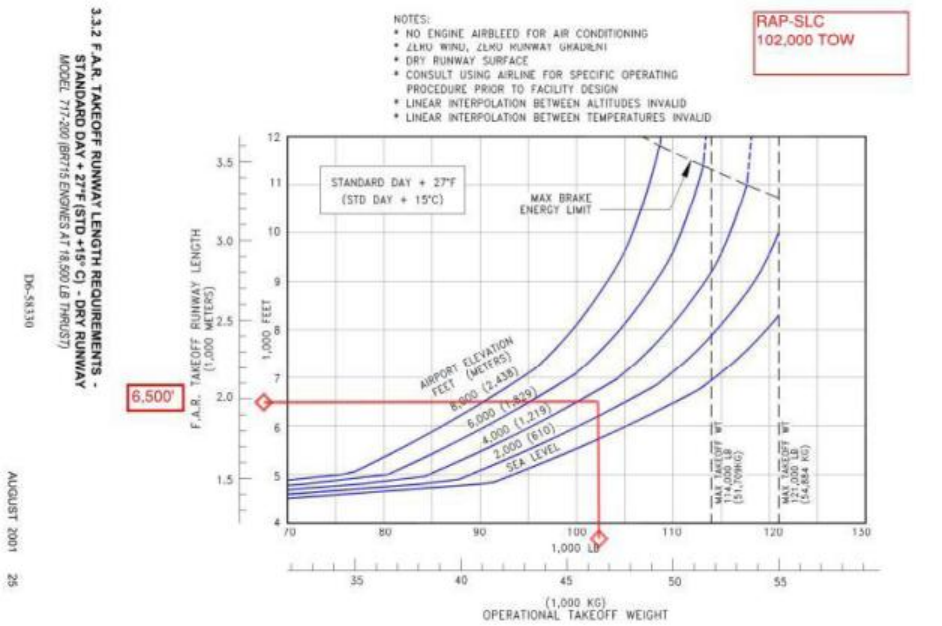
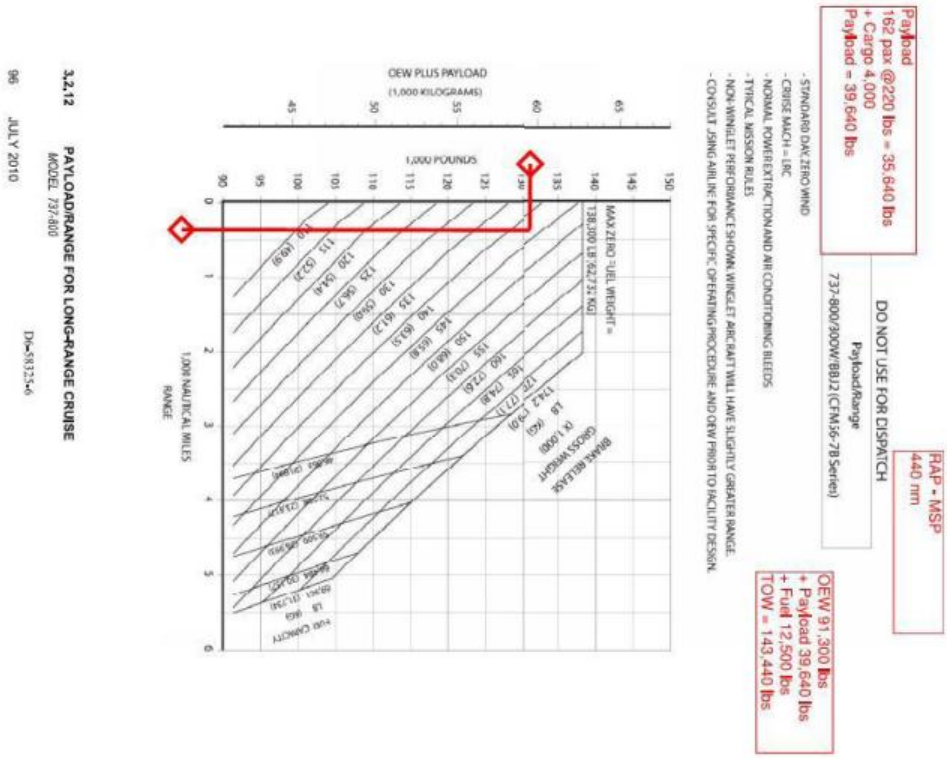


Figure H-45 Boeing B737-800 to Minneapolis - St. Paul International



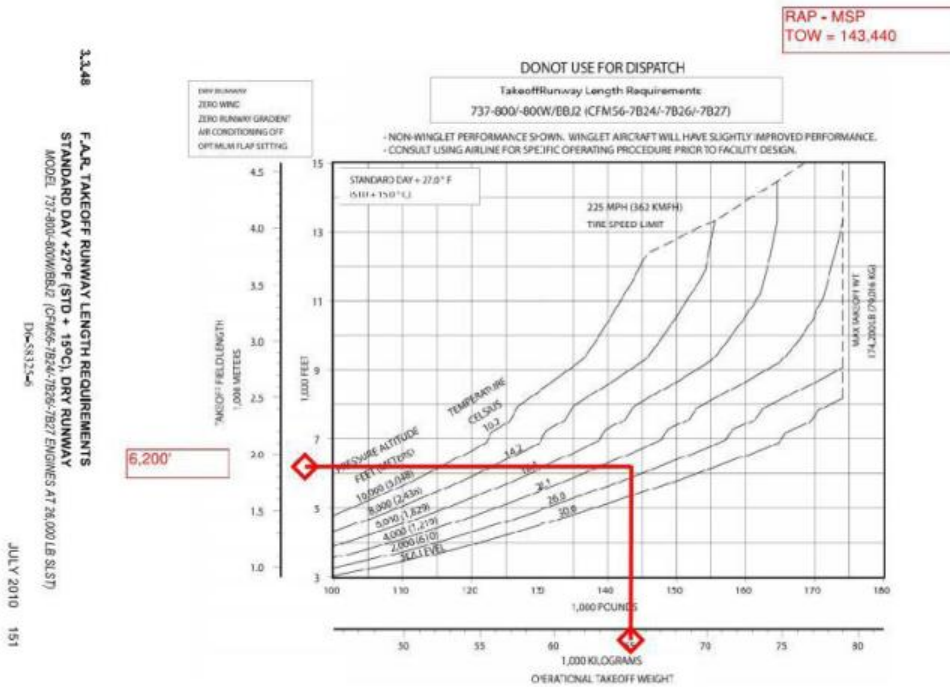
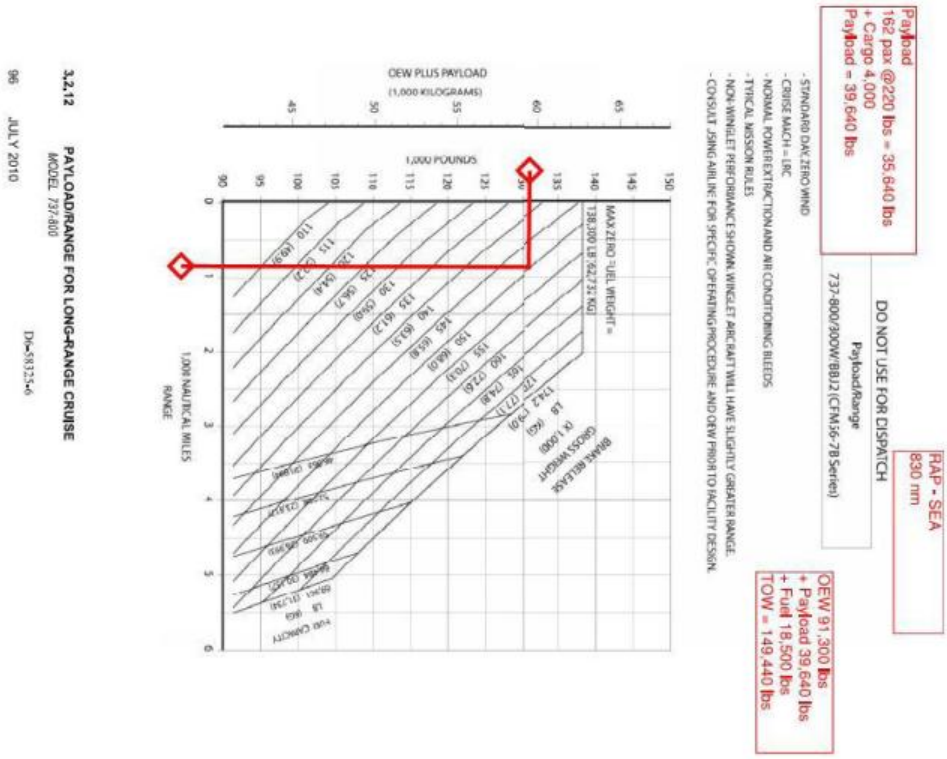


Figure H-46 Boeing B737-800 to Seattle - Tacoma International



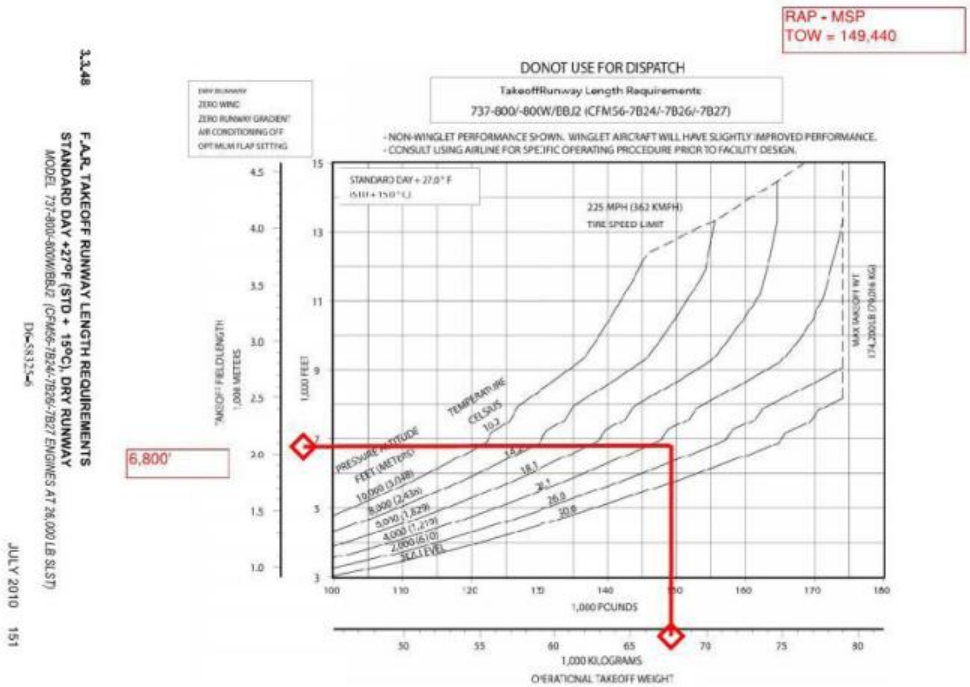
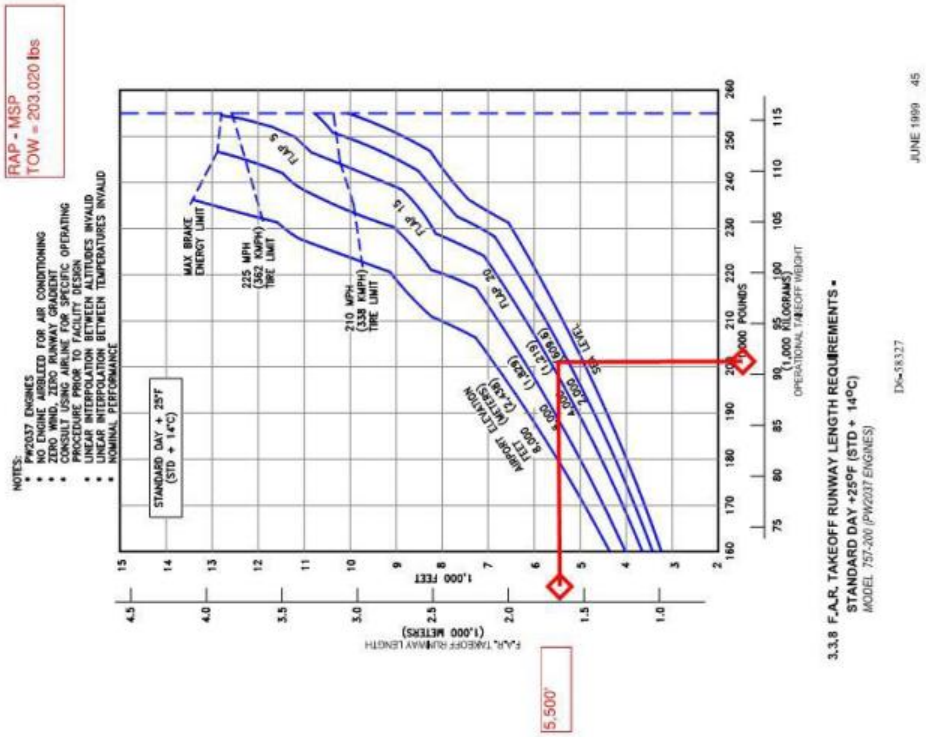
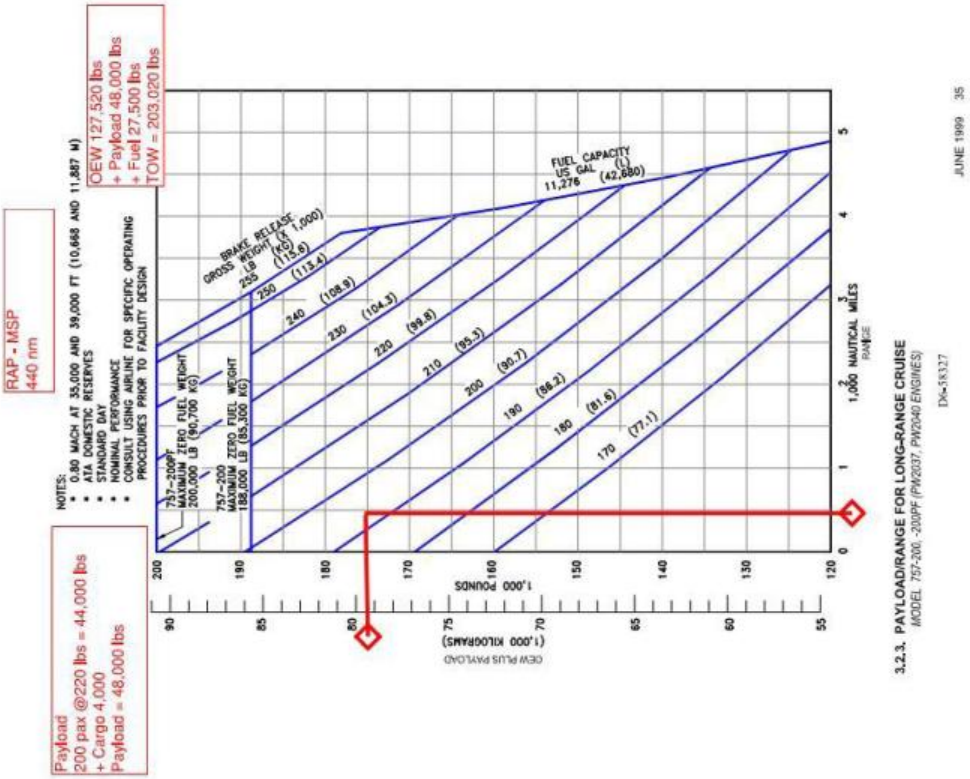


Figure H-47 Boeing B757-200 to Minneapolis - St. Paul International



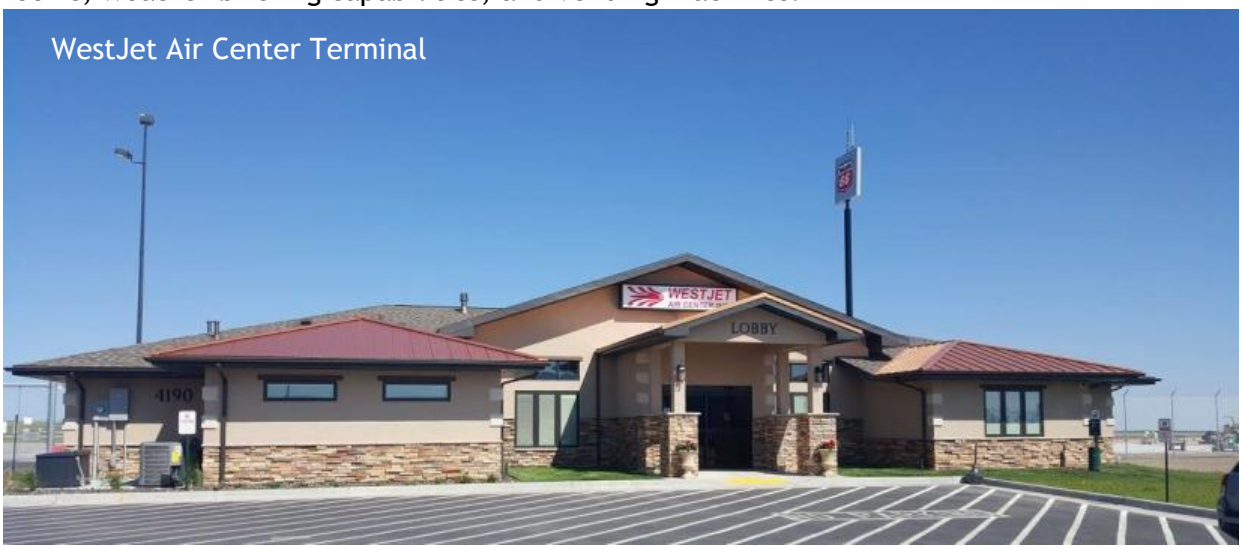


Appendix I - General Aviation & Other Uses

While commercial service operations can easily be defined under *14 CFR Part 121, Air Carrier Certification*, general aviation covers a much broader portion of the aviation community. General Aviation (GA) covers everything but commercial service and military activity. For the purpose of this appendix we will cover both General Aviation and Military activity. General aviation can include aerial application, medical, instructional, business, corporate, or personal aviation activity. These types of aeronautical activity serve the public in a capacity that may be less noticeable to the average citizen. Providing access for general aviation users can prove to be a vital asset to the communities the airport serves. This section contains information on general aviation as it pertains to a commercial service airport.

General Aviation Terminal

The general aviation terminal provides access to the airfield for airport users. This can be a separate building or within the Fixed-Base Operator (FBO) facility, and is usually separate from the commercial service terminal area. When an airport has multiple FBOs, each one typically provides a general aviation terminal facility. Amenities typically found in a general aviation terminal building include a pilot's lounge, restrooms, sleeping quarters, conference rooms, weather briefing capabilities, and vending machines.



WestJet Air Center Terminal

For Rapid City Regional Airport, the FBO serves as the terminal point for General Aviation users and these facilities are addressed below. A map showing the location of the different users at the airport is shown in **Exhibit I-1 – Airport Businesses**. A map showing the detail of operators in the General Aviation Area is shown in **Exhibit I-2 – Fixed Base Operators (FBOs) and Specialized Aviation Service Operators (SASOs)**.

Exhibit I-1 Airport Businesses

2. Vision Air
4. L and D Aero Services
5. L and D Aero Services
8. Advanced Aero Technologies
9. Black Hills Life Flight
19. WestJet Air Center (FBO)
44. Fugro Geospatial
48. Rapid Fuel
59. Dale Aviation

N

0 125 250 500 Feet

*Intended for Planning Purposes Only

Rapid City Regional Airport
FBOs and SASOs
Exhibit I-2

FBOs and SASOs

Background: Fixed-Base Operators (FBOs) and Specialized Aviation Service Operators (SASOs) serve the flying public with various amenities. They tend to be private companies that lease land from the airport, are suited to serve itinerant traffic but also serve based customers. The services FBOs provide typically include fuel sales, pilot facilities, flight line services, aircraft storage and sometimes services such as maintenance, flight instruction, aircraft rental, or charter services.

SASOs may provide a variety of specialized services for aircraft and pilots but this typically excludes full service fueling and flight line services which is a type of service provided only by FBOs. SASOs a specialty service or focus (e.g., aircraft maintenance, skydiving, avionics, aerial photography, flight instruction, etc.).

Table I-1 - FBOs and SASOs

FBOs and SASOs				
Operator	**Hangars/ Storage**	**Fuel**	**Maintenance**	**Other Services**
WestJet Air Center	Hangar, Tie-Down	Full	A&P	
L&D Aero Services			A&P	
Rapid Fuel	Tie-Down	Self	Avionics	
Advanced Aero Technologies			Avionics	
VisionAir				Training, Rental
Dale Aviation				Medical Transport
Fugro Geospatial				Aerial Mapping
Black Hills Life Flight				Medical Transport

Source: Rapid City Regional Airport

Minimum Standards

To ensure services are rendered at the airport to a satisfactory level, the airport has adopted Minimum Standards for Commercial Aeronautical Activities, which were last updated in 2013. This action by the airport is done in accordance with FAA Advisory Circular 150/5190-7 *"Minimum Standards for Commercial Aeronautical Activities"*. The Minimum Standards define the minimum level of services which an operator must provide for each category of aeronautical service. The minimum levels primarily focus on capabilities of the business to provide services such as size of facility, capacity of fuel tanks, number of qualified staff, and hours of operation. Each of these minimum levels differ for the different categories of aeronautical services. The categories of service include: FBO, Self-Serve Fueling, Aircraft Maintenance, Avionics Maintenance, Aircraft Rental or Flight Training, Aircraft Charter or Aircraft Management, Aircraft Sales, Aircraft Storage and Other.

Existing: For Rapid City Regional Airport there is one FBO, which is WestJet Air Center, and a variety of SASOs that operate. All of these operators are listed in **Table I-1**. Each of the operators at Rapid City are each located in the GA area with most of these also having direct access to the GA apron.

Future: WestJet constructed a new General Aviation Terminal in 2015 which will replace the current terminal office connected to their main hangar. The terminal will be located on the Main Apron as their other buildings exist. There are additional FBO/SASO hangar sites portrayed in PAL1 and PAL2 on the Main Apron, the South Large Hangar Area and the North Hangar Area which would work for different types of SASOs and FBOs. FBO development is not recommended in the North Hangar Area as portrayed in the following exhibit. See **Exhibit I-3 Future & Ultimate FBO/SASO Development Areas**.

Ultimate: In PAL3 and PAL4, there are FBO and SASO development area options in the north portion of the Main Apron area and in the South Large Hangar Area. The east side of the airport also has areas identified for FBO and SASO development. Any FBO development in the South Large Hangar Area should be limited to the portions which have the greatest apron depth.

Exhibit I-3 – Future & Ultimate & Ultimate FBO/SASO Development Areas

South Dakota Army National Guard

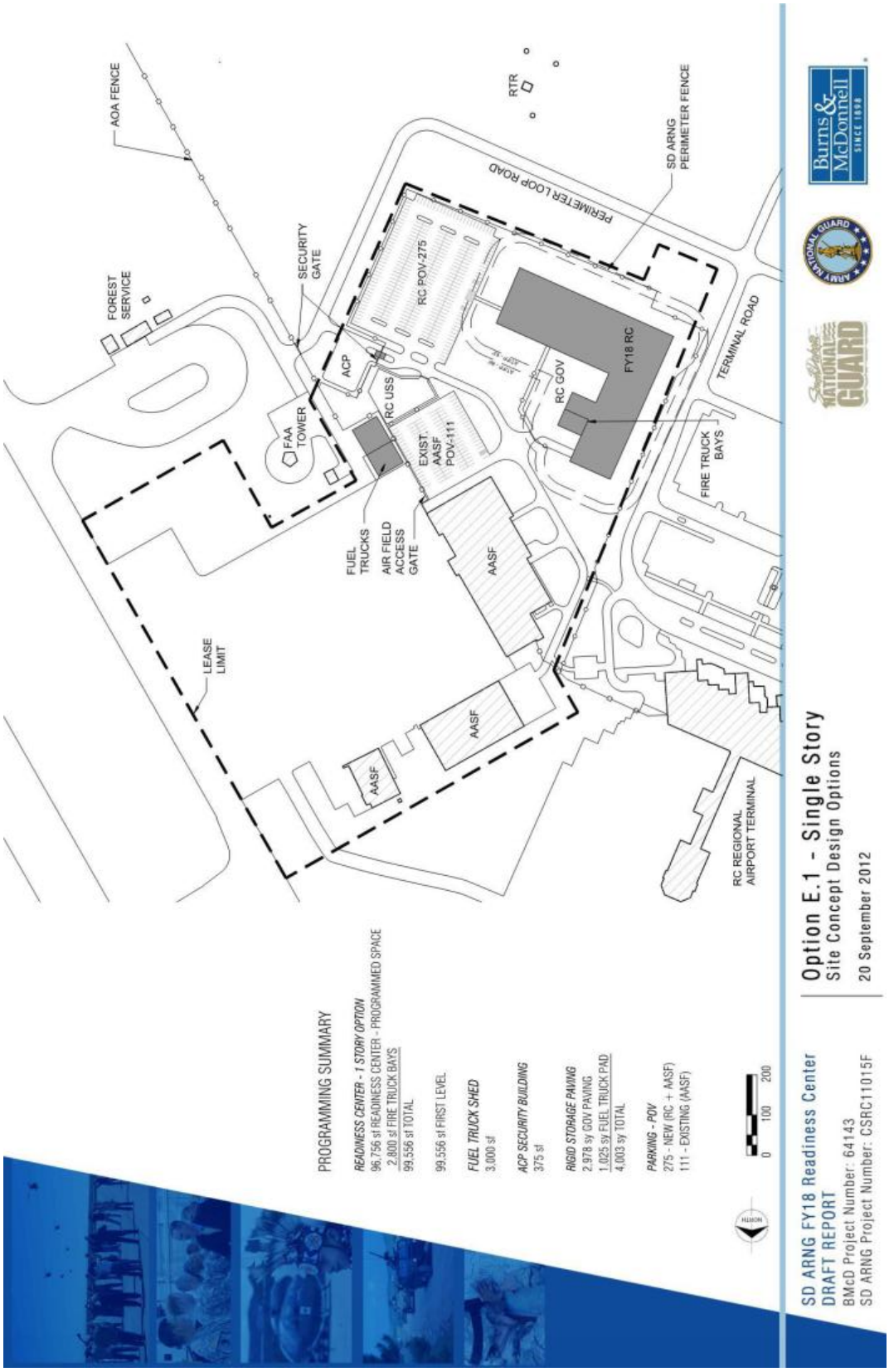
When military facilities are located at an airport, typically they will be located in their own section of the airfield, with special permission required to enter (either landside or airside). The types of operations conducted by military facilities can vary from search and rescue missions, aerial sustainment, air movement, reconnaissance/observation, and other operations approved by the secretary of defense. The buildings and apron are all paid for by funds from the State of South Dakota and U.S. Government separate from funds provided by the Federal Aviation Administration (FAA) for other airport improvements. FAA funds may not be used for improvements to military facilities since their use of the airport is exempt from paying into the Airport and Airway Trust Fund. This does not preclude local funds being used with funds derived from the SDARNG, but the use of local funds should be based upon a lease or commensurate benefit the airport will receive from the improvements.

Existing: South Dakota Army National Guard (SDARNG) operates a facility located directly southeast of the terminal complex of the airport. The mission of the SNARNG at the airport is medical transport and air cargo transport. The aircraft using the airport for the SDARNG consist of six UH-72 Lakota helicopters, six UH-60 Blackhawk helicopters, and one C12 Huron aircraft. The SDARNG facilities consists of a large apron (33,000 square yards), a fuel farm and three (3) buildings.

Future and Ultimate: The existing ±31 acre SDARNG leased area[1] will remain through the planning period with all development by the SDARNG planned within these existing boundaries. In PAL1 or PAL2 there is a plan to construct a new Readiness Center. When the readiness center is constructed there are also plans to rearrange the entrance to the facilities. See **Exhibit I-4**.

[1] The SDARNG lease expires 3/21/2056.

Exhibit I-4 – Future & Ultimate SDARNG Facilities



US Forest Service

The U.S. Forest Service (USFS) and the Bureau of Land Management (BLM) have many tanker bases around the country particularly in the western United States in areas where most U.S. Forest Service and Bureau of Land Management lands exist. The majority of the aerial firefighting capability used by the USFS and BLM is conducted by private contractors who fly the aircraft and are loaded with retardant at these USFS and BLM bases. Those Air Tanker bases in the region are listed in **Table I-2**.

Table I-2 – US Forest Service Bases in the Region

USFS/BLM Tanker Bases								
Airport	**Op**	**ID**	**City**	**State**	**VLAT**	**LAT**	**Load**	**Park**
Billings Logan Intl	BLM	BIL	Billings	MT	N	Y	2	6
Helena Regional	USFS	HLN	Helena	MT	N	Y	2	4-6
Missoula Intl	USFS	MSO	Missoula	MT	N	Y		6
Yellowstone	USFS	WYS	West Yellowstone	MT	N	Y	1	4
Rapid City Regional	USFS	RAP	Rapid City	SD		Y	1	5

Source: USFS 2013 Air Tanker Base Directory; Op – Operated by USFS or Bureau of Land Management (BLM), VLAT – Very Large Air Tankers, LAT – Large Air Tankers, Load – Simultaneous Loading capability, Park – USFS estimated space available on the airport for parking

Similar to the SDARNG, the buildings and apron for U.S. Forest Service facilities are paid for by funds from the U.S. Government separate from funds provided by the Federal Aviation Administration (FAA) for other airport improvements. FAA funds may not be used for improvements to military facilities since their use of the airport is exempt from paying into the Airport and Airway Trust Fund. This does not preclude local funds being used with funds derived from the USFS, but the use of local funds should be based upon a lease or commensurate benefit the airport will receive from the improvements.

Existing: At Rapid City Regional Airport, the United States Forest Service (USFS) operates a facility directly southeast of the SDARNG. The current layout is a loop taxilane, which is only able to load one aircraft at a time. See **Exhibit I-1**. There are three buildings at the Airtanker base including a main building with flight

operations office, pilot briefing area, and crew quarters. A garage houses a vehicle, workshop, and general storage. And finally a storage building houses hoses and filling equipment. There is also a retardant mixing station located at the Airtanker base. The role of the Airtanker base is primarily to support fixed wing multi-engine tankers. The Airtanker base is able to load helicopters and Single Engine tankers (SEAT) but those aircraft are often closer to the fires. Several SEAT aircraft are based at the Custer State Park Airport.

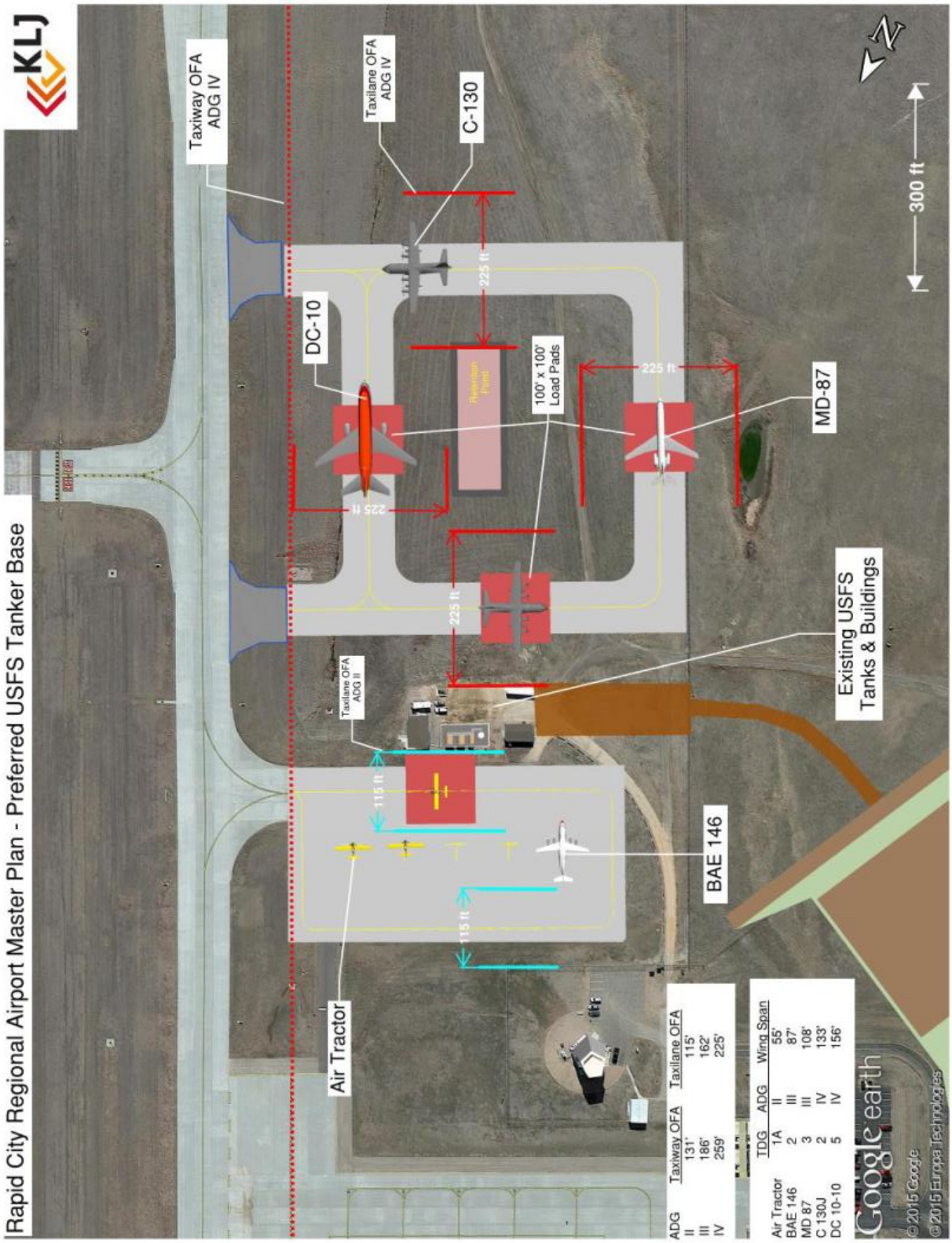
The Rapid City Airtanker base has handled a variety of fixed wing fire tankers in the past including BAe 146, C-130 and P-3 Orions. It was found there is difficulty in handling C-130's as the aircraft cannot loop in sequence because of the fence surrounding the ATCT. The aerial firefighting contractors also use Boeing 747 and DC-10 aircraft which cannot be filled at the Rapid City Air Tanker base.

As the fleet of aircraft used in aerial firefighting ages, there is a consistent evolution of aircraft types being configured and converted for use. At this time, the USFS is anticipating aircraft such as MD-87 Tankers as early as the summer of 2014 to be used at Rapid City. The MD-87 tanker would have difficulty navigating within the current taxilane loop. When firefighting activities are underway, the USFS also has a need to independently park aircraft for storage. At this time the only space is the GA apron area, which is located far north.

Future: It is recommended in PAL1 and PAL2 that the preferred alternative layout for the USFS Airtanker base be constructed initially with the loading pad on the south side of the existing tanks and a loop taxilane sufficient for the long term layout. See **Exhibit I-5 Future & Ultimate USFS Air Tanker Base.**

Ultimate: Additional loading pads should be completed in PAL3 and PAL4 to allow multiple large aircraft to be loaded. The existing loop on the north side of the existing tanks should be converted to a SEAT only facility with some parking for small aircraft. If the tanks and buildings were to be reconstructed, the new tanks and buildings should be constructed to the west of the taxilane loops.

Exhibit I-5 – Future & Ultimate USFS Air Tanker Base



Customs and Border Protection (CBP)

Background: The US Customs and Border Protection component of the Department of Homeland Security is typically referred to as "Customs." Customs provides their Flight Inspection Services (FIS) at international commercial airports as well as designated general aviation airports. At larger commercial airports, Customs is typically located within the airline terminal building. However, smaller commercial service airports or designated general aviation airports may locate a customs facility in or near the general aviation terminal building or FBO facility. Having Customs on the airfield can attract international business and can be an effective tool in economic development for the surrounding communities. By having Customs near the general aviation facilities, international flights can avoid the congestion of the passenger terminal and get in and out of the airport without interrupting the normal operations of air carrier traffic.

According to U.S. Air Commerce Regulations (19 CFR Part 112, Subpart B) there are three classifications of airports that handle international passengers/cargo. These are "International" airports, "Landing Rights" airports, and "User Fee" airports. A sub-type of international is a "Designated" airport which is only applicable to airports in the southern part of the U.S. which experience international flights from the south. International flights from the south are required to land at designated airports unless prior arrangements have been made to proceed to a "Port of Entry" or "User Fee" airport. Designated airports are not applicable for the northern portion of the U.S. and will not be addressed further. The airports in the region which are allowed to handle international passengers are listed in **Table I-3**.

- International – permission to land is not required but estimated arrival time must be provided to CBP
- Landing Rights – specific permission to land is required in addition to providing estimated arrival time to CBP
- User-Fee – does not meet Congressional Criteria for a CBP Port of Entry; the cost of CBP services are paid for by the community/users rather than the federal government

Regardless of the type of designation there are also three categories of CBP facility. The highest is the Federal Inspection Service (FIS) which is staffed at a minimum with 12-14 Federal employees, the second is the General Aviation facility with a minimum of 2-4 Federal employees. The third type is the User Fee facility which can function for general aviation or passenger airlines depending on location and configuration. The User Fee facility is staffed by Federal employees, but the cost of the service is paid by the airport, local government, and/or users.

Table I-3 - International Airport Categorization in the Region

International Airports					
Airport	City	State	Federally Designated		
			International	Landing Rights	User Fee
Centennial	Centennial	CO		X	
Colorado Springs Municipal	Colorado Springs	CO		X	
Denver Intl	Denver	CO		X	
Eagle County Regional	Gypsum	CO			X
Rocky Mountain Metropolitan	Broomfield	CO			X
Bozeman Yellowstone Intl	Bozeman	MT			X
Great Falls Intl	Great Falls	MT	X		
Helena Regional	Helena	MT		X	
Glacier Park Intl	Kalispell	MT		X	
Hector Intl	Fargo	ND			X
Grand Forks Intl	Grand Forks	ND		X	
Minot Intl	Minot	ND	X		
Sloulin Field Intl	Williston	ND	X		
Eppley Airfield	Omaha	NE		X	
Sioux Falls Regional	Sioux Falls	SD		X	
Natrona County Intl	Casper	WY			X

Source: CBP

Existing: The Rapid City Regional Airport currently does not have Customs and Border Protection facilities on the airport. Persons arriving by air from an international origination point must first land at a Point of Entry and then they can proceed to Rapid City Regional Airport. Airports nearest to Rapid City with such service are Casper WY, Sioux Falls SD, Williston ND, and Minot ND. There is interest in having a CBP facility for general aviation at the airport which is being explored by the City of Rapid City. A location for a stand-alone CBP facility will be examined in order to potentially serve general aviation and cargo aircraft.

Future: The CBP facility whether it is a temporary or a permanent location will be a demand driven facility. While the Ultimate location would be in the South Large Hangar Area where the TSA currently offices, if there were a need prior to the apron being constructed, there are other options in the South Large Hangar Area. Any of the hangar development sites, facing south, which are situated in this South Large Hangar Area could be used to construct a CBP facility for temporary or permanent use. See **Exhibit I-6 Future & Ultimate CBP Facility**.

Ultimate: The ultimate CBP facility is to use a portion of the existing TSA office building. The office building would be reconfigured with a new public entrance on the north side while the south side would become the entrance from the aircraft apron.

Exhibit I-6 – Future & Ultimate CBP Facility

Cargo Operations

Cargo operations are unique. Some cargo operations are based on larger aircraft that fly to an airport within a region, transfer packages to smaller aircraft, and those smaller aircraft then fly to smaller outlying communities. Smaller operations normally consist of smaller aircraft flying into the airport and transferring packages to and from trucks on the apron. Cargo operations occur during various times of the day, but typically occur rather quickly and all at once. The operations may occur out on the apron or through a building.

Existing: The Rapid City Regional Airport is currently served by air cargo services from UPS (Encore) and FedEx (Empire Airways). The aircraft serving Rapid City are feeder flights from Sioux Falls SD and operate on a daily basis. FedEx feeder aircraft is the ATR-42. UPS feeder aircraft include Fairchild Metroliner III, and Cessna 404/402 twin engine aircraft. The airport handled over 3.2 million pounds of cargo in 2013.

UPS handles its aircraft on the north portion of the GA apron and typically requires hangaring during the day to prevent snow and ice accumulation. FedEx handles its aircraft adjacent to the old terminal building and leaves the aircraft out each day. FedEx deices its aircraft each day as needed. The FedEx area is adjacent to the airline deicing area. See **Exhibit I-1**.

Future and Ultimate: A permanent location for handling air cargo was identified in the preferred alternative. The location is near the area presently used by FedEx but will shift slightly north. The area includes space for a dedicated air cargo building and a hangar. The facilities are expected to be constructed in PAL1 based on existing demand and the area will be sufficient to meet the cargo demands through the planning period. See **Exhibit I-7 Future & Ultimate Air Cargo**.

Exhibit I-7 – Future & Ultimate Air Cargo

Aprons

Background: General aviation apron space can be utilized by either transient or based aircraft for overnight storage. When apron space is located in front of an FBO, typically there will be a small tie-down charge for overnight storage. However, at smaller airports with no FBO, overnight storage can sometimes be free. Apron space can also be used by an FBO to shuffle aircraft in and out of hangar storage.

Typically, aircraft apron storage is usually a function of the airport geographic location. In the winter months, if the airport is located in the northern regions of the country, most apron aircraft storage will be transient aircraft. Due to harsh weather conditions that can be present in colder weather climates, most based aircraft have enclosed hangar space for their aircraft. This can also be true for any other type of severe weather climate. In extremely hot conditions, there may be less of a demand for apron space because based aircraft owners have a desire to store their aircraft in hangars for the shade in summer months. As a result, apron sizes may be smaller and utilized more frequently by transient aircraft.

Also, during adverse weather conditions, some commercial service airports utilize general aviation apron space for diverted commercial service aircraft. However, this is only possible if the airport has a runway capable of supporting such large aircraft.

Apron size requirements are typically driven by the most demanding aircraft (wingspan clearances) to utilize the space, as well as a function of how many aircraft will occupy the tie-down spots at any given time.

Existing: The general aviation apron areas at Rapid City Regional Airport are being designated as six different specific areas. These are three portions of the main general aviation apron (north, center and south), the old terminal area apron, the apron along taxiway T1 and the large hangar apron accessible from taxilane G3. These apron areas are depicted on **Exhibit I-8** and listed with attributes including Pavement Condition Index (PCI) from 2010 in **Table I-4**. Additional information regarding the pavements at the airport including the aprons can be found in **Appendix G - Airfield Pavements**.

Table I-4 – General Aviation Apron Areas

General Aviation Apron Areas				
Area		**Size (square yards)**	**Condition (PCI)**	**Areas from 2010 PCI Report**
AP1	Main Apron - North	14,857	67	4505
AP2	Main Apron – Center	25,990	96	4410, 4415
AP3	Main Apron – South	14,307	91	4310
AP4	Old Terminal Apron	5,177	73	4225, 4227
AP5	Apron Adjacent to T1	11,645	84	4230, 4110, 4160
AP6	Large Hangar Apron from G3	4,490	98	4325

Source: KLJ

Legend

- Apron
- Unpaved Tiedowns

AP1. Main Apron - North
AP2. Main Apron - Center
AP3. Main Apron - South
AP4. Old Terminal Apron
AP5. Apron with T1
AP6. Large Hangar Apron

N

0 125 250 500 Feet

*Intended for Planning Purposes Only

Rapid City Regional Airport
GA Apron and Hangar Map
Exhibit I-8

On the Main apron areas there are tie-downs for aircraft. The majority of the tie-downs are configured for Airport Design Group (ADG) I aircraft (wing span not greater than 49') but there are four positions configured for larger aircraft up to a wingspan of 55'. There are a total of 26 tie-downs on the main apron. The north portion of the main apron also has the self-fueling tanks for 100LL and Jet A and regularly accommodates UPS's aircraft each day in fair weather conditions. In poor weather the UPS aircraft is typically hangared.

Since Taxiway A was reconstructed and set to a 450 foot centerline separation from Runway 14-32, more space has been made available for apron. In addition, the realignment of Taxiway A corrected a long standing FAA modification to standards where the separation from the runway was as little as 250 feet on the north and south ends. The center (AP2) and south (AP3) portions of the main apron were each expanded to the east in recent years. The north portion (AP1) of the main apron is scheduled for reconstruction in 2014 and expansion to the east. This will add approximately 8,200 square yards of apron.

The main apron area has been configured with a roadway for vehicles. The roadway is 47 feet wide and extends from the old terminal north to Taxiway B. The roadway varies in location from the hangars from as little as 28 feet to as much as 60 feet. The position of this roadway can make it difficult to position some aircraft between the hangars and roadway without the aircraft hanging over the roadway. The other alternative for aircraft owners is to position their aircraft 75 to 107 feet from the hangar which can pose an inconvenience for passengers and crew.

The old terminal building and old fire station are scheduled for removal in 2014. Once these are removed additional apron and hangar area will be made available. This will affect the apron area identified as the Old Terminal Apron (AP4). The FBO, WestJet intends to use a portion of this area to replace their current FBO terminal and hangar. The reconfiguration of this area will be addressed in the process of this master plan.

The apron along Taxiway T1 (AP5) will also be affected by the removal of the old terminal building. This area currently accommodates FedEx's aircraft which parks there on a daily basis. This apron is also used for deicing airline aircraft. The area is not otherwise configured for tie-downs or aircraft parking.

The area identified as the Large Hangar apron (AP6) is accessible by Taxiway G3 and currently has one aircraft hangar constructed. Additional hangars are expected and the use of the apron is envisioned for primarily the tenants of these hangars and their aircraft activities.

In addition to the apron areas for aircraft parking there are several areas that are unpaved which are available for aircraft tie-downs. These are identified on **Exhibit I-x** and can accommodate approximately 16 small aircraft. Other grass areas which are available for hangar development may also be used for tie-downs as the need arises but are not used as such on a regular basis.

Future: The south portion of the Main Apron (AP4) is being reconstructed and the North portion of the Main Apron (AP1) is scheduled for reconstruction and expansion in PAL1 or PAL2. See **Exhibit I-9 Future & Ultimate Apron Expansion/Reconstruction**.

Ultimate: In PAL3 and PAL4 there are plans to expand the South Large Hangar Area requiring AP6 to be expanded. Also when the east side of the airport is configured for general aviation there will be a need to construct a new apron for the FBO and SASO buildings in this area.

Exhibit I-9 – Future & Ultimate Apron Expansion/Reconstruction

Aircraft Storage

Background: General aviation aircraft storage is usually located in the same area as the general aviation terminal area. Storage can come from private hangar construction, nested t-hangars, or FBO hangar storage. Nested t-hangar units usually store smaller single or twin engine aircraft (when available at an airport). Private hangar construction can vary in size and shape, from small square hangars to larger corporate hangars, and are capable of storing multiple aircraft. Hangars may be constructed by the airport or by private companies or individuals who lease airport property for a specific lease term.

Demand for hangar space for based aircraft varies and is usually influenced by the geographic location of the airport. If it is in the northern portion of the country, there may be a higher demand for hangar space than apron space. This is due to the adverse weather conditions in winter. These conditions can be hazardous to aircraft when left outside for longer periods of time. This can be true for other types of severe weather. In extremely hot conditions, there may be a higher demand for hangar storage/shade in the hot summer months.

Sometimes, aircraft owner/operators store their vehicles inside the hangars while operating their aircraft. While this type of storage is permissible, other non-aeronautical storage is not. It is important that the airport be aware of any non-aeronautical uses of hangars on their airfield. Non-aeronautical uses can affect the airport's ability to receive federal funding (under AIP grant assurances). It is imperative that the airport evaluates existing, future, and ultimate hangar uses/leases and ensures hangar usage is for aeronautical purposes.

While the layout of hangars can vary based on the type of use and size of the hangar there are general principles that can be considered in the location and attributes of hangars. The issues that must be considered with hangars are: 1) need for Dedicated Apron, 2) need for access to Main Apron, 3) Separation from Taxilanes, 4) Access to Taxilanes, and 5) Access to Landside (Public Road Network). These issues and the need to include them with a particular type of hangar are included in **Table I-5 - Typical Aircraft Hangar Attributes**.

One very important thing to consider for large hangars is their location and attributes should be considered both for what their intended use is and also what the potential use would be if the building changed tenants. This is why at a minimum, large conventional hangars should have some amount of dedicated apron, sufficient taxilane access, and landside access. This only helps the airport by allowing its current and future tenants to function as efficiently as possible.

Table I-5 – Typical Aircraft Hangar Attributes

Typical Aircraft Hangar Attributes				
	T-Hangars	Small Storage	Large Storage	FBO/SASO
Photo Examples				
Dedicated Apron	None	None	Equal to depth of hangar	Equal to depth of hangar (plus apron for services)
Main Apron Access	No	No	No	Yes
Taxilane Separation	Yes - for Design Group (I or II)	Yes - for Design Group (I or II)	Yes – for Design Group (II+)	Yes – for Design Group (II+)
Taxilane Access	Yes - for Design Group (I or II)	Yes - for Design Group (I or II)	Yes - for Design Group (II+)	Yes - for Design Group (II+)
Landside Access	No	Yes or No	Yes or No	Yes

Source: KLJ

Existing: Rapid City Regional Airport has 109 reported civil aircraft based at the airport. Aircraft storage facilities consists of large conventional hangars (greater than 8,000 square feet), small conventional hangars (8,000 square feet or less), and T-hangars. The primary aircraft storage area is north of the terminal area. See **Exhibit I-2**. Aircraft storage facilities are depicted in **Table I-6**.

The majority of the conventional hangars, small, large and FBO/SASO are positioned with the typical attributes that are desirable to allow these buildings to be used to their highest and best use. The exceptions are some old T-Hangars and miscellaneous buildings and a few conventional hangars.

Old T-Hangars and Miscellaneous Buildings

Immediately north of the FBO and west of Apron Areas 2 and 3 are four sets of old T-Hangars (15, 16, 17, 18). These hangars can accommodate a total of 27 airplanes but the buildings do not have sufficient separation for aircraft taxiing and are far beyond their useful life. In addition, these hangars are located where they use up 350 feet of main apron frontage.

Just west of the group of t-hangars are the four airport maintenance buildings (14, 24, 25, 26), the airlines six deicing storage containers, and three former car rental servicing buildings (40, 41, 42). The airport maintenance and airline deicing storage are not required in this

area but should be located with airside access. The car rental service buildings have been replaced by a new consolidated facility.

This entire area of old T-Hangars, Airport Maintenance facilities, airline deicing storage and former car rental service buildings should be considered for reuse with a new layout primarily for general aviation businesses and storage.

Conventional and FBO/SASO Hangars

Most conventional hangars are located for their highest and best use. The exceptions are one private hangar on the main apron area but there are several small conventional hangars (1, 4, 5, 6, 8). Small conventional hangars and private use hangars should typically not be placed on a large apron since it does not provide the highest and best use of the location. The placement of a private hangar on a main apron is similar to a home in a large city fronting a 6 lane roadway. This road frontage is typically used by businesses which rely on customer traffic.

There is one large FBO/SASO Hangar (59) without a dedicated apron or direct access to the main apron. This is the opposite of the example of small hangars on a large apron noted above. In this case it is similar to a large grocery store being placed inside a single family neighborhood and only accessed by a two lane residential street.

Financial Elements of Hangar Construction

Rapid City has typically allowed hangar development based on long term land leases. The tenant pays for all the improvements in exchange for a long term (20-25[2] years) ground lease rate. This scenario can work for many for large hangars but as hangar size gets smaller like T-hangars it is more difficult. The T-Hangars are occupied by individuals who are not necessarily interested in constructing an 8-10 unit building. The options are to land lease to a developer to build and lease the units or for the airport to construct the building and lease the units.

Future: All hangar development through the planning period is based on demand. As portrayed in **Exhibit I-10 Future Hangar Development Areas**, there are a variety of locations for small storage hangars such as T-Hangars and larger FBO/SASO hangars. The hangar locations identified in the future time range PAL1 and PAL2 are deemed to be the most ideal but please note that other circumstances may arise that dictate the need to construct some PAL3 or PAL4 hangars sooner than certain PAL1 and PAL2 hangars.

Ultimate: As portrayed in **Exhibit I-11 Ultimate Hangar Development Areas**, there are a variety of locations for small storage hangars such as T-Hangars and larger FBO/SASO hangars which are expected in PAL3 and PAL4. The PAL4 development does include hangars on the east side of the airport.

[2] South Dakota State Law restricts airport leases to no more than 50 years. SDLC 50-7-3.

Exhibit I-10 – Future Hangar Development Areas

Exhibit I-11 – Ultimate Hangar Development Areas

Table I-6 – General Aviation Aircraft Hangars

General Aviation Hangars (Square Feet)					
Facility Number	Area from Exhibit I-3	Facility Type	Use	Door Opening W x H	Hangar Area (SF)
1	AP1	Small Conventional Hangar	SASO		4,200
2	AP1	Large Conventional Hangar	SASO		8,275
4	AP1	Small Conventional Hangar/Office	SASO		5,100
5	AP1	Small Conventional Hangar/Office	SASO		6,000
6	AP1/2	Small Conventional Hangar	Private		3,600
7	AP2	Large Conventional Hangar	FBO		28,000
8	AP2	Small Conventional Hangar	SASO		4,786
9	AP2	Large Conventional Hangar/Office	SASO		10,000
11		Small Conventional Hangar	Private		1,600
12		Small Conventional Hangar	Private		2,700
13		T-Hangar (8 units)	Private		10,000
15		T-Hangar (14 units)	Private		14,622
16		T-Hangar (6 units)	Private		9,438
17		T-Hangar (5 units)	Private		11,800
18		T-Hangar (2 units)	Private		2,200
19	AP3	Large Conventional Hangar/Office	FBO		15,000
20		Small Conventional Hangar	Private		3,600
21		Small Conventional Hangar	Private		3,000
22		Small Conventional Hangar	Private		3,000
23		Small Conventional Hangar	Private		4,439
27		Small Conventional Hangar	Private		6,400
28		Small Conventional Hangar	Private		5,525
29		Small Conventional Hangar	Private		2,984
30		Small Conventional Hangar	Private		3,500
31		Small Conventional Hangar	Private		5,971
32		Small Conventional Hangar	Private		5,400
33		Small Conventional Hangar	Private		3,600
34		Small Conventional Hangar	Private		3,000
35		Small Conventional Hangar	Private		1,678
36		T-Hangar (1 unit)	Private		959
37		T-Hangar (1 unit)	Private		1,123
38		T-Hangar (1 unit)	Private		1,415
39		T-Hangar (4 units)	Private		9,053
44	AP5	Large Conventional Hangar/Office	SASO		15,600
55	AP6	Large Conventional Hangar/Office	Private		11,500
56		T-Hangar (8 units)	Private		12,100
59		Large Conventional Hangar	SASO		18,000
TOTAL		**Large Conventional Hangars**		**6**	**106,375**
		Small Conventional Hangars		**19**	**80,083**
		T-Hangars (units)		**50**	**72,710**
		Grand Total			**259,168**

Source: Rapid City Regional Airport

NOTE: Areas estimated by KLJ based on imagery to include Aircraft Storage areas only.

Vehicle Parking

Background: Generally speaking, vehicular parking for general aviation amenities are located in the same area as the aircraft. Fixed-Base Operators (FBOs) usually have their own parking, as do terminal buildings. General aviation hangar tenants typically drive their vehicle up to their hangar and often store in the hangar (when the aircraft is in use).

Existing: Most vehicle access and parking is sufficient for the businesses located at the airport. One business, Fugro, did note that their parking lot was not sufficient for all the employees located at the airport. Because of this some employees currently park on the aircraft apron. This can often be the case with vehicle parking in general aviation areas if there was not sufficient planning as to the number of employees that might work from a specific location or in the case of Fugro, where an existing hangar was repurposed.

Around the small hangars and T-hangars it is common for vehicles to be parked inside the hangars. There are some of these small hangars where owners are parking vehicles outside the hangars and these vehicles are encroaching on the taxilane object free area. This practice of parking within taxilane object free areas should be discontinued.

Future & Ultimate: It is recommended that vehicle parking be constructed with hangars so that all large conventional hangars have parking for vehicles with landside only access. Small hangars including T-Hangars may plan for parking inside of hangars. Any vehicle parking for small hangars must not impede on the taxilane object free areas.

Appendix J - Support Facilities

General Description

The support facilities at an airport are an integral element of the airport, enabling it to safely serve certain sizes of aircraft, types of service (e.g. passenger airlines), and to do so in all types of weather conditions. Support facilities in this appendix include:

- Aircraft Rescue & Firefighting
- Snow & Ice Control
- Airport Operations
- Other Buildings
- Fueling Operations
- Ground Access
- Fencing/Security
- Utilities

These do not all need to be connected directly to the airfield but must be located appropriately to meet the needs they are intended to fill. For example, the airport offices will need vehicle access for the general public while firefighting will need to have quick access to the airfield. These support facilities and their status at Rapid City Regional Airport are outlined in this appendix. **Exhibit J-1 Landside Facilities** map provides an overview location of the respective facilities discussed in this appendix.

J:\airport\1051213\GIS_Maps\LandsideFacilitiesMap_Duplicate.mxd TLG 7/29/2014

1. Private Hangar
2. SASO Hangar
3. SASO Office
4. SASO Hangar
5. SASO Hangar
6. Private Hangar
7. FBO Hangar
8. FBO Hangar
9. SASO Hangar
10. SASO Office
11. Private Hangar
12. Private Hangar
13. T-Hangar (SASO)
14. Airport Maintenance Shop
15. T-Hangar (FBO)
16. T-Hangar (Condo)
17. T-Hangar (FBO)
18. T-Hangar (FBO)
19. FBO Hangar and Terminal
20. SASO Hangar
21. SASO Hangar
22. Private Hangar
23. Private Hangar
24. Airport Maintenance Shop
25. Airport Cold Storage Bld.
26. Airport Sand Storage Bld.
27. Private Hangar
28. Private Hangar
29. Private Hangar
30. Private Hangar

31. SASO Hangar
32. Private Hangar
33. Private Hangar
34. Private Hangar
35. Private Hangar
36. T-Hangar (Private)
37. T-Hangar (Private)
38. T-Hangar (Private)
39. T-Hangar (Condo)
40. Vacant
41. Vacant
42. Vacant
43. TSA, Civil Air Patrol
44. SASO Hangar
45. 'Old' Terminal
46. 'Old' Fire Station
48. Aviation Fuel
49. Fuel Farm
50. Air Tanker Base
51. Air Traffic Control
52. National Guard
53. National Guard
54. National Guard
55. Private Hangar
56. T-Hangar (Condo)
59. SASO Hangar
60. Electrical Vault
62. Fire Department
70. Car Rental QTA

N

0 250 500 1,000 Feet

*Intended for Planning Purposes Only

KLJ

Rapid City Regional Airport
Landside Facilities Map
Exhibit J-1

Aircraft Rescue and Firefighting (ARFF)

The Aircraft Rescue and Firefighting (ARFF) services at the Rapid City Regional Airport are provided by the Rapid City Fire Department. Airports provide ARFF as required by the FAA based upon accommodating passenger service airlines with seating of at least 10 passengers. In accordance with Federal Aviation Regulation (FAR) Part 139 *Certification of Airports*, an acceptable ARFF response time requires the airport to have sufficient apparatus meeting the applicable index proceed to the mid-point of the furthest runway and begin delivering an extinguishing agent in no more than 3 minutes from the time of the call for the first responding vehicle, and 4 minutes for the second vehicle (if applicable). The ARFF index is based upon having 5 or more average daily departures of aircraft with a certain fuselage length. These Indices are as follows (refer to CFR Part 139.315-317 for details:

Index A – aircraft less than 90 feet (Beech 1900, Embraer 120, Bombardier CRJ200, etc.) Extinguishing Agent Requirements: 450 pounds of Class BC Agent and 100 gallons of Water mixed with Aqueous Film Forming Foam AFFF carried on 1 vehicle.

Index B – aircraft at least 90 feet but less than 126 feet (Bombardier Q400, CRJ700, Embraer 145, 175, 190, CRJ 700, DC-9, Airbus A319, Boeing 737-700, etc.) Extinguishing Agent Requirements: 450 pounds of Class BC Agent and 1,500 gallons of water with commensurate quantity of AFFF carried on 1 or 2 vehicles.

Index C – aircraft at least 126 feet but less than 159 feet (Boeing 737-800, 757-200, Embraer 195, MD-80, Airbus A321, etc.) Extinguishing Agent Requirements: 450 pounds of Class BC Agent and 3,000 gallons of water with commensurate quantity of AFFF carried on 2 or 3 vehicles.

Index D – aircraft at least 159 feet but less than 200 feet (Airbus A330, Boeing 757-300, 767-300, 787, etc.) Extinguishing Agent Requirements: 450 pounds of Class BC Agent and 4,000 gallons of water with commensurate quantity of AFFF carried on 3 vehicles.

Index E – aircraft at least 200 feet (Airbus A340, Boeing 747, 777, etc.) Extinguishing Agent Requirements: 450 pounds of Class BC Agent and 6,000 gallons of water with commensurate quantity of AFFF carried on 3 vehicles.

The airport regularly maintains an Index B level but is capable of Index C with prior notification for additional staffing with the equipment listed in **Table J-1**.

Table J-1 – ARFF Equipment

ID	Type	Make (Year)	Water (gallons)	AFFF (gallons)	Dry Chemical (pounds)	Condition
8	T3000	Oshkosh (2000)	3000	420	450	Excellent
18	Panther	Rosenbauer (2011)	1500	200	500	Excellent

Source: (Rapid City Regional Airport Fire Department) 2014

The ARFF equipment is located in one station located north of the airline terminal. The station has access to the airfield by T1 and equipment able to go around the west side of the runways via taxiways and an unpaved access road. The ARFF staff consists of six primary and nine relievers with two personnel on duty at any one time. In order to meet the requirements of the airline schedules, the ARFF staff is on duty 24 hours per day. The staff maintains training through onsite training, live fire training at Ellsworth AFB and other live fire training at other training facilities in order to maintain compliance with FAR Part 139. In addition, the airport has an emergency plan referred to as the Airport Emergency Plan (AEP) which serves as a guiding tool for the airport to outline how it will respond to different types of emergencies and what support entities exist at the airport and in the community to support these responses.

The Rapid City Regional Airport has mutual aid agreements with each of the entities that the City of Rapid City has agreements with. The typical responding agencies are Rapid City, Rapid Valley, Ellsworth AFB, North Haines, Whispering Hills and Pennington County Search and Rescue which provide personnel, engines and additional support equipment. In cooperation with the mutual aid agencies and Rapid City Regional Hospital, the Rapid City Regional Airport conducts table top exercises each year. These are in accordance with the requirements of FAR Part 139. Every 36 months, also in accordance with FAR Part 139, the airport conducts a live drill involving the mutual aid agencies and Rapid City Regional Hospital.

Additional information regarding ARFF can be found in the following advisory circulars:

150/5200-31C Airport Emergency Plan
150/5210-15A Aircraft Rescue and Firefighting Station Building Design
150/5220-10E Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles

ARFF equipment and facility needs are included in the airports Capital Improvement Plan included in this Master Plan.

Snow and Ice Control

Snow and ice control for an airport is one of the most critical components to ensure all weather access to a community. The FAA provides guidance for airports in determining the amount of equipment an airport needs and the size and layout of buildings to house the equipment. This guidance is found in three Advisory Circulars 150/5200-30C Airport Winter Safety and Operations; 150/5220-18A Buildings for Snow and Ice Control Equipment; and 150/5220-20 Airport Snow and Ice Control Equipment. An airport can determine the amount of equipment needed using the tables and information in AC 150/5220-20 and determine the size of building(s) using AC 150/5220-18A.

Priority 1 Area

The FAA emphasizes the clearance of Priority 1 areas as defined by AC 150/5200-30C. The Priority 1 areas include the primary runway(s), taxiways and aprons serving commercial service aircraft, as well as ARFF station(s), mutual aid access points and emergency service roads. The Rapid City Regional Airport has (2,265,330 square feet) of Priority 1 area (Runway 1.4m, Terminal Apron .5m, Taxiways .9m, ARFF .02m) for snow and ice control. Please note the Priority 1 areas for FAA calculation purposes do not include entrance roads, parking, and other landside needs in the airline terminal or general aviation areas. To meet the needs of passengers, there are 'landside' areas that the airport will categorize as Priority 1 and it will be necessary to have sufficient equipment and personnel to clear these areas as well in a timely manner. The last areas, commonly referred to as Priority 2 are the other areas on the airfield such as crosswind runways, general aviation areas, additional taxiways, and the remaining landside areas. The same staff and equipment used on the Priority 1 areas will redirect their efforts to Priority 2 areas as soon as they are able. However, as indicated previously, only airside Priority 1 areas are used in the FAA prescribed calculations for equipment.

Clearance Requirements

Once the amount of Priority 1 areas is determined, the airport uses the guidance for clearance times found in AC 150/5200-30C, summarized in **Table J-2** and equipment calculations in AC 150/5220-20 to determine the amount of equipment needed. For Rapid City Regional Airport the clearance standard is ½ hour for the Priority 1 areas.

Table J-2 – Clearance Times for Commercial Service Airports

Annual Airplane Operations (includes cargo operations)	Clearance Time (hours)
40,000 or more	½
10,000 but less than 40,000	1
6,000 but less than 10,000	1 ½
Less than 6,000	2
General: Commercial Service Airport means a public-use airport that has at least 2,500 passenger boardings each year and that receives scheduled passenger airplane service. These airports should have sufficient equipment to clear 1 inch of falling snow weighing up to 25 lb/ft^3 from Priority 1 areas within the recommended clearance times.	

Source: FAA AC 150/5200-30C Table 1-1

Snow Removal Equipment (SRE)

The Rapid City Regional Airport has the following SRE equipment listed in **Table J-3** to handle snow and ice control including the runways, taxiways and terminal apron. The parking operator, Standard Parking provides snow removal for the paid parking area. The airport maintenance staff provides snow removal for all other parking and roads out to Highway 44.

Table J-3 – Snow and Ice Control Equipment – Current & Recommended

Make/Model	Unit No.	Plow Size (feet)	Broom Size (feet)	Rotary Plow (tons/hour)	Year	Status (existing/ needed)
Runway/Taxiway Plows						
Oshkosh 4x4 w/Sand Spreader and Liquid Deicer	5	14	-	-	1996	
Oshkosh 4x4 w/Sand Spreader, Under Body Scraper and Liquid Deicer	19	24	-	-	2001	
Mack 4x4	21	18	-	-	1984	
Oshkosh 4x4	41	17	-	-	1996	
Apron Plows						
Michigan Loader	12	20	-	-	2001	
Dresser Motor Grader	16	12	-	-	1992	
Brooms/Blowers/Other						
Oshkosh 4x4	20	-	20	-	1996	
Flush Truck – Liquid Deicer	22	-	-	-	2008	
Oshkosh Snow Blaster 4x4	6	-	-	5000	2010	
Oshkosh 4x4	15	-	20	-	2001	

Source: (Rapid City Regional Airport Snow and Ice Control Plan) 10/31/2013

The FAA allows federal funding to be used to acquire SRE based on the Priority 1 Areas and Clearance Times. Based on current FAA policy, general aviation airports may use federal funding to acquire only one piece of equipment. For airports with scheduled airline service, more equipment can be funded. Any SRE acquired with federal funding must principally be used for snow and ice control. Any other use must be in compliance with FAA policy.

The Rapid City Regional Airport will initiate snow removal/ice control operations at the discretion of the Operations personnel in conjunction with the Senior Maintenance personnel on duty. The airport uses plows, brooms and blowers depending on depth, consistency of snow, wind direction, runway surface temperatures, speed of accumulation and other factors which vary with the event. The airport changes maintenance personnel to two 12 hours shifts for snow and ice control (2:00 am to 2:00 pm and 2:00 pm to 2:00 am).

Snow and Ice Control Plan and Reporting

The Rapid City Regional Airport has a Snow and Ice Control Plan that includes information on all equipment, staff, and procedures the airport follows to handle snow and ice events. The airport is also required to consistently report the current airfield conditions to the FAA so that pilots can make informed decisions in using the airport. This is done by the airport's operations staff who provides Notices to Airmen (NOTAMs) through the FAA as to field conditions.

The airport uses equipment such as runway surface sensor systems, decelerometers, and/or continuous friction measuring devices in order to assess the field conditions, carry out snow/ice control, and accurately report current conditions. These items are described as follows:

- Runway Surface Sensors – this is a package of sensors located on the runway that can detect current pavement conditions and ground temperature at specific locations. This tool is used by airport operations along with weather forecast information to determine how to best treat the snow and ice conditions in order to maintain airport safety. The airport has a surface sensor system with in-pavement sensors on Runway 14-32 and Taxiway A.
- Decelerometers – this is a device used in a vehicle to measure the rate of deceleration. It is used to determine the current braking action conditions. These conditions are then reported through the NOTAM system as Mu readings. The decelerometer can only be used in snow and ice conditions and does not provide information regarding contaminants such as rubber deposits. The airport has two electronic Bowmonk decelerometers.
- Continuous Friction Measuring Equipment (CFME) – this is a device used in or with a vehicle that provides a measurement of runway friction with any type of contaminant including rubber deposits. The conditions are then reported through the NOTAM system as Mu readings. The airport has one CRME mounted in a Dodge Caravan.

The Mu that is noted above is the measure of friction and ranges from 0 to 100 with 0 equating to no traction. When the Mu measures less than 40 then commercial service airports are required to report this through a NOTAM. When the Mu measures less than 26, corrective

action must be taken which is usually prescribed in the airport's Snow and Ice Control Plan. Treatment can include clearing, chemicals, sand (meeting FAA size requirements), etc.

Rapid City Regional Airport maintains a supply of sand and deicing chemicals. Deicing chemicals are only used when brooms and plows are not effective. When the Mu reading is below 40 or the snow depth on the pavement surface has accumulated beyond 1 inch, (1/2 inch slush), then snow removal and/or treatment will be initiated.

SRE Storage Buildings

The Rapid City Regional Airport stores and maintains the snow and ice control equipment and material in four buildings which are 12,800 square feet, 4,200 square feet, 3,000 square feet and 2,400 square feet. All the airports SRE and maintenance equipment are stored and maintained in these buildings. Some of the buildings are old and in need of repair. The complex is generally sufficient except that the buildings are located in an area within the general aviation area which is highly desirable for general aviation use.

Table J-4 – Snow Removal Equipment and Maintenance Facilities

Facility No.	Location	Facility Type	Area (Square Feet)
14	GA Area	Equipment Storage and Maintenance	12,800
24	GA Area	Equipment Storage	4,200
25	GA Area	Equipment Storage	3,000
26	GA Area	Material Storage	2,400

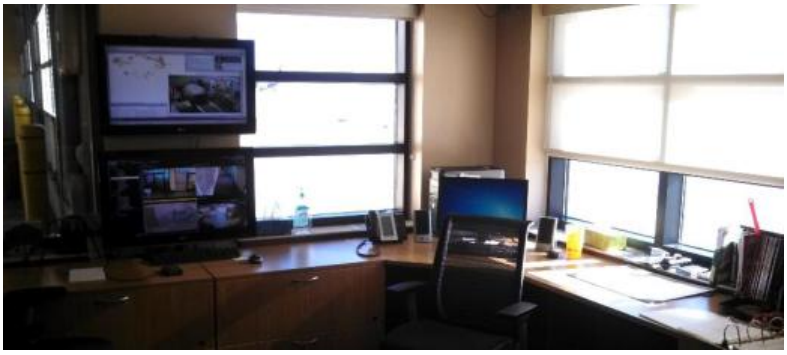
Source: Rapid City Regional Airport

The FAA will provide funding for the portion of the building necessary for snow and ice control equipment storage and maintenance. When an airport constructs such a building, it is often used for all airport maintenance functions and therefore should be constructed large enough for all the airport's maintenance/operations needs. When federal funding is used, there will need to be a determination in the planning stages of the project to identify eligible and ineligible portions of the building. The design and construction will then be allocated on a percentage basis based upon eligible and ineligible square footage to assure that federal funding is only used on the eligible portions of the building. For example, if 68% of the total building square footage is eligible, then the remaining 32% of ineligible square footage would be paid with local funds for design and construction. Federal funds would only go toward the 68% eligible portion and then it is still only at the level of participation that the FAA is contributing for the whole project which would typically be as high as 90% (i.e., 90% of the 68% eligible portion).

Snow and ice control equipment and facility needs are included in the airport's Capital Improvement Plan included in this Master Plan.

Airport Operations

Whether operating as a general aviation airport or as a commercial service airport licensed by FAR Part 139, each airport is a conglomeration of infrastructure, buildings, property, and services that are used daily by the flying public. Behind the scenes of the airport, there is a mixture of staff, contractors, and tenants who keep things running. The focus of this section is on how the airport oversees and directs the behind the scenes support for facilities that the airport maintains, not including tenant-maintained facilities. The Rapid City Regional Airport operates in accordance with FAR Part 139 and as such is regulated in regards to maintaining an airport safe for the flying public.



Staffing

The Rapid City Regional Airport has a staff of 30 full-time employees including ARFF staff. The full-time staff includes 2 administrative, 4 management, 4 operations, 13 maintenance, and 7 ARFF. In addition, there are part-time employees in operations, maintenance and Skycaps. All maintenance and custodial services for the airport are provided by airport staff.

The portion of the management team that directs the maintenance and operations of the airport includes Deputy Director of Maintenance and Facilities and the Deputy Director of Operations and Security.

Facilities

The airport staff occupies four different building areas including the GA area for maintenance and facility staff, the ARFF station for ARFF and operations staff, the terminal maintenance area for maintenance and facility staff, and the terminal office for administrative and finance staff.

Facility needs are included in the airport's Capital Improvement Plan included in this Master Plan.

Other Buildings

The airport contains a variety of buildings which have been described in different sections. There are several remaining buildings which are described in this section primarily because of their location within close proximity to the general aviation area and thus the area that is likely to see redevelopment to maximize space for general aviation use.

Electrical Vault

For airports these are small buildings that exist in obscurity but are critically important. The electrical vault is the building in which the airport receives power from commercial providers and distributes that power through regulators, controls and wiring to light the airfield. Other buildings at the airport are typically not powered through the electrical vault as it is typically used only for airfield lighting. The building also houses the emergency generator for lighting the airfield in the event of a power failure. As it relates to an area that requires redevelopment, the electrical vault is fixed in its location due primarily to the cost of relocating all the electrical service and distribution lines that proceed to and from the vault to the airfield. For Rapid City, the electrical vault was constructed in 2008 and has a long useful life ahead. Planning any redevelopment without relocating this electrical vault is recommended.

TSA Office

Immediately east of the Electrical Vault and along Airport Road is an office building which currently houses TSA and other offices. There is a need for this building to be on airport property as it allows the TSA to best serve the needs of the airport. The building was constructed in 2005 and is perpendicular to the primary runway. Because it is so closely located to the Electrical Vault, together they create an island of support uses that could remain in place and planned around when consideration is given to redeveloping the general aviation area.

Surplus Car Rental Service Facilities

Prior to 2014, each car rental agency had constructed individual servicing and washing facilities for their operations. With the completion of the new Car Rental Quick Turn Around Facility, these buildings are no longer needed and this area along Airport Road has now become available for redevelopment. There are four different buildings which were in use until 2014 for the purpose of servicing rental cars.

Fueling Operations

In order to support the activities at the airport, there is a need to store and deliver fuel to aircraft and ground vehicles. These facilities can be owned by the airport or private entities. Even if the facility is owned by the airport, it is common for the airport to lease the fuel facilities to an FBO.

Aircraft Fueling

The Rapid City Regional Airport has seven fuel tanks with a total capacity of 25,000 gallons of 100LL, 50,000 gallons of jet A, and 25,000 gallons of JP-8. **Table J-5** provides a detailed listing of fueling facilities at the airport. This listing includes fuel facilities for self-fuelers in addition to fuel dispensed to the public. Self-fuelers are people/companies who have chosen to fuel their own aircraft and have constructed their own facilities and use these facilities with only their own personnel and only on their own aircraft. In addition to fuel storage tanks, fuel trucks are required to dispense fuel around the airport where aircraft are parked. **Table J-6** provides a listing of fuel trucks at the airport for servicing aircraft. There are no operators that self-fuel at the airport except the South Dakota Army National Guard. Each of the above ground fuel tanks are double walled providing self-contained spill prevention. Should there be a need to relocate the above ground tanks, there is minimal permanent infrastructure in place to impede them being relocated.

Table J-5 – Aircraft Fueling Facilities

Location	Fuel Type	Capacity (gallons)	Above /Under Ground	Self-Fueling Pump	Use / Condition	Owner	Year
Fuel Farm	Jet A	20,000	Above	N	FBO	WestJet	1998
Fuel Farm	Jet A	20,000	Above	N	FBO	WestJet	1996
Fuel Farm	100LL	15,000	Above	N	FBO	WestJet	1996
North GA Apron	100LL	10,000	Above	Y	SS	Rapid Fuel	1989
North GA Apron	Jet A	10,000	Above	Y	SS	Rapid Fuel	1986
SD ARNG	JP-8	12,500	Above	N	ARNG	ARNG	2000
SD ARNG	JP-8	12,500	Above	N	ARNG	ARNG	2000

Source: (SD Department of Environment and Natural Resources) January 2014

Table J-6 – Aircraft Fueling Trucks

Location	Fuel Type	Capacity (gallons)	Use	Owner	Year
WestJet	100LL	1,200	FBO	WestJet	1999
WestJet	100LL	3,000	FBO	WestJet	1999
WestJet	Jet A	3,000	FBO	WestJet	2001
WestJet	Jet A	5,000	FBO	WestJet	2001
WestJet	Jet A	5,000	FBO	WestJet	2011

Source: WestJet Air Center

Ground Vehicle/Other Fueling

The Rapid City Regional Airport has three with a total capacity of 30,000 gallons of diesel, 42,000 gallons of unleaded for use at the airport and five other tanks of diesel dedicated to emergency generators. **Table J-7** provides a detailed listing of fueling storage at the airport. These fuel farms include those used to support airport operations, rental cars, and others. Each of the above ground fuel tanks are double walled providing self-contained spill prevention. Should there be a need to relocate the above ground tanks, there is minimal permanent infrastructure in place to impede them being relocated.

Table J-7 – Ground Vehicle/Other Fueling Facilities

Location	Fuel Type	Capacity (gallons)	Above /Under Ground	Self-Fueling Pump	Use / Condition	Owner	Year
Fuel Farm	Unl	30,000	Above	Y	Airport	Airport	1986
Fuel Farm	Diesel	30,000	Above	Y	Airport	Airport	1986
Rental Car Service	Unl	12,000	Under	Y	Rental Cars	Airport	2014
Electrical Vault	NatGas			N	Generator	Airport	
Terminal	Diesel	2,000	Under	N	Generator	Airport	1988
ARFF	Diesel	2,000	Under	N	Generator	Airport	2010
ATCT	Diesel		Above	N	Generator	FAA	
SD ARNG	Diesel	250	Above	N	Generator	SD ARNG	1996
SD ARNG	Diesel	250	Above	N	Generator	SD ARNG	2001

Source: (SD Department of Environment and Natural Resources) January 2014

Fuel facility needs are included in the Capital Improvement Plan included in this Master Plan.

Ground Access

The airport provides the air accessibility for the community but once an aircraft arrives, its passengers and cargo rely upon the airport's connectivity to the road network to get to their final destination. The Rapid City Regional Airport is connected to Rapid City by State Highway 44. The airport is closest to Interstate Highway 90 which is 9.5 miles away going west then north. For persons going to or from the airport from Box Elder or further east, there is an extra 4 miles of back tracking when traveling on state highways and the Interstate. See **Exhibit J-2 Area Roads**.

In addition to a road network, the Rapid City Regional Airport is also accessible by Rapid Transit System and Prairie Hill Transit. Based on limited demand and the availability of other travel options, these transit systems do not have the airport on their route system. Rapid Transit provides service through a route structure and on demand. Prairie Hills Transit serves a six county area including Pennington County with on demand service. Service for both systems is generally on weekdays with no service on Sundays or Holidays.

On Airport Public Roads

People conducting business at the airport often will need to go from one business to another at the airport and therefore need an efficient route to travel by vehicle without entering or crossing the airfield. This need is met currently for vehicles to travel around the landside of the airport by using Airport Road, Terminal Road, Fire Station Road, and LaCroix Court. See **Exhibit J-3 Airport Public Roads**.

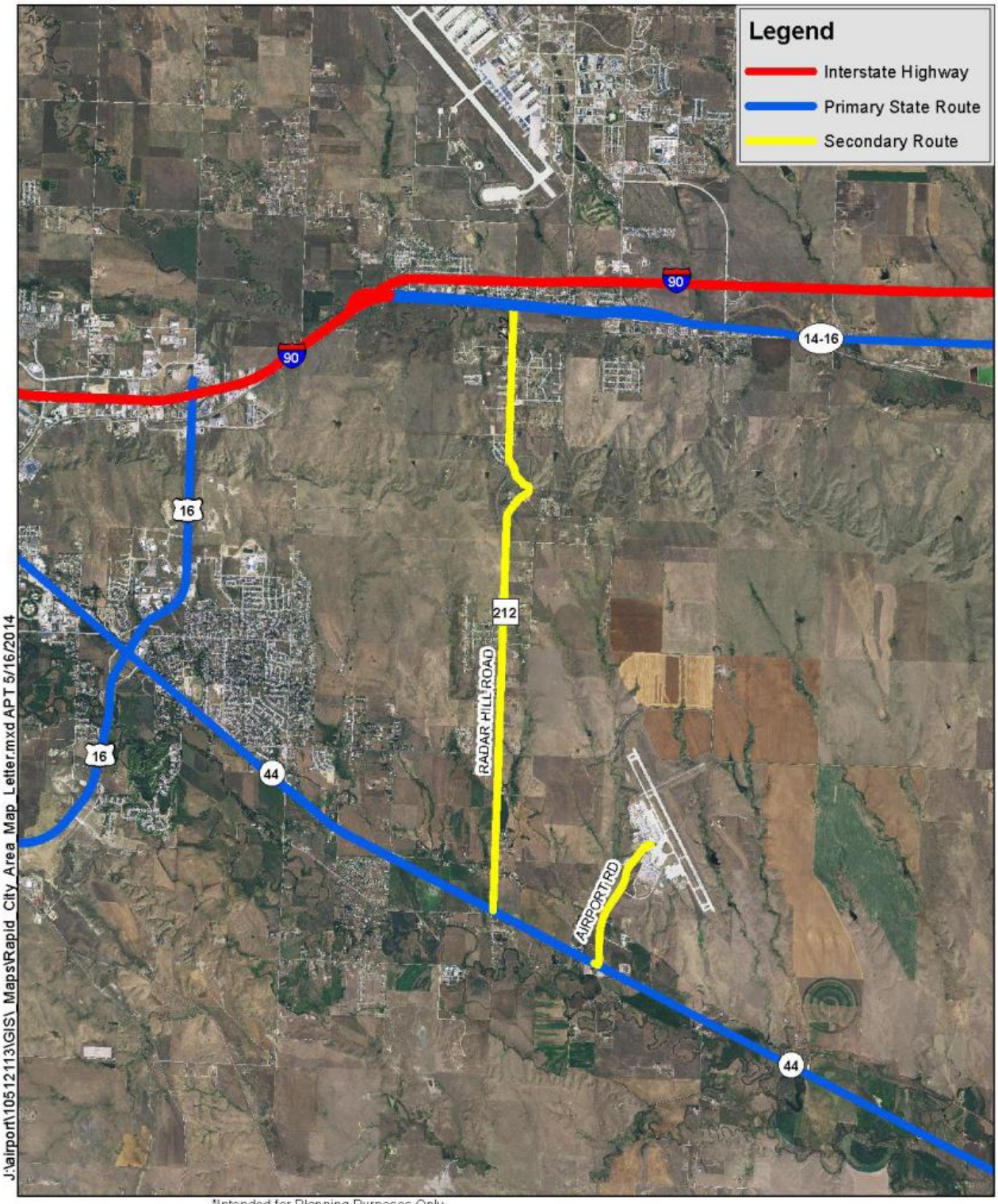
On Airport Non-Public (Interior) Roads

Inside of the airfield, there is a need for vehicles to move around without impeding aircraft movements. This includes ARFF, FAA NAVAID maintenance, airport maintenance, airport operations and others. Airport perimeter roads provide a means for vehicles to move around the airport in all weather conditions and not impede aircraft movement or landings and takeoffs. In order to allow all-weather operation of the airfield, the roads must be sufficiently clear of all protective areas on the airfield. Depending upon the amount of use, these perimeter roads may be paved or unpaved and may be needed to support equipment as large as ARFF and SRE equipment. When an unpaved surface is used, it is recommended a 'lead-in' portion of pavement be constructed within 300 feet of any taxiways, aprons, or runways to eliminate any debris from being tracked onto the aircraft movement areas.

Since the airport perimeter road is interior to the airfield, it is imperative that appropriate security measures such as gates and limited access points be established to restrict access to only those persons with a need and sufficient training to be inside the airfield. See **Exhibit J-4 Airport Interior Access Roads**.

Airport access road and on airport road needs are included in the airports Capital Improvement Plan included in this Master Plan.

Exhibit J-2 Area Roads



*Intended for Planning Purposes Only

KLJ

PRELIMINARY

N

0 1 2 4 Miles

Rapid City Regional Airport Area Roads Map

Exhibit J-3 Airport Public Roads

*Intended for Planning Purposes Only

KLJ

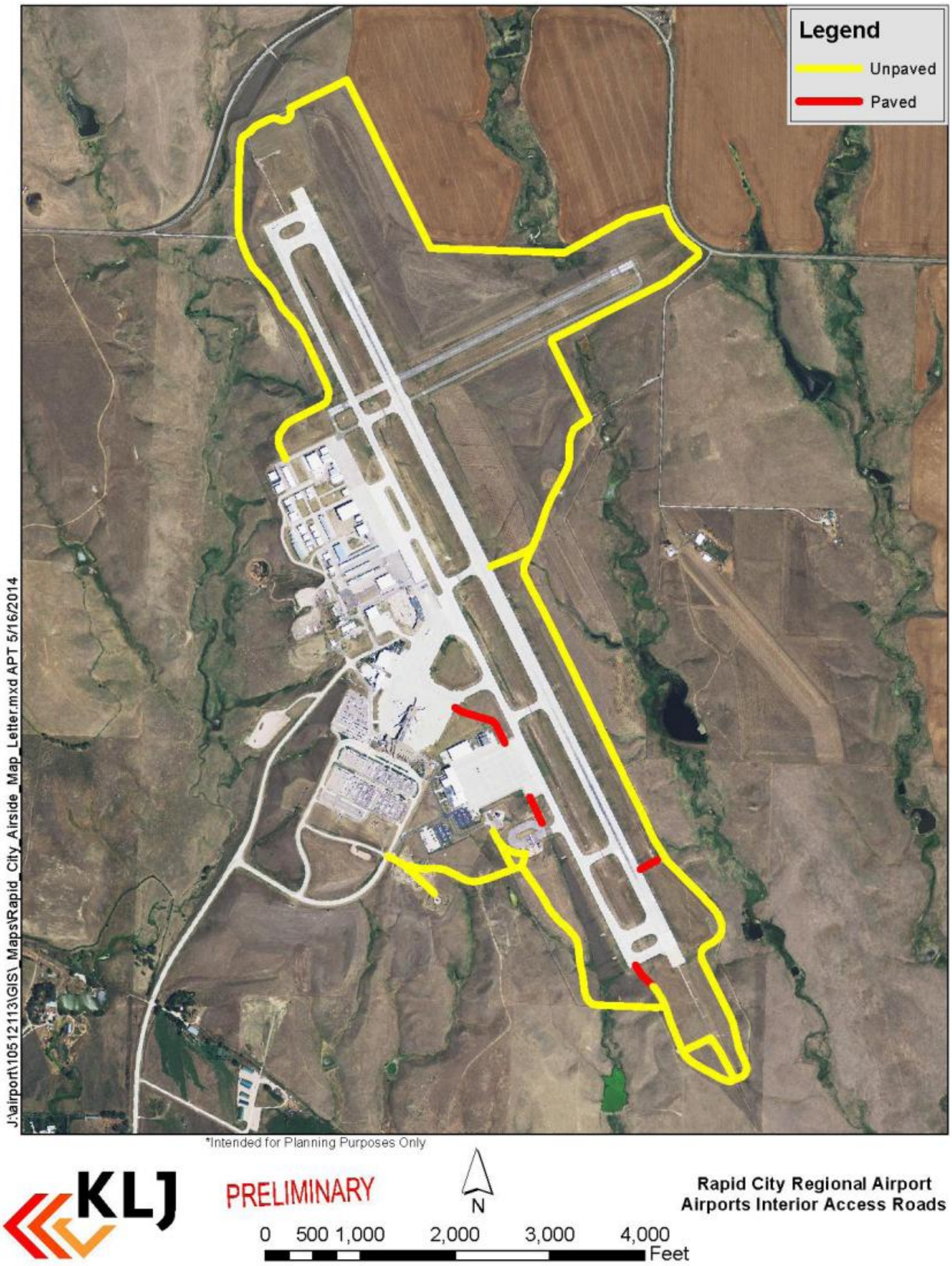
PRELIMINARY

N

0 500 1,000 2,000 Feet

Rapid City Regional Airport
Airport Public Roads

Exhibit J-4 Airport Interior Access Roads



Fencing/Security

The Rapid City Regional Airport has a perimeter fence sufficient to meet the needs of the airport. This fence provides both wildlife control and a security perimeter to keep the airfield safe and limit access to only those who have need or permission to use the airfield. The fencing and gate access is maintained and operated by the airport staff in accordance with Transportation Security Administration and FAA requirements. The air operations area at the Rapid City Airport is encompassed by a security fence to prevent unauthorized access to the active airport environment. The fence is a six foot high chain link with barbed wire security top in the terminal area with the remainder of the airfield protected with a ten foot high chain link with barbed wire top.

Fencing and security needs are included in the airports Capital Improvement Plan included in this Master Plan.

Utilities

The Rapid City Regional Airport has utility services provided from a number of entities. These are listed in **Table J-8**.

Table J-8 – Utility Services

Utility	Provider	Service Connection Point(s)
Electricity	West River Electric	West Side
Natural Gas	MDU	North End of Airport Road
Communications	Midcontinent Communications	Airport Road
Cable Television	Midcontinent Communications	Airport Road
Water	City of Rapid City	South East of Airport
Sanitary Sewer	Rapid City Regional Airport	West of GA Area
Storm Sewer	Rapid City Regional Airport	NA

Source: Rapid City Regional Airport

Most improvements to utilities will occur at the expense of the utility unless there is a determination that it will be paid by the airport as a user. Any needed improvements in utility service is noted in the Capital Improvement Plan of this Master Plan with notations related to funding sources for the project.

Appendix K – Navigational Aids

Introduction

This appendix discusses the existing and required airport navigational aids (NAVAIDs) at the Rapid City Regional Airport. NAVAIDs are any ground or satellite based electronic or visual device to assist pilots with airport operations. They provide for the safe and efficient operations of aircraft on an airport or within the vicinity of an airport. NAVAID types at or near the airport evaluated in this appendix include:

- Area Navigation
- Runway Approach
- Airfield Visual
- Meteorological
- Communications

The type of NAVAIDS required on an airport are determined by FAA guidance based on an airport's location, activity and usage type. Available FAA guidance can be found by reviewing the latest Advisory Circulars, Handbooks and Orders.

Area Navigation NAVAIDs

There are several different types of ground and/or satellite based NAVAIDs that provide guidance to aircraft in the air. The FAA owns and maintains the majority of the navigational aids in the United States; however, some are owned and maintained by state or local agencies. En-route NAVAIDs provide navigation assistance to aircraft along a route of flight.

The FAA is updating the nation's air transportation infrastructure through the Next Generation Air Transportation System (NextGen) program. New procedures and technology are to be implemented to improve the efficiency and safety of the national air transportation system. For area navigation, satellite-based NAVAIDs will primarily be used for air navigation with ground-based NAVAIDs used for secondary purposes. Other initiatives include implementing a new surveillance technology for tracking aircraft known as Automatic Dependent Surveillance-Broadcast (ADS-B) to improve position accuracy reporting and supplement ground radar data for air traffic control.

The following Area NAVAIDs are used by aircraft in and around the Rapid City Regional Airport.

Global Positioning System (GPS)

GPS is a ground and satellite-based navigation system comprised of a network of satellites that transmit radio signals to provide triangulation to ground or air based receivers. Through this triangulation, longitude, latitude, altitude and speed can all be determined. A GPS procedure uses area navigation (RNAV) to help aircraft navigate on a horizontal course through pre-defined GPS waypoints. A series of ground-based transmitters, known as Wide Area Augmentation System (WAAS), enhances the precision of this system allowing receivers

to accurately determine the position of a vehicle within a few horizontal and vertical feet of actual location. This enables precision-like approaches with vertical and horizontal guidance to a runway end. GPS, RNAV and WAAS are used by equipped aircraft for en-route and approach navigation and are widely available for navigation throughout the contiguous United States. This new technology is allowing required navigation performance (RNP) procedures to be developed with three-dimensional waypoints. Future development of Local Area Augmentation System (LAAS) may provide even higher accuracy requirements.

As a part of the FAA's NextGen program, an ADS-B Transmitter-Receiver was placed at the Rapid City Regional Airport in 2013 near the airport electrical vault.

Very-high Frequency Omni-directional Range (VOR)

A VOR is a ground-based NAVAID used for en-route and approach course navigation. The radio beacon has the longest range of currently utilized ground based NAVAIDs. Aircraft can navigate to and from this beacon using compatible airborne receivers to receive the radio signals. It gives pilots a direct indication of bearing relative to the facility. With VORs that are collocated with distance measuring equipment (DME), certain aircraft navigation radios can triangulate the signal between several different VOR/DME stations to choose a direct course of flight on a desired heading. For VORs collocated with a tactical air navigation system (TACAN) beacon, these facilities are referred to as a VORTAC. The TACAN is the system typically used by the military and the majority of VORs include a TACAN. The TACAN provides the same distance information as the DME and is available for both military and civil use. The widespread use of satellite based GPS technology has caused FAA to review decommissioning a large portion of existing VORs.

Rapid City Regional Airport has one VORTAC located 4.5 miles southeast of the airport. The VORTAC is identified as 'Rapid City'. The VORTAC is the instrument used for the Runway 14 and Runway 32 VOR or TACAN approaches

Non-Directional Beacon (NDB)

This beacon is one of the oldest types of navigational technology still used in aircraft navigation. A NDB is simply a low power AM radio station. Aircraft have equipment called Automatic Direction Finder (ADF) which allows the aircraft to tune into the frequency that the NDB is transmitting, and a dial that points a needle to the location of the NDB. NDBs are subject to lightning, precipitation static, and other disturbances that may result in erroneous navigation information. As a result of this and their replacement by GPS, NDB facilities are being decommissioned by FAA. When the NDB is installed in conjunction with an ILS (Instrument Landing System) marker, the NDB is called a locator outer marker (LOM).

Rapid City Regional Airport has one NDB, identified as 'Ranch', which serves as an LOM for the Runway 32 ILS approach.

Radar

An Airport Surveillance Radar (ASR) facility provides primary and secondary surveillance radar to air traffic controllers to detect the position of aircraft within the surrounding terminal airspace, generally within 60 miles. Select civilian facilities operating ASR-8 and -9 facilities are being upgraded to a newer ASR-11 digital system compatible with ADS-B as part of the FAA's NextGen initiative. Long-range radar, known as Air Route Surveillance Radar (ARSR), provides coverage over 200 miles from the radar site for air traffic controllers responsible for large areas of airspace. Over time, ASR and ARSR will be replaced by the use of ADS-B technology as identified in FAA's NextGen implementation plan. The Dakota Air Traffic Control Facility, located at Ellsworth AFB, has a Digital Airport Surveillance Radar (DASR) which is situated to provide coverage for both Ellsworth AFB and Rapid City Regional Airport. The DASR is located along Radar Hill Road, northwest of Rapid City Regional Airport and is maintained by the U.S. Air Force.

Recommendations

There are no recommended changes in area navigational aids.

Runway Approach NAVAIDs

Other NAVAIDs are developed specifically to provide "approach" navigation guidance, which assists aircraft in landing at a specific airport or runway. These NAVAIDs are electronic or visual in type.

Instrument Landing System (ILS)

An ILS is a ground-based system that provides precision instrument guidance to aircraft approaching and landing on a runway. ILS approaches enable a safe landing in Instrument Meteorological Conditions (IMC) with low cloud ceiling and/or visibility. An ILS operates through emitting radio beams that define the horizontal and vertical path to the runway landing threshold. Horizontal guidance is available up to 18 nautical miles and vertical guidance available up to 10 nautical miles from a runway end. Major components of ILS include:

- Localizer (LOC) antenna emitting a lateral signal providing pilots with horizontal position information relative to extended runway centerline
- Glide Slope (GS) antenna emitting a glide path (typically 3 degrees) providing pilots with vertical guidance information relative to the runway landing threshold.
- Inner Marker (IM) and/or Middle Marker (MM) and Outer Marker (OM) beacons notifying pilots at critical points along the approach with an aural signal. IMs are only used for Category II and higher ILS systems.
- Locator Outer Marker (LOM) is co-located with an NDB and identifies the point on the final approach course that the aircraft intercepts the glide slope and may begin descent to the runway.
- Approach Lighting System (ALS) visual aid providing high intensity visual lighting array.

The FAA is in the middle of decommissioning ILS marker beacon systems and is moving to replace these and NDB-based markers with GPS fixes.

There are three categories of ILS systems, each capable of supporting approaches in equipped aircraft with lower weather minimums, see **Table K-1**. Each category also requires an increasing complexity of airport equipment as well as aircraft and flight crew certifications.

Table K-1 – Standard ILS Categories

Standard ILS Categories		
ILS Category	**Decision Height (ft.)**	**Runway Visual Range (ft.)**
Category I	200	2,400/1,800
Category II	100	1,000
Category IIIa	0-100	700
Category IIIb	0-50	150
Category IIIc	0	0

Source: FAA Aeronautical Information Manual

Rapid City Regional Airport has a Category I instrument approach for Runway 32. This runway approach meets the needs of the airport during the winter winds except when easterly up flow winds exist. Runway 14 is often favored during winter when easterly winds exist and in summer months with southeasterly winds. Currently Runway 14 has a non-precision instrument approach and it is recommended a Category I instrument approach be established for Runway 14.

Visual Guidance Slope Indicator (VGSI)

A VGSI system provides visual descent guidance to aircraft on approach to landing. There are several types of VGSI systems available. Examples include a Precision Approach Path Indicator (PAPI) system and a Visual Approach Slope Indicator (VASI). Each system directs beams of red and white light along the approach glide path set at different locations and/or angles to provide pilots with a visual indication of the aircraft's position relative to the designated approach slope for a runway. VGSI systems have a five mile range during the day and a 20 mile range at night. These systems are typically installed on runway ends with instrument approaches, but are also installed for visual runways. PAPI systems, a newer technology, consist of a single row of two to four lights radiating high intensity red or white beams to indicate whether the pilot is above or below the approach path to the runway.

Runway 5, 14, 23 and 32 are equipped with four-box PAPI-4L lights installed on the left side of the runway. The PAPIs are maintained by the airport staff.

Runway End Identifier Lights (REIL)

REILs consist of high-intensity flashing white strobe lights located on the approach ends of runways. These lights are aimed directionally into the approach zone of aircraft to assist the pilot in early identification of the runway threshold at night or in poor visibility conditions. Additionally, these are typically installed on runways that are surrounded by a preponderance of other lights or if the runway lacks contrast with surrounding terrain. REILs are

unidirectional for the designated runway approach or omnidirectional to provide good circling guidance.

REILs are installed on Runway 14 and maintained by the FAA.

Approach Lighting System (ALS)

ALS are required for runway ends which have published precision instrument approach procedures and these systems help pilots transition from instrument flight to visual flight for landing. The ALS extends beyond the approach end of the runway to provide a lighted "lead-in" for pilots to the runway threshold to transition from reference to instruments to a visual landing. There are various configurations, lighting types and complexities of these systems. The requirement for an airport runway end is dependent upon the type of precision approach and visibility minimums of the approach. Common types of ALS include:

- Omnidirectional Approach Lighting System (ODALS) consisting of seven omnidirectional sequenced strobe lights along runway approach centerline providing visual guidance to non-precision runways.
- Medium-intensity Approach Lighting System with Sequenced Flashing Lights (MALSF) is a system of seven rows of lights, three flashing lights and a row of steady burning green lights prior to runway threshold. The system is 1,400 feet in overall length.
- Medium-intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) consists of seven rows of lights, five flashing lights and a row of steady burning green lights prior to runway threshold. The system is 2,400 feet in total length and is commonly used for Category I precision approaches.
- Approach Lighting System with Sequenced Flashing Lights (ALSF) is a more complex lighting system used for Category II or III precision approaches. The system includes a green threshold bar, 15 total rows of white lights, nine side rows bars along centerline, and sequenced flashing white lights.

Runway 32 is currently served by a MALSR. The equipment is maintained by the FAA.

Recommendations

Runway 14 currently has a non-precision instrument approach. A Category I instrument approach is recommended for Runway 14. In order to have a Category I ILS, an ALS such as the MALSR installed on Runway 32 will need to be installed on Runway 14.

The PAPIs on all runways are very old and parts have become very difficult to find. It is recommended that the airport work with the FAA to replace the PAPIs beginning with the PAPIs on Runway 14-32 and arrange for the FAA to maintain these PAPIs as is typical for airports. The PAPIs are scheduled for replacement in 2015.

Airfield Visual NAVAIDs

Visual NAVAIDs provide airport users with visual references within the airport environment. They consist of lighting, signage and pavement markings on an airport. Visual NAVAIDS are

necessary airport facility components on the airfield, promoting enhancing situational awareness, operational capability and safety.

Airport Beacon

An airport beacon is rotating light that projects a beam of alternating green and white light which appears as a series of flashes to approaching pilots. The airport beacon serves as the airport identification light so approaching pilots can identify the airport location during night and instrument flight rule conditions. The beacon is known to be visible from 40 miles away at night. The brightness or intensity of beacons can vary by airport. The intensity is dependent upon the amount of ambient light present in the area at night and the runway lighting system installed.

The rotating beacon for Rapid City Regional Airport is a white-green beacon located on the west side of the general aviation hangar area, south of Runway 5-23.

Runway Lighting

Runway edge lights are placed off the edge of the landing surface of a runway. The lights help pilots define the edges and end of the runway during night and low visibility conditions. These lights are spaced at equal distances along a runway, and perpendicular from side to side of a runway. These lights are generally white in color. The runway end lights appear red to a pilot approaching the end of the runway, and green as aircraft approach the runway from the air. Instrument runways have a row of eight lights at the end of a runway while visual runways have four. For medium and high intensity systems, the last 2,000 feet of each runway with instrument approaches have amber lights to caution pilots that the end of the runway is approaching. The light intensity can be adjusted by use of a radio controlled switch (pilot controlled lighting) on an airport frequency or manually by airport attendants and/or air traffic controllers. Runway lights are classified according to the intensity of light they produce:

- High Intensity Runway Lights (HIRL) are generally installed on precision instrument runways
- Medium Intensity Runway Lights (MIRL) are installed on visual or non-precision instrument runways
- Low Intensity Runway Lights (LIRL) installed on visual runways at small airports

Runway14/32 is equipped with HIRL while Runway 5/23 is equipped with MIRL.

Taxiway Lighting

Taxiway edge lighting delineates the taxiway and apron edges. Taxiway lights are blue in color and spaced according to FAA standards. Taxiway lights are, by design, of lower intensity than runway lights. The FAA standard taxiway edge lighting system is Medium Intensity Taxiway Lights (MITL).

An economical alternative to taxiway lighting at general aviation airports is the use of retro-reflective markers. These markers are plastic and have blue reflective material designed to reflect light back toward its source.

The taxiway lights at Rapid City Regional Airport are all MITL.

Other taxiway lights are installed at airports to promote safe operations. For Rapid City Regional Airport these include:

- Runway Guard Lights (RGL) are elevated and/or in-pavement unidirectional yellow lights installed along the taxiway indicating the runway holding position. The lights alternately illuminate to provide a visual indication of a nearby active runway. Rapid City has RGLs installed on all Taxiways connecting to Runway 14-32 and Taxiway A at Runway 5-23.

Pilot Controlled Lighting

Airfield lighting systems allow for pilots to control the complexity and intensity of lights. Runway 14/32 and 5/23 are equipped with a pilot-controlled lighting system (PCL) which is available when the control tower is closed. Lights are able to be activated using aircraft radio.

Airfield Signage

Airfield signage is essential for the safe and efficient operation of aircraft and ground vehicles on the airport movement area. Signs are located adjacent to the edge of runways, taxiway and aprons. There are several types of signs that each serve a unique purpose. Common signs include:

- Mandatory Instruction Signs are red with white text denoting taxiway/runway intersections, runway/runway intersections, ILS critical areas and other critical areas.
- Location Signs are black with yellow text and identify the taxiway or runway where the aircraft or vehicle is located.
- Boundary Signs are yellow with black text and identify the location of a critical area for a pilot exiting a runway.
- Direction / Destination Signs are yellow with black text containing arrows to indicate the direction of taxiways or general direction to a location.
- Information Signs are yellow with black text and provide additional information to pilots.
- Runway Distance Remaining Signs are black with white numbers and provide runway distance remaining during takeoff and landing operations with a white number on black background.

Current FAA standards require all airports to have mandatory instruction signs installed at a minimum. 14 CFR Part 139 certificated airports must have a sign plan developed and implemented. All airfield signs at Rapid City Regional Airport currently meet the requirements of the FAA.

Pavement Markings

Pavement markings help airport users visually identify important features on the airfield. Pavement markings are installed on the runways, taxiways and aprons. FAA has defined numerous different pavement markings to promote safety and situational awareness.

Runway

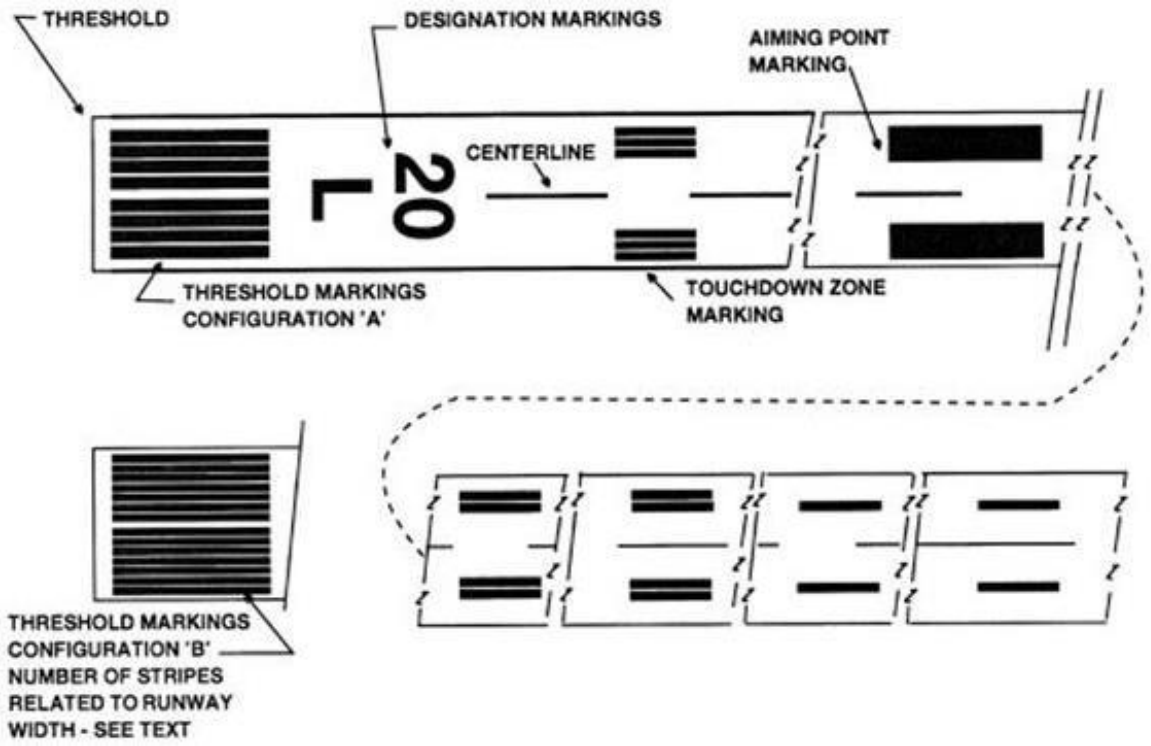
Runway pavement markings are white in color. The type and complexity of the markings are determined by the approach threshold category to the runway end. The minimum required runway markings for a standard runway are as follows, see **Exhibit K-1**:

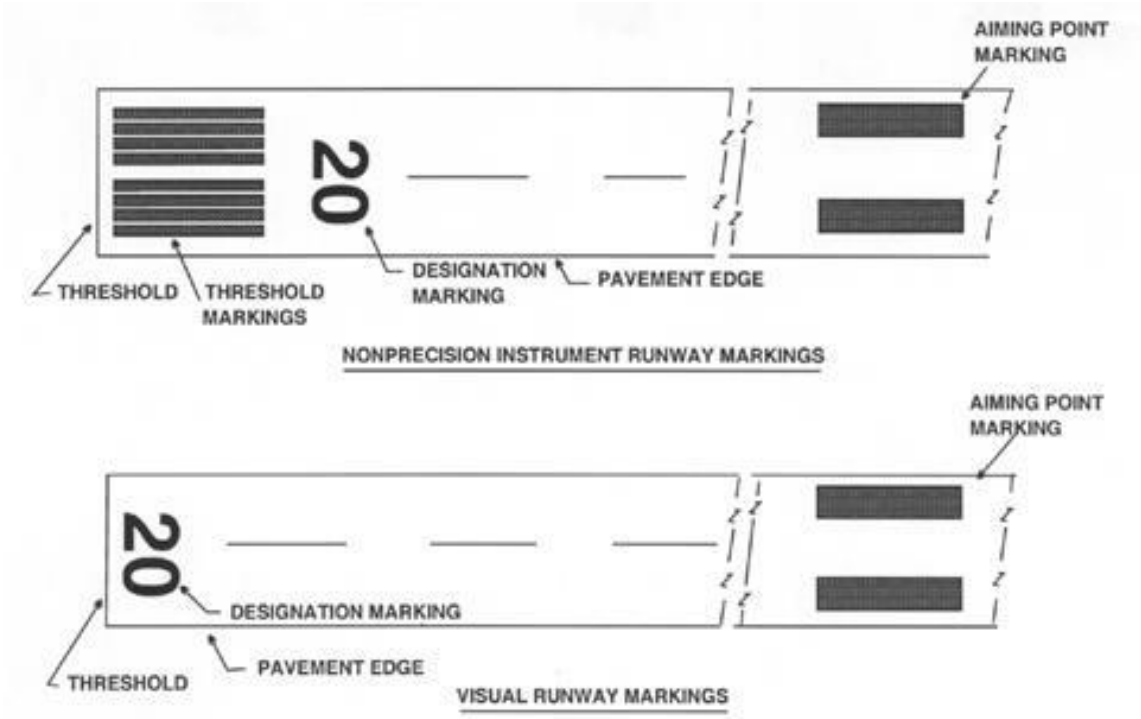
- Visual (landing designator, centerline)
- Non-Precision (landing designator, centerline, threshold)
- Precision (landing designator, centerline, threshold, aiming point, touchdown zone, edge)

Additional runway markings for a displaced threshold, blast pad, stopway or shoulders may also be required for an airport. Cone markers may be used to identify the edges and ends of turf runways.

Runway 14/32 is equipped with precision runway markings identifying the runway designation, threshold, centerline, side stripes, aiming point and touchdown zone. Runway 5/23 is equipped with non-precision runway markings identifying the runway designation, threshold, centerline and aiming point.

Exhibit K-1 – Runway Markings





Source: FAA Airmen Informational Manual (AIM), Chapter 2

Taxiway & Apron

Taxiway and apron markings are important for directional guidance for taxiing aircraft and ground vehicles. Common taxiway and apron markings include:

- Holding Position Markings are a visual reference to prevent aircraft and vehicles from entering critical areas such as an active runway environment. These markings consist on yellow bars and dashes on a black background.
- Taxiway/Taxilane Centerline is a solid yellow stripe along the designated centerline.
- Taxiway/Taxilane Edge markings are solid or dashed yellow stripes delineating the edge of usable taxiway.
- Non-Movement Area markings delineate the edge of the area controlled by local air traffic control or available for parked aircraft or objects.

Enhanced taxiway markings are required to further provide additional visual cues to an aircraft or vehicles approaching a runway holding position. Other markings include surface painted signs, geographic position markings and vehicle roadways.

Pavement markings should have black borders to help delineate their existence on airport pavements. Some markings require glass beads for enhanced reflectivity.

All taxiway markings at Rapid City Regional Airport are currently in compliance with FAA standards.

Recommendations

There are no recommended changes in airfield visual navaids.

Meteorological Aids

Aircraft operating to and from an airport require meteorological aids to provide current weather data. Weather information helps pilots make informed decision about flight operations. Airports have various aids installed providing local weather information.

Surface Weather Observation

There are various types of surface weather observation stations. An Automated Surface Observation System (ASOS) is a Federal weather reporting station at airports. It provides continuous 24-hour observations and reporting for the FAA, National Weather Service (NWS) and Department of Defense (DoD). The suite of sensors provide temperature, dew point, wind speed and direction, visibility, cloud ceiling and precipitation information. Some stations have optional freezing rain and

thunderstorm sensors. Weather observing systems are recommended to be kept clear of agricultural operations within 100 feet, clear of objects above the 30 foot sensor height within 500 feet, and clear of high objects within 1,000 feet.

Rapid City Regional Airport has an ASOS located on the airport east of Runway 14-32 and south of Runway 5-23. The ASOS is maintained by the NWS and broadcasts continuously at 118.525 MHz.

Wind Cone

Wind cones visually indicate the current wind direction and velocity on an airfield. A primary wind cone is located in a central visible location on the airport and is usually lighted for night operations. A segmented circle is installed around the wind cone to aid pilots in its identification from the air. Supplemental wind cones are installed around the airfield to provide surface wind direction information to pilots where the primary wind cone is not visible. Wind cones must be lit for night air carrier operations. Rapid City Regional Airport's primary wind cone and segmented circle is located east of Runway 14-32 and south of Runway 5-23. There are supplemental wind cones at the approach ends of Runways 14, 32 and 23.

Other

Runway Visual Range (RVR) visibility sensor systems provide instant reporting of the visibility at targeted locations on the airfield. These systems must be located at the touchdown zone, mid-point (if required for runway length) and rollout points to allow for Category II or lower operations. Rapid City Regional Airport is equipped with RVR equipment.

Recommendations

There are no recommended changes in meteorological navaids.

Communication Aids

The ability for pilots to communicate with other pilots and air traffic control is critical for the safety and efficiency of the overall air transportation system.

The Rapid City Regional Airport has an operating airport traffic control tower (ATCT) which operates daily from 6:00 am to 10:00pm. This tower is in the FAA's contract tower program and is operated by Midwest Air Traffic Control and operates on tower frequency 125.85 MHz and ground control 121.90 MHz. The airport does not have an Automatic Terminal Information Service (ATIS) broadcast. The ATCT facility is located immediately south of the SDARNG facilities. ATCT provides clearances, radar advisories and safety alerts to Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) flights within the controlled Class D airspace. Class D airspace controlled by the ATCT typically extends out five miles from the airport and up to an altitude of 2,500 feet Mean Sea Level (MSL). See **Appendix L** for a discussion of airspace classifications.

Beyond the immediate local airport environment, air traffic control radar services in the local area are provided by Ellsworth AFB, identified as 'Ellsworth Approach'. When Ellsworth Approach is closed, aircraft contact Denver ARTCC. The nearest Remote Communication Air/Ground (RCAG) transmitter for ARTCC communications is located on the airport. Pilots communicate with Ellsworth Approach to obtain traffic advisories and flight clearances. Both Ellsworth Approach and Denver ARTCC can be reached on the ground at the airport.

When the ATCT is closed, pilots "see-and-avoid" other aircraft in the local area aided through the use of a series of position reports using the Common Traffic Advisory Frequency (CTAF). This frequency also can be used to select the intensity of the runway and approach lighting using the pilot controlled lighting system. The CTAF frequency for Rapid City is 122.95.

When the ATCT is closed, pilots open and close FAA flight plans on the ground through phone or internet, or through Ellsworth Approach, Denver ARTCC or Flight Service Station (FSS) in the air. FSS provides various services including flight plan opening/cancelling, timely en-route weather information, Notices to Airmen (NOTAM), and Air Traffic Control advisories. A Remote Communications Outlet (RCO) provides a reliable link allowing aircraft to directly contact the FSS.

Recommendations

The ATCT built in 1964 is low and is situated so that several buildings at the SDARNG restrict the view of aircraft as they leave airline terminal gates. If a new ATCT is constructed, it is recommended that the height of the tower and its location be arranged so that visibility is not impeded at the new location. A site was identified in the Preferred Alternative and replacement of the ATCT is included in the Capital Improvement Plan.

Table K-2 – Navigational Aid Summary

Navigational Aid Summary Table		
Component	**Runway 14/32**	**Runway 5/23**
Runway Length (feet)	*8,701*	*3,601*
Runway Width (feet)	*150*	*75*
Pavement Markings	Precision	Non-Precision
Runway Lighting	HIRL	MIRL
Taxiway Lighting	MITL	MITL
Approach Lighting	MALSR (32) PAPI-4L (14,32)	PAPI-4L (5,23)
Instrument Approach Procedures	ILS(32) RNAV (GPS) (14,32) VOR or TACAN (14, 32)	RNAV (GPS) (5,23)
Navigational Aids	Air Traffic Control Tower (ATCT)	
Meteorological Facilities	Automated Surface Observation System (ASOS) Runway Visual Range (RVR) Lighted Wind Cone with Segmented Circle	

Source: Airnav.com, FAA Airport Master Record Form 5010 Report

Appendix L – Instrument Procedures and Airspace

Introduction

This appendix discusses the existing and recommended instrument procedures and airspace at the Rapid City Regional Airport. Instrument procedures allow aircraft to operate by reference to flight instrument under Instrument Flight Rules (IFR). Airspace is an irreplaceable resource around the airport necessary for the safe and orderly operation of aircraft.

The appendix will review the existing and recommended instrument procedures necessary for the airport including:

- Standard Instrument Approach Procedures
- Departure Procedures
- Taxiway Procedures

A copy of the published instrument procedures for the airport is included at the end of this appendix. This document will also review the existing and recommended airspace standards necessary for the airport including:

- Airspace Classification
- Part 77 Civil Airport Imaginary Surfaces
- Runway Approach/Departure Surfaces
- Terminal Instrument Procedures (TERPS)
- One Engine Inoperative (OEI) Surfaces
- Other Airport Design Surfaces

The type of instrument procedures and airspace required on an airport are determined by FAA guidance from on the airport's design standards. Available FAA guidance can be found by reviewing the latest Advisory Circulars, Handbooks and Orders.

Instrument Procedures

Standard Instrument Approach Procedures

Standard Instrument Approach Procedures (SIAP) are used by landing aircraft to navigate to the airport during IFR weather conditions: periods of low flight visibility and/or low cloud ceilings. FAA publishes SIAPs defining the horizontal and vertical flight path to land at an airport. Each procedure has varying flight visibility and cloud ceiling weather "minimums" published defining the minimum conditions where a legal approach can be made. Weather minimums established for each SIAP based on the approach type, airport/runway design, navigational aids, airspace obstructions, aircraft equipment and flight crew certification.

The flight visibility minimums are one factor to determine what FAA design standards apply to the airport or a particular runway. As a general rule, instrument approaches that provide

procedures for aircraft to land in lower visibility and lower ceilings require additional protection space and have “flatter” approach paths to airports which restrict the height of objects off the ends of the runways.

Although FAA flight rule weather minimums change based on the airspace classification, flights typically must be conducted under IFR if cloud ceilings are less than 1,000 feet above the ground and/or flight visibility less than 3 statute miles. Conditions exceeding this minimum can be conducted under Visual Flight Rules (VFR). Visual approaches to a runway require no published SIAP and can be conducted when the weather is acceptable for VFR flights.

FAA defines the types of SIAP:

- Non-Precision Approach (NPA) – A standard instrument approach procedure with horizontal course and no electronic vertical descent guidance. These approaches utilize satellite-based or ground-based navigational aids such as GPS, VOR or NDB.

- Approach with Vertical Guidance (APV) – An instrument approach procedure providing electronic course and vertical descent electronic guidance. These approaches utilize ground-based Glideslope (GS) navigational aids or satellite-based navigational aids such as a Localizer Performance with Vertical Guidance (LPV).

- Precision Approach (PA) – An instrument approach procedure with electronic course and vertical descent guidance and visibility minimums of less than ¾ mile visibility (4,000 foot Runway Visual Range - RVR). These approaches utilize ground-based navigational aids as part of an Instrument Landing System (ILS). The three components of an ILS are a Localizer (LOC) antenna for course guidance, a Glideslope (GS) antenna for vertical guidance and an Approach Lighting System (ALS).

See **Appendix K** for discussion of navigational aids.

Approaches may be conducted straight-in to a runway end or allow circling to the landing runway. Typical straight-in instrument approach weather minimums for runways that meet all requirements are outlined in the following table:

Table L-1 – Typical Instrument Approach Minimums

Typical Instrument Approach Minimums			
Approach Procedure	**Approach Type**	**Cloud Ceiling Minimum (HAT)**	**Visibility Minimum RVR, s.m.**
ILS - Category III[1]	Precision (PA)	≤ 100 feet	≤ 1200' RVR
ILS - Category II	Precision (PA)	100 feet	1200' RVR
ILS – Category I	Precision (PA)	200 feet	2400'/1800' RVR
LPV	Approach with Vertical Guidance (APV)	250 feet*	1 mile*
LNAV/VNAV	Non-Precision (NPI)	400 feet	1 mile
LNAV	Non-Precision (NPI)	400 feet	1 mile
VOR	Non-Precision (NPI)	400 feet	1 mile
None	Visual	1,000 feet	3 miles

Note: HAT = Height Above Touchdown, RVR = Runway Visual Range, s.m. = statute miles (reported), ILS = Instrument Landing System, LPV = Localizer Performance with Vertical Guidance, LNAV = Lateral Navigation, VNAV = Vertical Navigation, VOR = Very High Frequency Omni-Directional Range
**Lowest LPV minimums observed in United States is 200 feet cloud ceiling and ¾ mile visibility.*
Source: FAA Advisory Circular AC 150/5300-13A, FAA Aeronautical Information Manual, KLJ Analysis

FAA defines the minimum airport infrastructure standards for each type of instrument approach in Advisory Circular 150/5300-13A *Airport Design*.

[1] There are three different levels of Category III ILS approaches, each requiring a higher category of airborne equipment, crew training and airfield infrastructure requirements. Category A allows for a decision height below 100 feet with 700 feet RVR. Category B allows for a decision height below 50 feet with an RVR as low as 150 feet. Category C allows for zero decision height and zero RVR.

Table L-2 – Standards for PA and APV with <250 ft. HATh

Table 3-4. Standards for Precision Approach Procedures with Vertical Guidance (APV) Lower than 250 ft Height Above Threshold (HATh)

Visibility Minimums[1]	**< 3/4-statute mile**	**< 1-statute mile**
HATh [2]	200 ft	250 ft
TERPS GQS [3]	Table 3-2, row 8 Clear	
TERPS precision final surfaces	Clear	See Note 4
TERPS Chapter 3, Section 3	34:1 Clear	20:1 Clear
Precision Obstacle Free Zone (POFZ) 200 ft × 800 ft	Required	Not Required
ALP [5]	Required	
Minimum Runway Length	4,200 ft (Paved)	
Runway Markings (See AC 150/5340-1)	Precision	Non-precision
Holding Position Signs and Markings (See AC 150/5340-1 and AC 150/5340-18)	Precision	Non-precision
Runway Edge Lights [6]	HIRL / MIRL	
Parallel Taxiway [7]	Required	
Approach Lights [8]	MALSR, SSALR, or ALSF	Recommended
Applicable Runway Design Standards; e.g., OFZ	< 3/4-statute mile approach visibility minimums	≥ 3/4-statute mile approach visibility minimums
Threshold Siting Criteria To Be Met [9]	Reference paragraph 303 and Table 3-2, rows 7 & 8	Reference paragraph 303 and Table 3-2, rows 6 & 8
Survey Required for Lowest Minimums	Vertically Guided Airport Airspace Analysis Survey criteria in AC 150/5300-18	

Notes:

1. Visibility minimums are subject to application of Order 8260.3 ("TERPS"), and associated orders or this table, whichever are higher.
2. The HATh indicated is for planning purposes only. Actual obtainable HATh is determined by TERPS.
3. The GQS is applicable to approach procedures providing vertical path guidance.
4. If the final surface is penetrated, HATh and visibility will be increased as required by TERPS.
5. An ALP is only required for airports in the NPIAS; it is recommended for all others.
6. Runway edge lighting is required for night minimums. High intensity lights are required for RVR-based minimums.
7. A full-length parallel taxiway meeting separation requirements. See Table 3-8.
8. To achieve lower visibility minimums based on credit for lighting, an approach light system is required.
9. Circling procedures to a secondary runway from the primary approach will not be authorized when the secondary runway does not meet threshold siting (reference paragraph 303), OFZ (reference paragraph 308) criteria, and TERPS Chapter 3, Section 3.

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

Table L-3 – Standards for NPA and APV with ≥250 ft. HATh

Table 3-5. Standards for Non-precision Approaches (NPAs) and APV with ≥ 250 ft HATh

Visibility Minimums [1]	**< 3/4-statute mile**	**< 1-statute mile**	**≥ 1-statute mile Straight In**	**Circling** [10]
HATh [2]	250	400	450 ft	Varies
TERPS GQS (APV only)		Table 3-2, row 8 Clear		
TERPS Chapter 3, Section 3	34:1 clear	20:1 clear	20:1 clear or penetrations lighted for night minimums (See AC 70/7460-1)	
ALP [3]	Required			Recommended
Minimum Runway Length	4,200 ft (Paved)	3,200 ft [4] (Paved)	3,200 ft [4, 5]	
Runway Markings (See AC 150/5340-1)	Precision	Non-precision [5]		Visual (Basic) [5]
Holding Position Signs and Markings (See AC 150/5340-1 and AC 150/5340-18)	Precision	Non-precision [5]		Visual (Basic) [5]
Runway Edge Lights [6]	HIRL / MIRL		MIRL / LIRL	MIRL / LIRL (Required only for night minimums)
Parallel Taxiway [7]	Required		Recommended	
Approach Lights [8]	MALSR, SSALR, or ALSF Required	Required [9]	Recommended [9]	Not Required
Applicable Runway Design Standards, e.g. OFZ	< 3/4-statute mile approach visibility minimums	≥ 3/4-statute mile approach visibility minimums		Not Required
Threshold Siting Criteria To Be Met [10] (Reference paragraph 303)	Table 3-2, row 7	Table 3-2, row 6	Table 3-2, rows 1-5	Table 3-2, rows 1-4
Survey Required for Lowest Minimums	Vertically Guided Airport Airspace Analysis Survey AC 150/5300-18	Non-Vertically Guided Airport Airspace Analysis Survey AC 150/5300-18		

Notes:

1. Visibility minimums are subject to the application of Order 8260.3 ("TERPS"), and associated orders or this table, whichever is higher.
2. The HATh indicated is for planning purposes only. Actual obtainable HATh is determined by TERPS.
3. An ALP is only required for obligated airports in the NPIAS; it is recommended for all others.
4. Runways less than 3,200 feet are protected by Part 77 to a lesser extent. However, runways as short as 2,400 feet could support an instrument approach provided the lowest HATh is based on clearing any 200-foot (61 m) obstacle within the final approach segment.
5. Unpaved runways require case-by-case evaluation by the RAPT.
6. Runway edge lighting is required for night minimums. High intensity lights are required for RVR-based minimums.
7. A full-length parallel taxiway must lead to the threshold.
8. To achieve lower visibility minimums based on credit for lighting, a full approach light system (ALSF-1, ALSF-2, SSALR, or MALSR) is required for visibility < 1-statute mile. Intermediate (MALSF, MALS, SSALF, SSALS, SALS/SALSF) or Basic (ODALs) systems will result in higher visibility minimums.
9. ODALS, MALS, SSALS, and SALS are acceptable.
10. Circling procedures to a secondary runway from the primary approach will not be authorized when the secondary runway does not meet threshold siting (reference paragraph 303), OFZ (reference paragraph 308), and TERPS Chapter 3, Section 3.

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

Existing

Rapid City Regional Airport experiences IFR weather approximately 13.23 percent of the time requiring the use of an SIAP for arriving aircraft. Aircraft commonly conduct flights under IFR and utilize SIAPs to an airport during VFR conditions.

Table L-4 – Meteorological Analysis

Meteorological Analysis			
Weather Condition	**Cloud Ceiling Minimum**	**Visibility Minimum**	**Observation Percentage**
Visual Flight Rules (VFR)	3,000 feet	5 miles	79.20%
Marginal Visual Flight Rules (MVFR)	1,000 feet	3 miles	7.57%
Instrument Flight Rules (IFR)	600 feet	1 mile	6.59%
Instrument Flight Rules (IFR) Category I	200 feet	½ mile	3.64%
Instrument Flight Rules IFR Category II	100 feet	¼ mile	0.59%
IFR Category III & Below	0 feet	1/8 mile	2.41%
TOTAL			**100.00%**

Source: National Climatic Data Center data from Rapid City Regional Airport (2004-2014)

The Rapid City Regional has 7 different instrument approaches procedures. The following table has the name of the approach, visibility and ceiling minimums for each approach. Copies of the current published SIAPs are located at the end of this appendix.

Table L-5 – Instrument Approach Procedures

Instrument Approach Procedures			
Approach Procedure	**Approach Type**	**Lowest Cloud Ceiling Minimum (HAT)**	**Lowest Visibility Minimum RVR, n.m.**
ILS OR LOC RWY 32	ILS (PA)	3343’ (200’)	2400’ RVR, ½ mile
RNAV (GPS) RWY 05	LPV (NPI)	3423’ (300’)	1 mile
RNAV (GPS) RWY 14	LPV (APV)	3450’ (300’)	1 mile
RNAV (GPS) RWY 23	LPV (NPI)	3454’ (300’)	1 mile
RNAV (GPS) RWY 32	LPV (APV)	3360’ (200’)	½ mile
VOR OR TACAN RWY 14	VOR (NPI)	3780’ (600’)	1 mile
VOR OR TACAN RWY 32	VOR (NPI)	3440’ (200’)	½ mile

Note: HAT = Height Above Touchdown, RVR = Runway Visual Range, n.m. = statute miles (reported), ILS = Instrument Landing System, LPV = Localizer Performance with Vertical Guidance, LNAV = Lateral Navigation, VNAV = Vertical Navigation, VOR = Very High Frequency Omni-Directional Range
Source: FAA

The lowest weather minimums that an aircraft can operate are 200 foot ceiling and ½ mile visibility when wind conditions are appropriate for Runway 32. When the winds are appropriate for Runway 14, the lowest weather minimums are a 300 foot ceiling and 1 mile visibility.

The airport also has non precision approaches to Runway 5 and 23. Approaches to Runway 23 are discouraged since this approach crosses the path of the primary approach to Ellsworth AFB.

The nearest public airport with comparable or better instrument approaches is Pierre Regional Airport with an ILS approach.

Future & Ultimate

There are no new approaches currently under development for the Rapid City Regional Airport. However, since the winds in the summer favor approaches for Runway 14 it is recommended that an ILS approach be pursued for Runway 14. Even though new ILS systems are difficult to justify, it is important for the airport to carry out actions under the airports control such as the Runway Protection Zone. In addition, the airport can pursue installation of a MALSR (see Appendix K Navigational Aids) which would improve the visibility minimums for Runway 14 from 1 mile to ¾ mile.

Table L-6 – Meteorological Analysis

Meteorological Analysis			
Approach Type	**Cloud Ceiling Minimum**	**Visibility Minimum/RVR**	**Observation Percentage**
RNAV (GPS) RWY 14	300 feet	1 mile	7.71%
PA – Category I ILS	200 feet	½ mile	2.52%

Source: National Climatic Data Center data from Rapid City Regional Airport (2004-14)
RVR = Runway Visual Range, n.m. = statute miles (reported), ILS = Instrument Landing System

Departure Procedures

Departure procedures are established for an airport to allow aircraft to safely depart and climb out from the immediate airport environment to transition to an altitude that ensures sufficient obstacle clearance. Some airports may have prevailing obstacles in the departure corridor. These may require takeoff weather minimums for commercial flights, an increased rate of climb or special instructions for all flights. A standard climb rate gradient is 200 feet per nautical mile. Obstacles in the departure surface are noted to alert the pilot so they can be avoided.

Airspace

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. Sufficiently clear airspace near the approach and departure ends and along extended centerline are vitally important for safe airport operations. This section identifies overall airspace standards as well as existing and future standards for Rapid City Regional Airport.

Airspace Classification

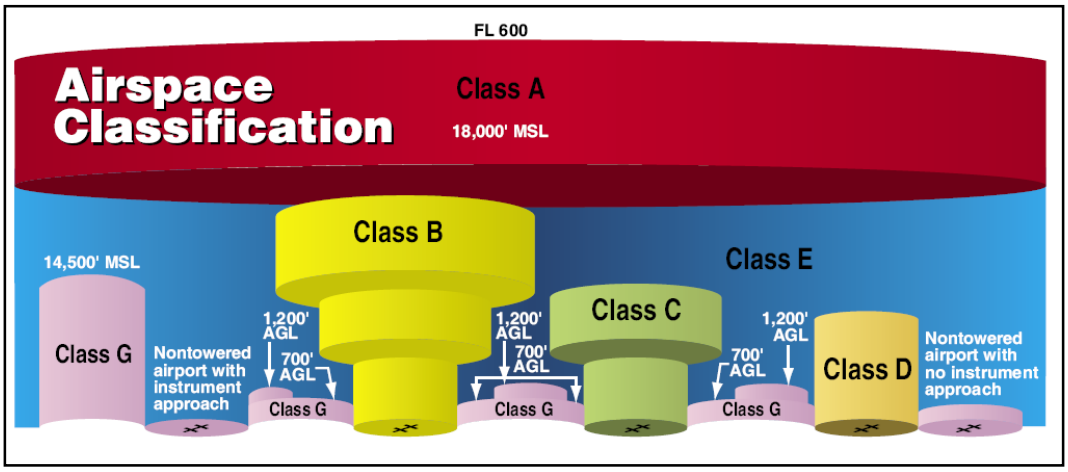
Airspace protection above and around airports is necessary for safe operation of aircraft. Airspace must be protected from obstructions in order to prevent any loss of the airport's ability to handle aircraft. Airspace classes, air traffic operating rules, navigation aids, other airports, obstructions and noise abatement procedures affect airspace.

The Federal Aviation Act of 1958 gave the Federal Aviation Administration (FAA), then known as the Federal Aviation Agency, the responsibility for control of navigable airspace and regulation of aircraft operations within the United States. Federal Aviation Regulations (FAR) Part 91, General Operating and Flight Rules, prescribes rules governing airspace.

The National Airspace System (NAS) consists of various classifications of airspace regulated by the FAA. Airspace classification ensures the safe separation of VFR and IFR aircraft. Airspace is separated into controlled, uncontrolled, special use, or other airspace. Controlled airspace is classified as A, B, C, D, or E. Uncontrolled airspace is classified as G. These classes specify appropriate minimum cloud clearances, visibility requirements, and other operating requirements for aircraft. The major difference between controlled and uncontrolled airspace is that the FAA does not exercise air traffic control over aircraft operating within uncontrolled airspace.

Figure L-1 and **Table L-7** detail the different classes of airspace and weather minimums. **Appendix K** outlines the navigational aids available to support the airport and airspace classifications.

Figure L-1 – FAA Airspace Classifications



Source: FAA Pilot's Handbook of Aeronautical Knowledge (2008)

Table L-7 – Visual Flight Rule Weather Minimums

Airspace			Flight Visibility	Distance from Clouds
Class A			Not applicable	Not applicable
Class B			3 statute miles	Clear of clouds
Class C			3 statute miles	1,000 feet above 500 feet below 2,000 feet horizontal
Class D			3 statute miles	1,000 feet above 500 feet below 2,000 feet horizontal
Class E	At or above 10,000 feet MSL		5 statute miles	1,000 feet above 1,000 feet below 1 statute mile horizontal
	Less than 10,000 feet MSL		3 statute miles	1,000 feet above 500 feet below 2,000 feet horizontal
Class G	1,200 feet or less above the surface (regardless of MSL altitude).	Day, except as provided in section 91.155(b)	1 statute mile	Clear of clouds
		Night, except as provided in section 91.155(b)	3 statute miles	1,000 feet above 500 feet below 2,000 feet horizontal
	More than 1,200 feet above the surface but less than 10,000 feet MSL.	Day	1 statute mile	1,000 feet above 500 feet below 2,000 feet horizontal
		Night	3 statute miles	1,000 feet above 500 feet below 2,000 feet horizontal
	More than 1,200 feet above the surface and at or above 10,000 feet MSL.		5 statute miles	1,000 feet above 1,000 feet below 1 statute mile horizontal

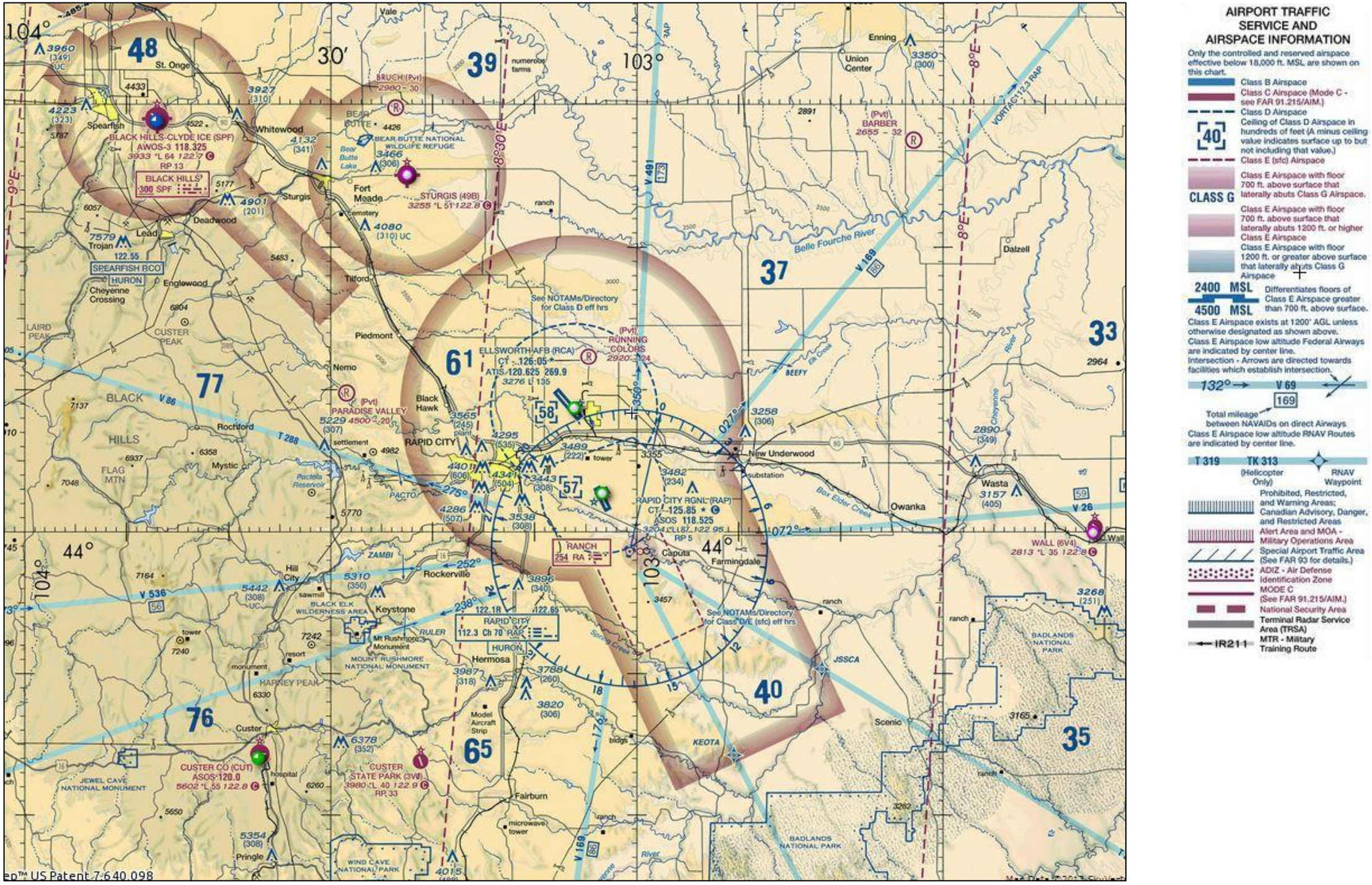
Source: FAA Pilot's Handbook of Aeronautical Knowledge (2008)

Existing Future & Ultimate

Rapid City Regional Airport is in Class D airspace with Approach/Departure control provided by Ellsworth Approach. Ellsworth Air Force Base is a terminal radar approach control facility (TRACON) known in the U.S. Air Force as a radar approach control (RAPCON). TRACONs are typically located at large airports or in busy traffic areas and are responsible for controlling air traffic within a 30-50 nautical mile radius of the airport between the surface and 18,000 feet. The Ellsworth RAPCON, referred to by call sign 'Ellsworth Approach', controls traffic within approximately a 40 nautical-mile radius of the Airport and up to an elevation of 18,000 feet. Ellsworth Approach controls traffic arriving and departing and transitions traffic between the RAPCON airspace and the enroute cruise altitudes. Ellsworth Approach provides this service for both Ellsworth and Rapid City Regional Airport and does so also when Rapid City Regional Airport ATCT is closed. Ellsworth Approach currently operates 24 hours per day.

Rapid City Regional Airport and Ellsworth Air Force Base have overlapping airspace as seen in **Exhibit L-1**, which require a joint effort between Ellsworth Air Force Base radar approach control facility (RAPCON) and the Rapid City Air Traffic Control tower.

Exhibit L-1 – Surrounding Airspace



Source: [FAA Cheyenne Aeronautical Sectional Chart](#) (July 2014) – NOT FOR NAVIGATION

Part 77 Civil Airport Imaginary Surfaces

Airspace is an important resource around airports that is very essential for safe flight operations. There are established standards to identify airspace obstructions around airports. 14 CFR (Code of Federal Regulations) Part 77 *Safe, Efficient Use, and Preservation of the Navigable Airspace* establishes various airspace surfaces in the vicinity of airports. Federal Aviation Regulation (FAR) Part 77 is used to determine and analyze obstruction data by evaluating objects that penetrate these "imaginary" three-dimensional surfaces.

The FAR Part 77 surfaces are the protective surfaces most often used to provide height restriction zoning protection around an airport. These airspace surfaces include the primary, approach, transitional, horizontal and conical surfaces each with different standards. When evaluating objects, the FAA determines if an object is a hazard to air navigation and if corrective action is needed based on more in-depth minimum airspace standards (i.e. FAA Approach/Departure Surface). FAA notification criteria standards are also established in FAR Part 77. Examples of corrective action include removing, lowering, or obstruction lighting an object. A general diagram of the FAR Part 77 surfaces is shown in **Figure L-2.**

FAR Part 77 surfaces are identified below:

- Primary Surface - Imaginary airspace surface centered along the runway centerline, ending at the runway end for non-paved runways, and extending 200 feet beyond the runway ends for hard-surfaced runways. The width is defined as 250 feet for visual runways, 500 feet for non-precision runways greater than ¾ mile, and 1,000 feet for non-precision runways as low as ¾ mile and precision runways.
- Approach Surface - A surface centered along runway centerline extending outward and upward from the end of the primary surface. This airspace surface ensures the approach areas to each runway are clear of obstructions. The width and approach slope for the approach surface varies based on the type of runway and approach planned. Typical approach slopes are 20:1 (20 feet horizontal for every 1 vertical foot) for visual and non-precision utility runways, 34:1 for non-precision other-than utility runways, and 50:1 for precision runways out to 10,000 feet then 40:1 out to 50,000 feet.
- Transitional Surface - This imaginary surface extends outward and upward at right angles to the runway centerline and extended centerline, from the sides of the Primary Surface and the Approach Surfaces at a 7:1 slope. Precision approaches have defined transitional surfaces near the outer ends of the approach surface.
- Horizontal Surface - This airspace surface protects for aircraft operations in the vicinity of each airport. The horizontal surface is an imaginary airspace surface located 150 feet above the established airport elevation, with perimeters calculated from the end of each primary surface for a runway. The radius of the horizontal surface is 5,000 feet for each visual or utility runway, or 10,000 feet for non-precision or precision runways.
- Conical Surface - This surface extends upward and outward from the end of the horizontal surface for a distance of 4,000 feet at a 20:1 slope.

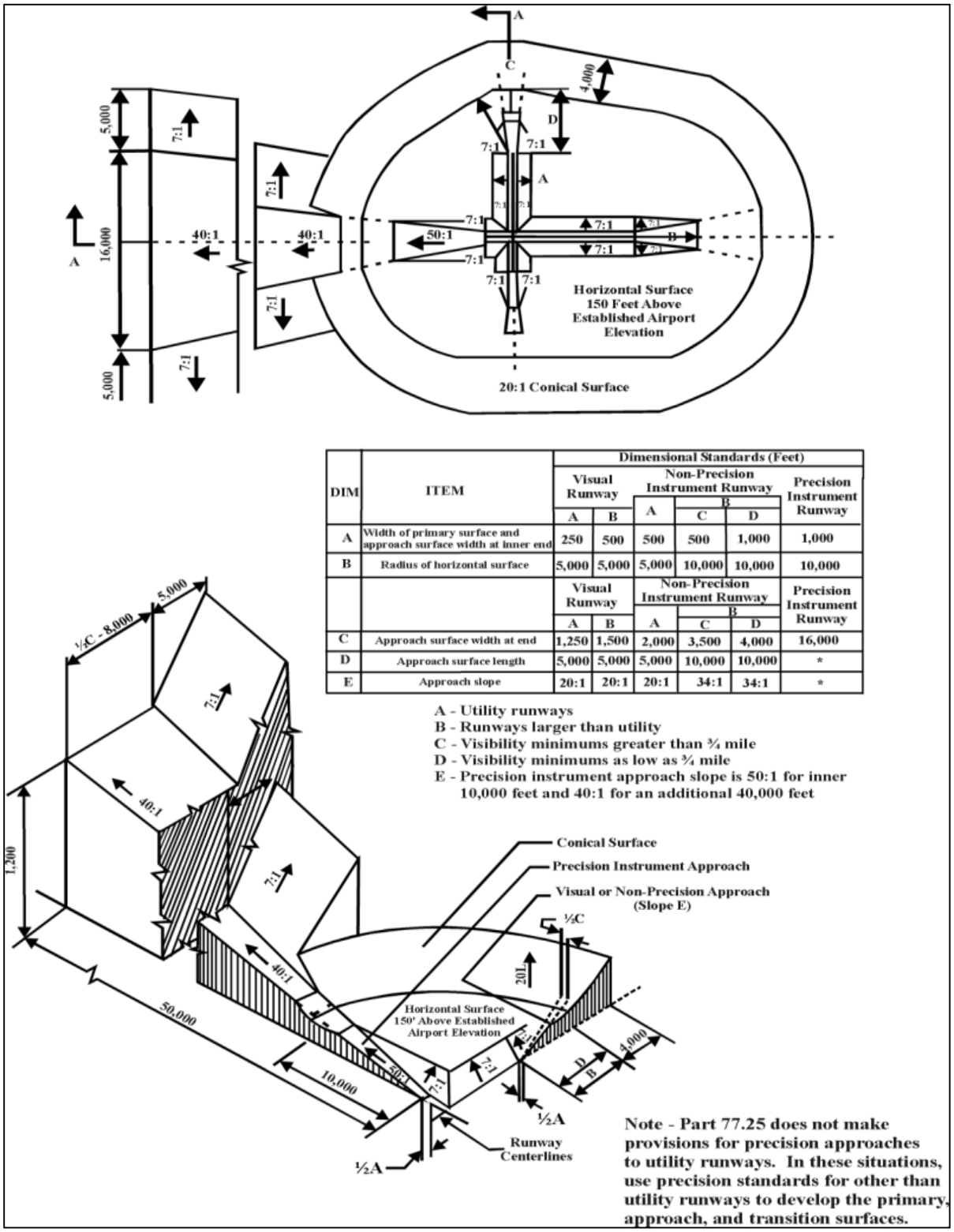
Sufficiently clear airspace is necessary for the safe and efficient use of aircraft arriving and departing an airport. FAR Part 77 airspace standards are defined by the most demanding approach to a runway. These definitions are included in **Table L-8**.

Table L-8 – FAR Part 77 Definitions

Approach Type	
Visual (V)	Runway intended solely for the operation of aircraft using visual approach procedures with no instrument approach designation on an approved FAA Airport Layout Plan.
Non-Precision (NP)	Runway having an existing instrument approach procedure with only horizontal guidance with no precision approach designation on an approved FAA Airport Layout Plan. Visibility minimums are typically 1 mile but as low as ¾ mile.
Precision (PIR)	Runway having an existing instrument approach procedure utilizing an Instrument Landing System (ILS) or other system with horizontal and vertical guidance. Visibility minimums are less than ¾ mile.
Runway Classification	
Utility	Runway constructed for and intended to be used by propeller driven aircraft of 12,500 pounds maximum gross weight or less.
Other-Than-Utility	Runway constructed for and intended to be used by turbine aircraft greater than 12,500 pounds.
Part 77 Classifications	
A	Utility Runways
B	Other Than Utility Runways
C	Visibility minimums greater than ¾ mile
D	Visibility minimums as low as ¾ mile
PIR	Precision Instrument Runway

Source: 14 CFR Part 77

Figure L-2 – FAR Part 77 Airspace



DIM	ITEM	Dimensional Standards (Feet)					
		Visual Runway		Non-Precision Instrument Runway			Precision Instrument Runway
					B		
		A	B	A	C	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
					B		
		A	B	A	C	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

Source: Federal Aviation Administration (FAA)

Existing

The combination of the approach type and the runway classification defines the dimensional criteria for each approach. The Part 77 airspace dimensional criteria for Rapid City Regional Airport are identified in the table below.

Table L-9 – Existing Part 77 Approach Airspace Standards

Existing Part 77 Approach Standards						
Runway End	**Approach Standards**	**Part 77 Code**	**Inner Width***	**Outer Width**	**Length**	**Slope**
14	Non-Precision Other than Utility	C	500’	3,500’	10,000’	34:1
32	Precision	PIR	1,000’	16,000’	50,000’	50:1/40:1
5	Non-Precision Utility	A	500’	2,000’	5,000’	20:1
23	Non-Precision Utility	A	500’	2,000’	5,000’	20:1

**Inner width is also the Primary Surface width driven by the most demanding approach to a runway.*
Source: 14 CFR Part 77, FAA Form 5010-1 Airport Master Record

According to the established rules, airspace surfaces must clear public roads by 15 feet, interstate highways by 17 feet, railroads by 23 feet, and private roads by 10 feet or the height of the most critical vehicle.

Below is a list of the most critical airspace obstructions for each existing runway end as evaluated by FAA. Part 77 obstruction mitigation considerations include existing and future airport design standards, other airspace surfaces amount of penetration into the surface and the type of obstacle (natural, natural growth or man-made). A detailed obstruction identification and mitigation disposition is identified in the Airport Layout Plan developed at the end of this planning study and located in **Appendix X – Airport Layout Plan**.

Table L-10 – Critical Part 77 Airspace Obstructions

FAA Form 5010 Airspace Obstructions						
Runway End	**Surface**	**Object Type**	**Distance from End**	**Location from Centerline**	**Penetration**	**Slope to Clear (Required)**
14	Approach	Fence	1,000’	620’ Left	**10.5’**	**23:1** (34:1)
32	Approach	-	-	-	-	na (50:1)
5	Approach	-	-	-	-	na (20:1)
23	Approach	-	-	-	-	na (20:1)

*Notes: Penetration value estimated based. **RED** indicates does not meet current standards.*
Source: FAA Airport Master Record Form 5010 Report

The existing FAR Part 77 obstructions to air navigation are identified below:

- Approach Surface
    - Runway 14 – Fence obstructs Runway 14 approach surface (34:1). Should a precision instrument approach with a 50:1 slope be established for Runway 14, there is ground and fence penetrations that will need to be addressed. Future disposition is planned to lower ground and fence.
- Transitional Surface – There are no existing airspace obstructions to this surface.
- Horizontal Surface – There are no existing airspace obstructions to this surface.
- Conical Surface
    - Lighted radio tower which penetrates the conical surface by 35 feet is 15,640 feet north of the threshold to Runway 14.
    - Unlighted tower penetrates the conical surface by 95 feet is 14,400 feet north of the threshold to Runway 14.
    - Unlighted windmill penetrates the conical surface by 18 feet is 15,940 feet north of the threshold to Runway 14.

Future & Ultimate

Each existing runway approach is sufficient for the design aircraft and usage forecast to occur within the planning period with the exception of Runway 14. As noted previously, the southerly winds in the summer make it a priority to establish a Precision Instrument approach to Runway 14. In order to accomplish this there is ground and small obstructions (e.g. fencing and roads) which must be addressed to achieve a 50:1 approach surface for Runway 14.

Table L-11 – Future/Ultimate Part 77 Approach Airspace Standards

Future/Ultimate Part 77 Approach Standards						
Runway End	**Approach Standards**	**Part 77 Code**	**Inner Width***	**Outer Width**	**Length**	**Slope**
Future Airport Configuration						
14	Precision	PIR	1,000’	16,000’	50,000’	50:1/40:1
32	Precision	PIR	1,000’	16,000’	50,000’	50:1/40:1
5	Non-Precision Utility	A	500’	2,000’	5,000’	20:1
23	Non-Precision Utility	A	500’	2,000’	5,000’	20:1
Ultimate Airport Configuration						
14	Precision	PIR	1,000’	16,000’	50,000’	50:1/40:1
32	Precision	PIR	1,000’	16,000’	50,000’	50:1/40:1
5	Non-Precision Utility	A	500’	2,000’	5,000’	20:1
23	Non-Precision Utility	A	500’	2,000’	5,000’	20:1

**Inner width is also the Primary Surface width driven by the most demanding approach to a runway.*
Source: 14 CFR Part 77, FAA Form 5010-1 Airport Master Record, KLJ Analysis

Runway Approach/Departure Surfaces

FAA identifies approach surfaces that must be cleared at an absolute minimum for safety for landing aircraft. These surfaces are identified in **Figure L-3** and **L-4** – "Table 3-2" of FAA Advisory Circular 150/5300-13A, *Airport Design*. 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 require mitigation which may include the removal of the object or the runway landing threshold to be shifted or displaced down the runway. Penetrations to the departure surface may simply require the obstacle to be published, or require mitigation including increasing the minimum aircraft climb rate or runway length operational restrictions. An FAA aeronautical study should be completed to determine the operations impacts and necessary mitigation. When usable landing or takeoff distances do not match the runway length, then a special application of declared distances should be used to meet operational safety requirements. Declared distances can be used to mitigate approach/departure obstructions, land use incompatibilities, or incompatible airport design areas.

Figure L-3 - Approach/Departure Standards Table

Table 3-2. Approach/departure standards table

	Runway Type	DIMENSIONAL STANDARDS* Feet (Meters)					Slope/ OCS
		A	B	C	D	E	
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 runways expected to serve large airplanes (Visual day/night); or instrument minimums ≥ 1 statute mile (1.6 km) (day only).	0 (0)	400 (122)	1000 (305)	1,500 (457)	8,500 (2591)	20:1
4	Approach end of runways expected to support instrument night operations, serving approach Category A and B aircraft only. [1]	200 (61)	400 (122)	3,800 (1158)	10,000 [2] (3048)	0 (0)	20:1
5	Approach end of runways expected to support instrument night operations serving greater than approach Category B aircraft. [1]	200 (61)	800 (244)	3,800 (1158)	10,000 [2] (3048)	0 (0)	20:1
6	Approach end of runways expected to accommodate instrument approaches having visibility minimums ≥ 3/4 but <1 statute mile (≥ 1.2 km but < 1.6 km), day or night.	200 (61)	800 (244)	3,800 (1158)	10,000 [2] (3048)	0 (0)	20:1
7	Approach end of runways expected to accommodate instrument approaches having visibility minimums < 3/4 statute mile (1.2 km) or precision approach (ILS or GLS), day or night.	200 (61)	800 (244)	3,800 (1158)	10,000 [2] (3048)	0 (0)	34:1
8 [3, 5, 6, 7]	Approach end of runways expected to accommodate approaches with vertical guidance (Glide Path Qualification Surface [GQS]).	0 (0)	Runway width + 200 (61)	1520 (463)	10,000 [2] (3048)	0 (0)	30:1
9	Departure runway ends for all instrument operations.	0 [4] (0)	See Figure 3-4.				40:1

* The letters are keyed to those shown in Figure 3-2.

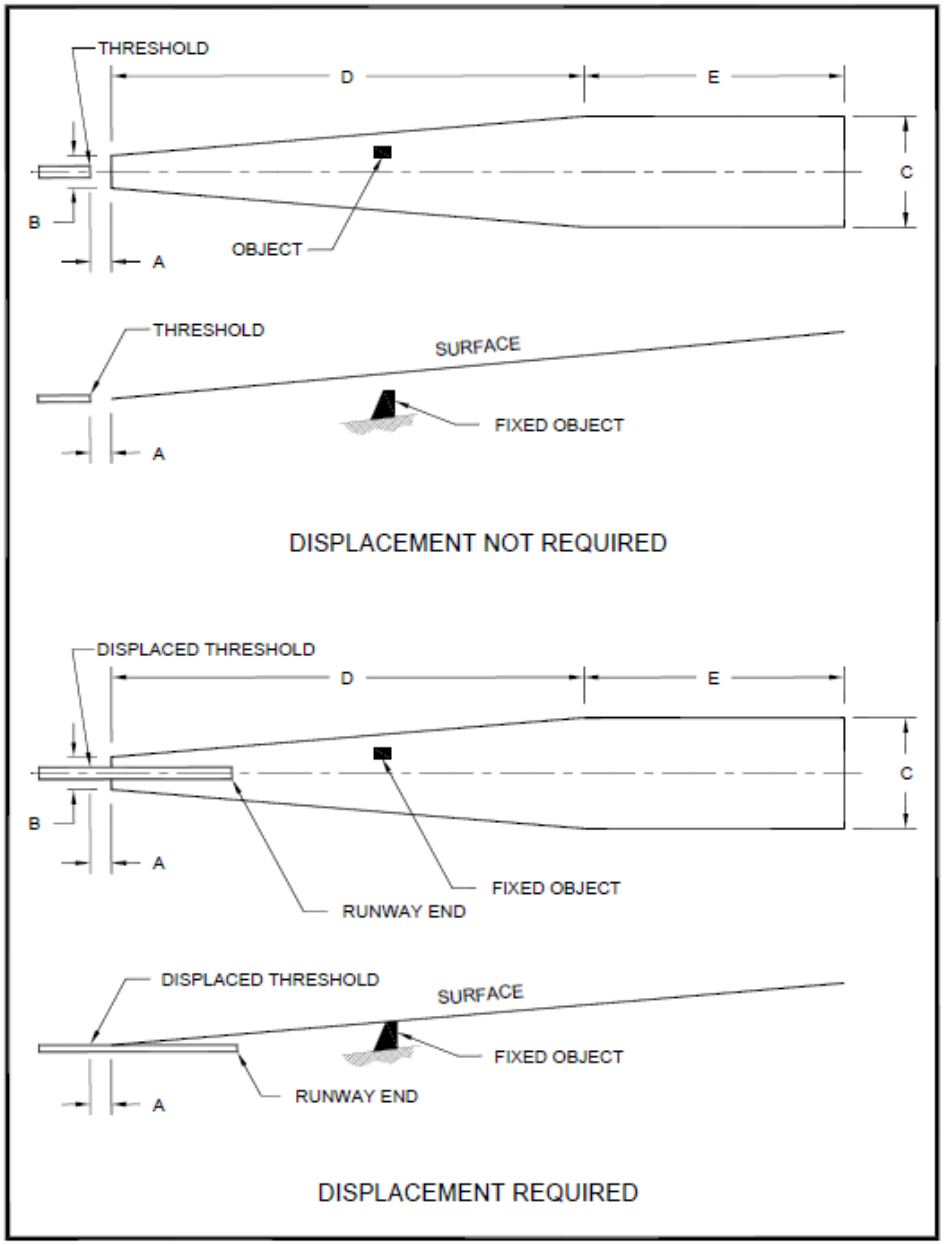
Notes:

1. Marking and lighting of obstacle penetrations to this surface or the use of a Visual Guidance Slope Indicator (VGSI), as defined by Order 8260.3, may avoid displacing the threshold.
2. 10,000 feet (3048 m) is a nominal value for planning purposes. The actual length of these areas is dependent upon the visual descent point position for 20:1 and 34:1, and DA point for the 30:1.
3. When objects exceed the height of the GQS, an APV (ILS, PAR, LPV, LNAV/VNAV, etc.) is not authorized. Refer to Table 3-4 and its footnote 3 for further information on GQS.
4. Dimension A is measured relative to TODA (to include clearway).
5. Surface dimensions / OCS slope represent a nominal approach with 3 degree Glide Path Angle (GPA), 50 feet (15 m) TCH, < 500 feet (152 m) HATh. For specific cases, refer to Order 8260.3. The OCS slope (30:1) supports a nominal approach of 3 degrees (also known as the GPA). This assumes a TCH of 50 feet (15 m). Three degrees is commonly used for ILS systems and VGSI aiming angles. This approximates a 30:1 approach slope that is between the 34:1 and the 20:1 approach surfaces of Part 77. Surfaces cleared to 34:1 should accommodate a 30:1 approach without any obstacle clearance problems.
6. For runways with vertically guided approaches the criteria in row 8 is in addition to the basic criteria established within the table, to ensure the protection of the GQS.
7. For planning purposes, determine a tentative DA based on a 3 degree GPA and a 50-foot (15 m) TCH.

Source:

FAA Advisory Circular AC 150/5300-13A, Airport Design

Figure L-4 – Threshold Siting Based on an Approach Slope



Note: See Table 3-2 for dimensional data.

Figure 3-2. Threshold siting based on approach slope

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

Existing

Rapid City Regional Airport currently meets the requirements for the existing Approach and Departure surfaces for the runways. There are no obstructions or operational restrictions which currently impact any of the Approach and Departure surfaces. The existing standards for Rapid City are provided in **Table L-12**.

Table L-12 – Existing Approach/Departures Surface Standards

Existing Approach/Departure Standards									
Runway End	**Table 3-2 Standard**								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
14					**X**				**X**
32							**X**		**X**
5				**X**					**X**
23				**X**					**X**

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

Future & Ultimate

The future and ultimate approach/departure surfaces are listed in Table L-13.

Table L-13 – Future & Ultimate Approach/Departures Surface Standards

Future & Ultimate Approach/Departure Standards									
Runway End	**FAA Airport Design Table 3-2 Row/Line**								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
14							X		X
32							X		X
5				X					X
23				X					X

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

Terminal Instrument Procedures (TERPS)

The FAA has established standards to develop instrument procedures in the United States. FAA Order 8260.3B, *U.S. Standards for Terminal Instrument Procedures (TERPS)* and related orders outlines these complex standards to develop departure, climb, en-route, approach, missed approach and holding standards for aircraft operating along a published route with different navigational equipment. Some critical obstruction clearance standards are integrated into the approach/departure surfaces identified in Airport Design including many final approach segments and the 40:1 sloped departure surface. Other important obstacle clearance surfaces within the inner airport environment identified in TERPS include the precision obstacle clearance surfaces and the missed approach surfaces. Some TERPS surfaces may even be more restrictive that Part 77 standards. Penetrations to TERPS surfaces results in higher weather minimums or operations restrictions.

One Engine Inoperative (OEI) Surfaces

One Engine Inoperative (OEI) procedures are developed by air carriers to clear obstacles in situations where one engine becomes inoperative. OEI obstacle surfaces have shallow slopes to provide object clearance when aircraft climb performance is reduced as a result of engine power loss. OEI procedures are developed by each airline. Critical obstructions effect the utility of the runway by these aircraft. The FAA had required a clear 62.5:1 sloped surface to be kept clear of obstacles from departure ends. The 62.5:1 OEI surface is no longer required by FAA because of the large area covered, the scope of obstructions found and inability for airport sponsors to clear these areas. FAA is anticipated to publish new guidance by 2016. We recommend this surface be used for future runway, airspace and land use planning.

Other Design Surfaces

Other airport design airspace surfaces considered protect navigational aids and identify airport data to populate FAA databases.

Inner-Approach/ Transitional Obstacle Free Zones

If an approach lighting system is installed, a clear inner-approach and inner-transitional Obstacle Free Zone (OFZ) is necessary. The inner-approach OFZ is a 50:1 sloped surface begins 200 feet from the runway threshold and extends 200 feet beyond the last approach light. The inner-transitional OFZ airspace surface is along the sides of the ROFZ. No objects not necessary for airport operations, including aircraft tails can penetrate this surface. For Rapid City Regional Airport, there are no current or projected issues which would create an obstruction to the inner-approach or inner-transitional OFZ.

Precision Obstacle Free Zone (POFZ)

If a precision instrument approach is in existence there exists a POFZ which begins at the runway threshold as a flat surface 800 feet wide centered on the runway centerline and extending 200 feet to connect to the inner-approach OFZ. As with the OFZ, no objects not necessary for airport operations including aircraft or vehicles on the ground can penetrate this surface. For Rapid City Regional Airport, there are no current or projected issues which would create an obstruction within the POFZ of Runway 32 or Runway 14.

Visual Aids

Visual aids at an airport require clear obstacle clearance surface to provide sufficient guidance for pilots. These include approach lighting systems and visual guidance slope indicators. For a Precision Approach Path Indicator (PAPI) system, this surface begins 300 feet in front of the VGSI system and extends upward and outward at an angle 1 degree less than the lowest on-course aiming angle. The specific airspace standards for this and for approach lighting systems are defined in FAA Order 6850.2B. For Rapid City Regional Airport, there are no current or projected issues which would create an obstruction to visual aids.

FAA Aeronautical Surveys

The FAA has implemented Aeronautical Survey requirements per Advisory Circular 150/5300-18B *General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards*. FAA airport survey

requirements require obstruction data for specialized obstruction surfaces to be collected using assembled aerial imagery for the airport. Special obstruction surfaces are used for this effort to provide with FAA sufficient airport and obstacle information. This data is used in aeronautical publications and to develop instrument approach procedures.

No action is necessary by the airport sponsor. The last aeronautical survey completed was in June 2011. When runway ends change or an enhanced instrument approach is proposed then a new obstruction analysis is necessary. Obstructions that have been removed can be deleted from the database by coordinating with FAA Flight Procedures Office. The next trigger for an aeronautical survey will be a change in instrument approach procedures.

Published Instrument Procedures

The following **Figures L-5** through **L-12** and **Table L-14** contain all the Instrument approach procedures for Rapid City Regional Airport. **Figure L-**5 which is ILS Runway 32, contains notations to understand key elements in the Instrument Approach Procedure. The ILS Runway 32 procedure is repeated without notations in **Figure L-6**.

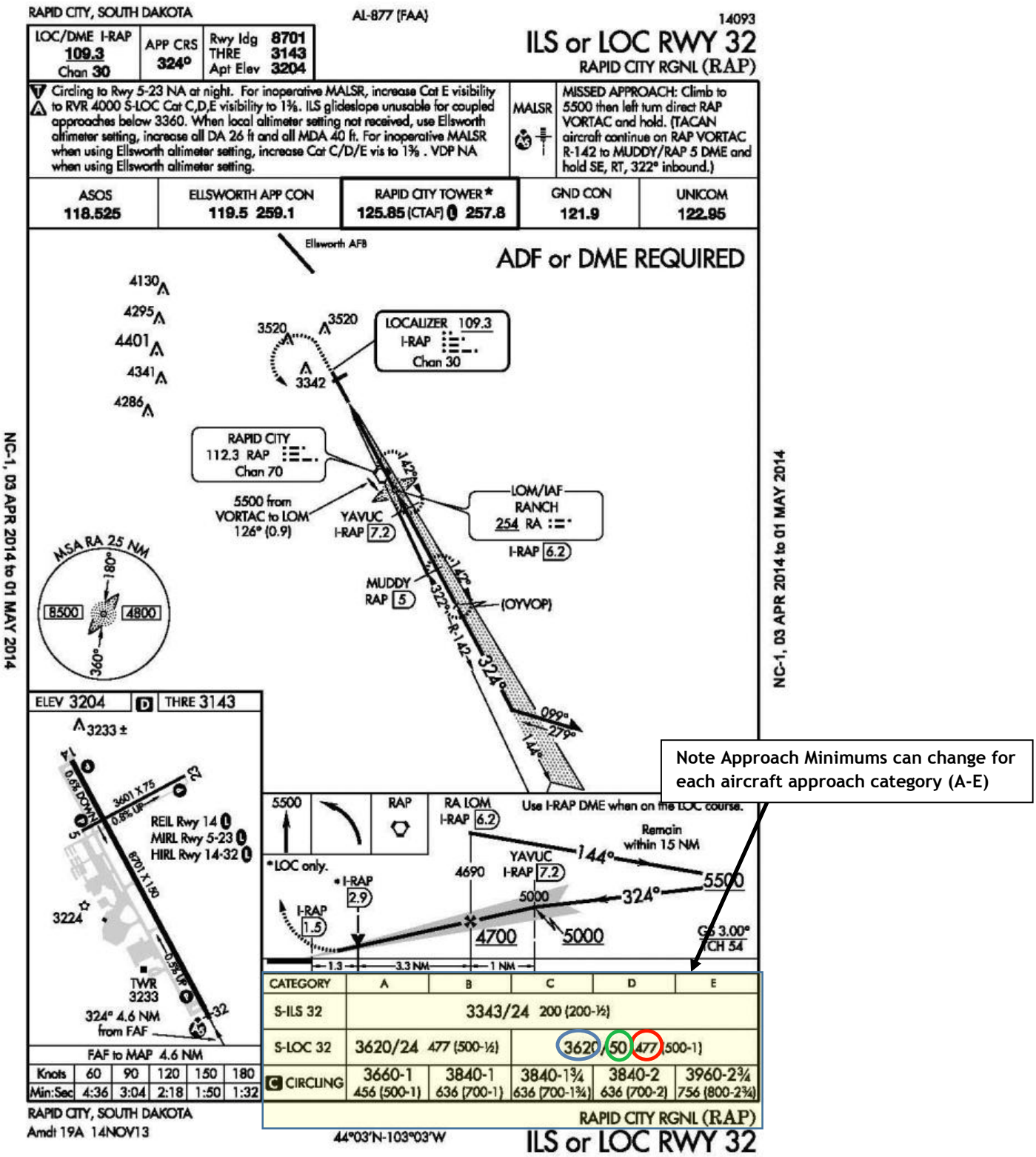
Table L-14 – Instrument Approach Procedures & Airspace Summary

Instrument Approach Procedures & Airspace Summary				
Type	**Standard**	**Existing**	**Future**	**Ultimate**
Published IAPs	-	RNAV (GPS) 05, 14, 23 & 32 ILS 32 VOR 14 & 32	RNAV (GPS) 05, 14, 23 & 32 ILS 14 & 32 VOR 14 & 32	RNAV (GPS) 05, 14, 23 & 32 ILS 14 & 32
Airspace Classification	-	Class D	Class D	Class D
Part 77 Code	*Same as Existing*	RWY 14 – C RWY 32 – PIR RWY 5 - A RWY 23 - A	RWY 14 – PIR RWY 32 – PIR RWY 5 - A RWY 23 - A	RWY 14 – PIR RWY 32 – PIR RWY 5 - A RWY 23 - A
Part 77 Obstructions	-	YES	YES	YES
APDS Obstructions	NO	YES	YES	YES
Other Obstructions	NO	NO	NO	NO

Source: FAA

APDS = Approach/Departures Surfaces

Figure L-5 – ILS OR LOC RWY 32 Instrument Approach – With Notations



Source: FAA

Minimum Descent Altitude (MDA) – Above Sea Level	Lowest Visibility or RVR (divided by 100)	Lowest Height Above Touchdown (HAT) – Above Ground Level

Figure L-6 – ILS OR LOC RWY 32 Instrument Approach

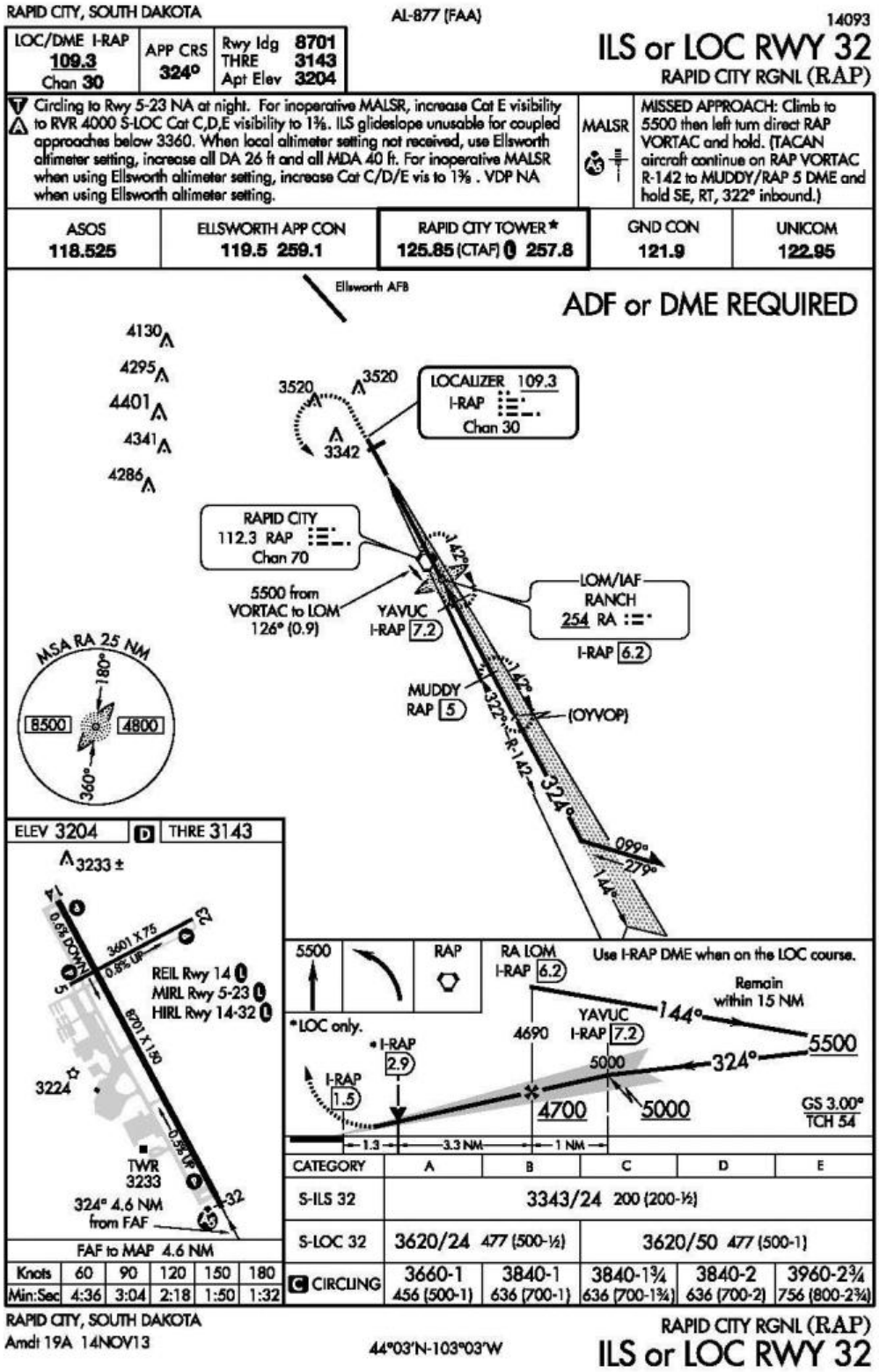


Figure L-7 – RNAV (GPS) RWY 14 Instrument Approach

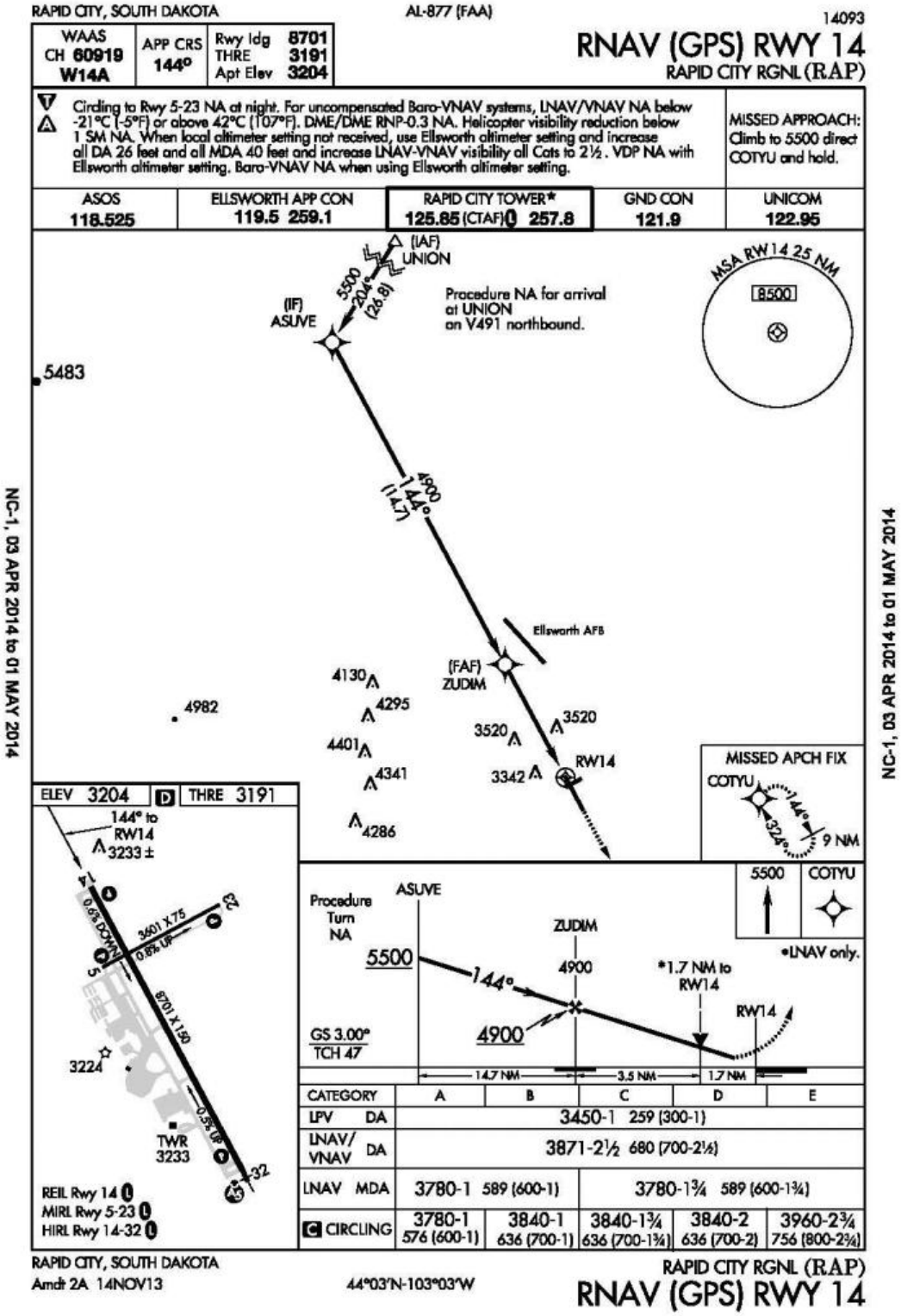


Figure L-8 – RNAV (GPS) RWY 32 Instrument Approach

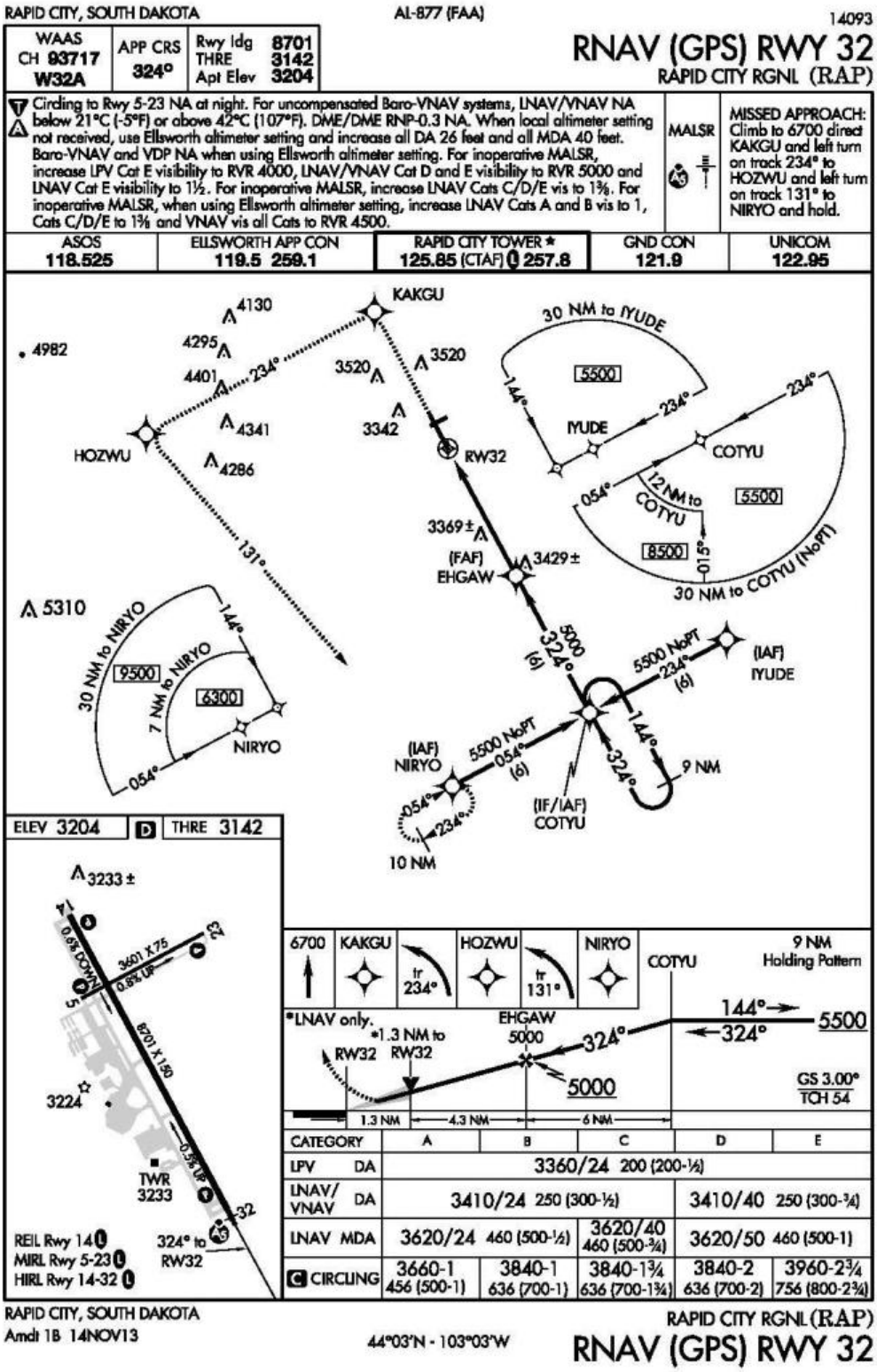


Figure L-9 – VOR or TACAN RWY 14 Instrument Approach

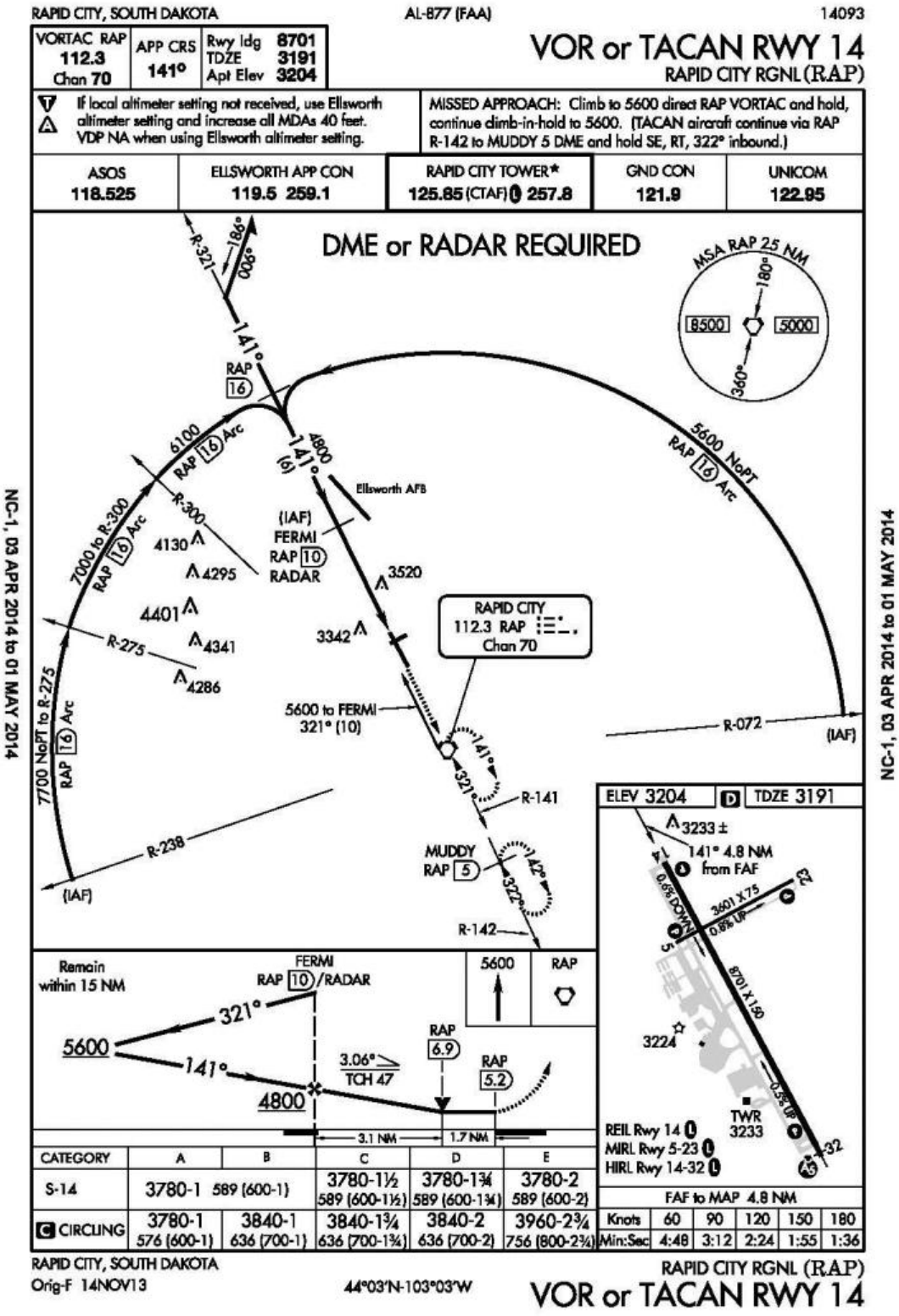


Figure L-10 – VOR or TACAN RWY 32 Instrument Approach

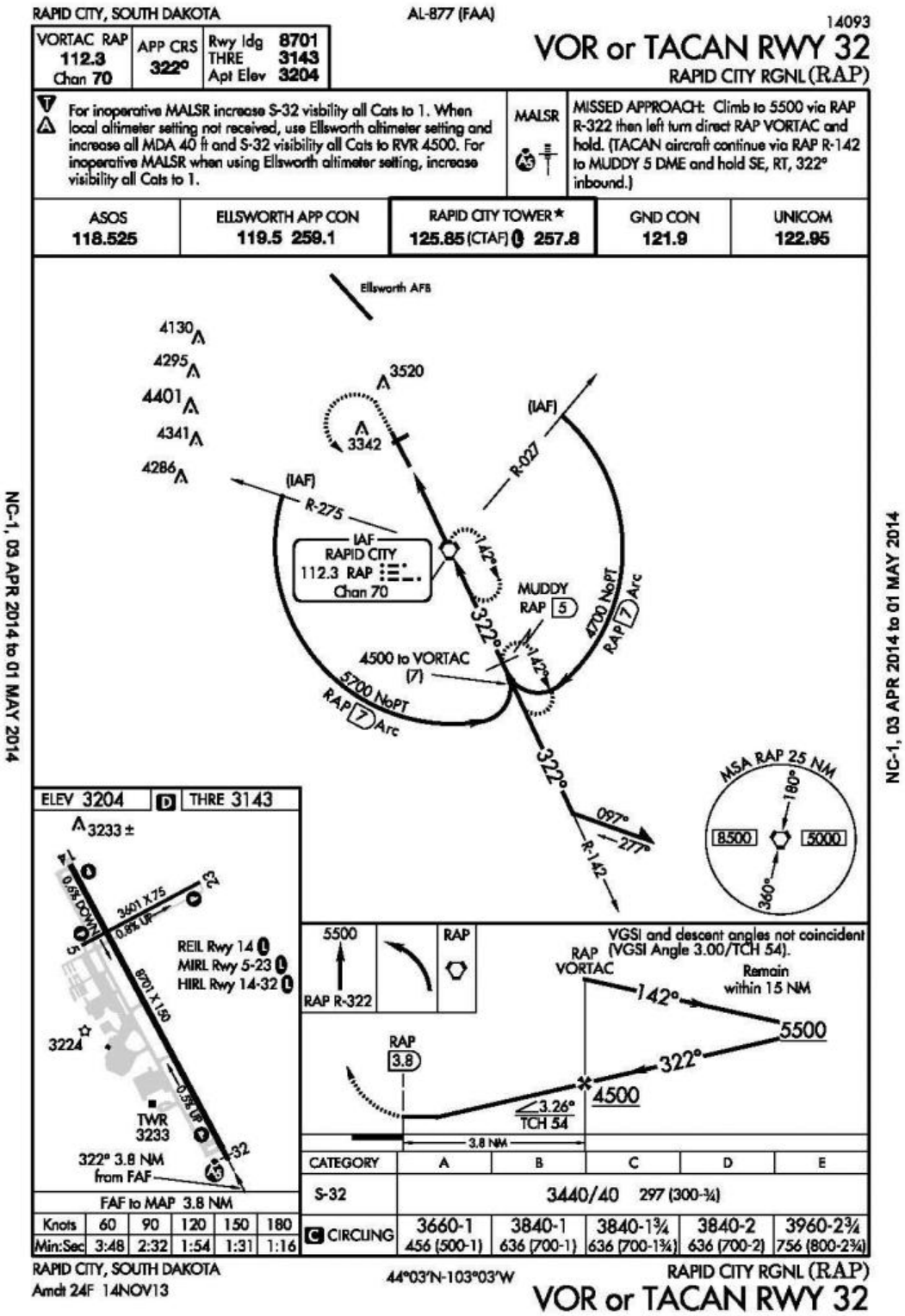


Figure L-11 – RNAV (GPS) RWY 5 Instrument Approach

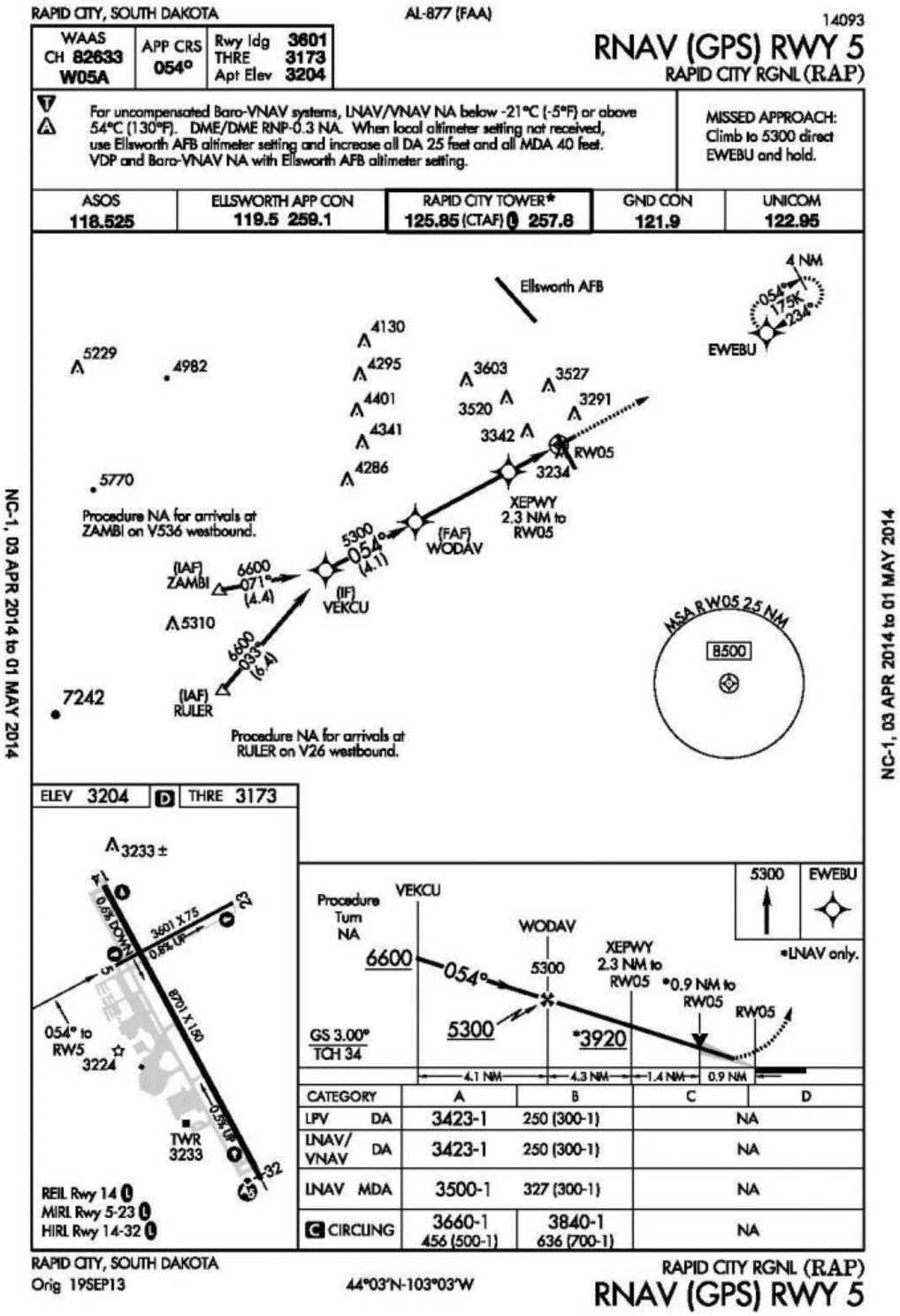
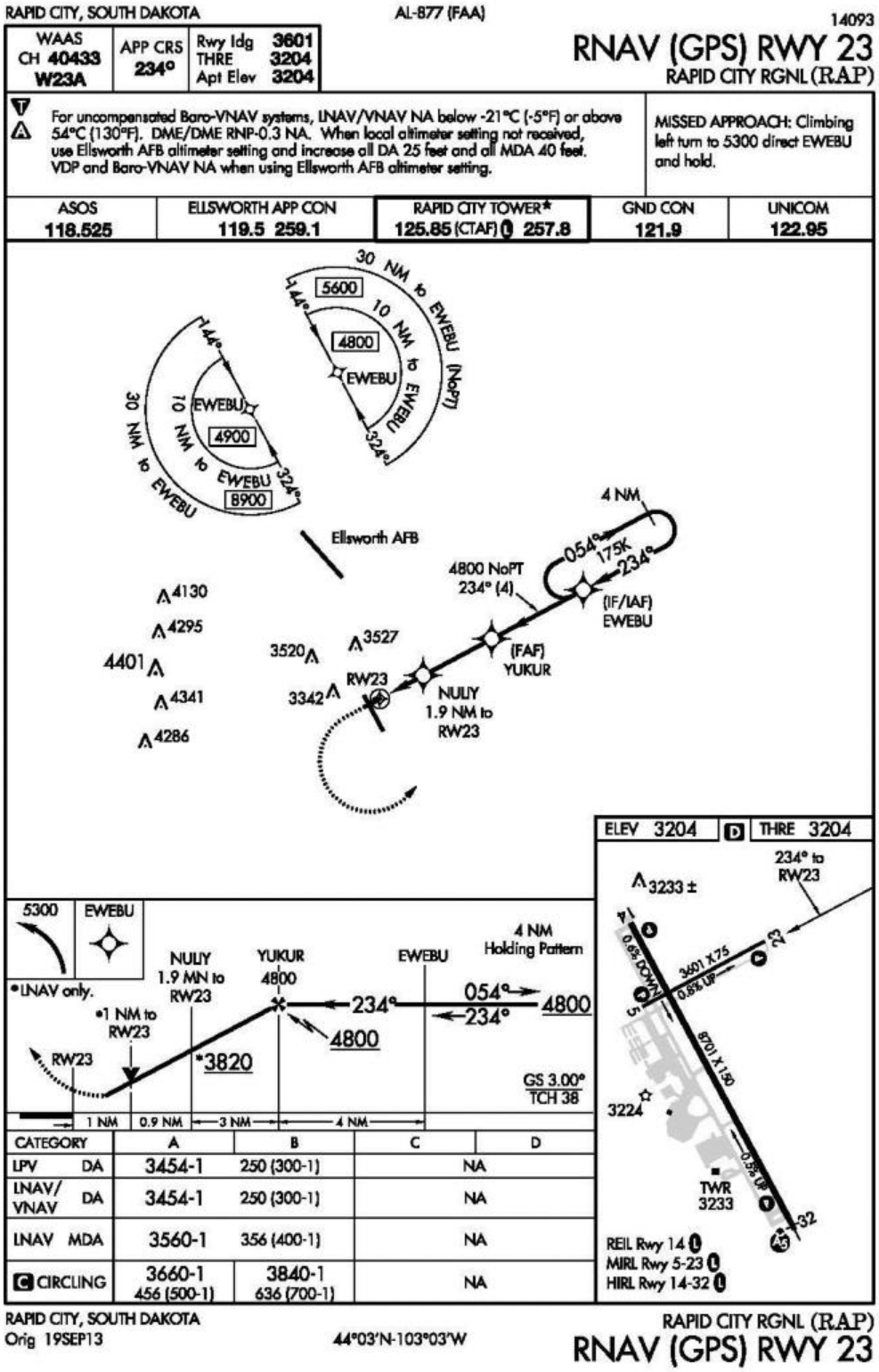


Figure L-12 – RNAV (GPS) RWY 23 Instrument Approach



Appendix O – Land Use Compatibility

Introduction

Land Use Compatibility Planning

Airports are community assets providing significant benefits. They facilitate the movement of people, goods and services, promote tourism and trade, stimulate business development and support a variety of jobs.

The objective of land use planning is to guide on-airport and off-airport land use development to be compatible with airport operations. On-airport compatible land use is controlled by the airport and primarily serves aeronautical activities. Off-airport land uses is not directly controlled by the airport. Surrounding land uses compatible with airports typically include those uses that can co-exist with a nearby airport without either constraining the safe and efficient operation of the airport or exposing people working or living nearby to unacceptable levels of noise or safety hazards. Compatible land use also considers minimizing potential hazards to aircraft and the flying public. The impact of airport planning decisions extends well beyond the airport property line thus must be considered.

Land use planning around airports is important to airports and communities for several reasons:

- **Safety** - Compatibility is needed to maintain safety of the general and flying public. Risk should be reduced to an acceptable level. The airport must also maintain operational utility within identified safety and risk criteria.
- **Airport Utility** - Land uses around airport should provide no undue restrictions placed on the airport's existing or future arrival and departure procedures. Opportunities for future development identified in the Airport Master Plan and shown on the Federally (FAA) approved Airport Layout Plan should be considered.
- **Human Environment** - Balancing the human environment with airport operations is important to maintain an acceptable level of airport impacts (i.e. noise and visual exposure) with the surrounding community.
- **Economic Development** – Operational restrictions placed on the airport as a result of land use compatibilities have the potential to have a trickle-down effect on the community. This reduces the community's ability to accommodate the aviation needs of the public and local businesses, thus limiting economic development opportunities.

Incompatible land uses are one of the largest issues facing airports today, often resulting in conflicts between airports and their communities. They also may result in airport operational and grant project funding implications in certain situations. Building consistency between the recommendations in this Airport Master Plan with airport land use compatibility standards and area-wide planning is vital for maintaining compatible land use.

The objective of this chapter is to assist the Rapid City Regional Airport in identifying land use standards and developing recommendations so that the airport can continue to meet safety criteria so that airport operations and surrounding land uses can safety co-exist into the future. This chapter should become framework to future land use planning efforts between Airport, Rapid City, City of Box Elder, Pennington County, and Meade County.

It should be noted that an Airport Land Use Compatibility Plan was completed in 2010[1]. This plan is available on the Rapid City website-- http://www.rcgov.org/Transportation-Planning/airport-land-use-compatibility-plan.html.

In reviewing the land use compatibility standards for the existing, future and ultimate RAP airport, the 2010 Land Use Plan was reviewed. Outreach efforts were made to local officials in Rapid City, Box Elder, Pennington County, and Meade County, since it appeared from reviewing the city/county ordinances that several of the 2010 Land Use Compatibility Plan recommendations were not updated in city/county ordinances. Since this Airport Master Planning Update is not showing any land acquisitions, and since the development on the airport owned property is for aeronautical purposes, the main focus of this review was to look at fully implementing the 2010 Land Use Compatibility Plan recommendations.

Roles and Responsibilities

Airport Sponsor

As the airport sponsor, Rapid City, applies and receives federal grants. These federal grants require Rapid City to develop and maintain the airport compatible with FAA rules and regulations through FAA Grant Assurances (obligations). There are currently 39 grant assurances which an airport sponsor assumes as a contractual obligation with the Federal Government when the sponsor accepts federal funds for airport development. These grant

> **20. Hazard Removal and Mitigation.** It will take appropriate action to assure that such terminal airspace as is required to protect instrument and visual operations to the airport (including established minimum flight altitudes) will be adequately cleared and protected by removing, lowering, relocating, marking, or lighting or otherwise mitigating existing airport hazards and by preventing the establishment or creation of future airport hazards.
>
> **21. Compatible Land Use.** It will take appropriate action, to the extent reasonable, including the adoption of zoning laws, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft. In addition, if the project is for noise compatibility program implementation, it will not cause or permit any change in land use, within its jurisdiction, that will reduce its compatibility, with respect to the airport, of the noise compatibility program measures upon which Federal funds have been expended.
>
> *Source: FAA Grant Obligations No. 20 & 21 dated March 2014*

assurances describe how the sponsor must operate the airport and serve the needs of the flying public. Grant assurances 20 and 21 pertain to compatible land use around airports.

[1] The Compatible Land Use Plan was adopted by the Rapid City Regional Airport and some components were adopted by the City of Rapid City and Pennington County. Items which are still recommended to be adopted are noted in this appendix.

FAA grant assurances require airports take appropriate action to protect airspace and restrict land uses in the immediate vicinity to those compatible with airport operations. Compatible land use control is the responsibility of the airport sponsor, Rapid City.

Federal Aviation Administration (FAA)

The FAA can provide guidance and funding to promote compatible land development around airports; however, it has no regulatory authority for controlling land uses. State and local governments are responsible for land use planning, zoning and regulations. Grant assurances are developed by the FAA to protect federal investments in airports, but are the responsibility of the airport sponsor to maintain.

The FAA monitors all obligated airports to ensure they comply with the requirements of the grant assurances through its Compliance Program. If the sponsor fails to take the necessary corrective action, the FAA can legally impose penalties on the sponsor, including the loss of federal funding.

As defined by law, the FAA's authority to enforce most regulations and grant assurances is limited to within the airport boundaries. The FAA's only authority on compatible land use planning is through the grant assurances airport sponsors must adhere to in order to obtain federal funding for airport improvements. In most cases, the most practical and cost effective method for a sponsor to affect compatible land use outside of the airport's property is through zoning or easements rather than through land acquisition.

State of South Dakota

South Dakota Codified Laws allow counties and cities of the state to enter into joint planning and zoning agreements. Municipalities may also exercise zoning powers within three miles of their corporate limits subject to county approval. There are no minimum land use development and airspace standards around airports.

Additional State regulations and laws in place under Chapter 50-9 concern structures affecting aviation in South Dakota. Under Chapter 50-9-1, South Dakota Aeronautics Commission approval is required for any new or altered structure greater than 200 feet above the terrain, and for any new or altered structure within a 100:1 slope from the runway at a public airport with a runway with a length 3,200 feet or greater.

Surrounding Jurisdictions

Local jurisdictions are responsible for developing and enforcing land use planning, zoning and regulations. Development proposals are reviewed and approved at this local level through an established process. Any adopted airport land use compatibility zoning that restricts the type and height of new development, for example, is enforced by the local jurisdiction. For the Rapid City Regional Airport, surrounding jurisdictions include the Rapid City, Box Elder, Pennington and Meade Counties; these four entities were included in the review process.

Land Use Compatibility Elements

Overview

Four elements should be considered in order to achieve land use compatibility:

- Airspace
- Safety
- Noise
- Airport Compliance

A general description of each element is provided based primarily on criteria developed by the FAA.

Airspace

Details regarding the existing airspace at Rapid City are provided in **Appendix L – Instrument Procedures and Airspace**. The following information will be general in nature and will include policy level actions which are recommended as it relates to land use controls to protect airspace.

The airspace compatibility element includes avoiding vertical development that reduces the level of safety, increases risks of aircraft accidents or measurably reduces the operational utility of airports. Types of development that may impair airports from meeting this objective include man-made structures (e.g. buildings, radio towers and wind turbines) and natural growth objects and terrain (e.g. trees, ground). Other airspace impacts include visual or electronic interference. Examples include bright lights near runways causing glare, or airborne emissions from industrial plants that may reduce pilot visibility or cause severe turbulence. The risk of accidents involving airspace obstructions can be lowered through the efforts of the FAA to evaluate and manage airspace and through local government control over the creation of incompatible structures.

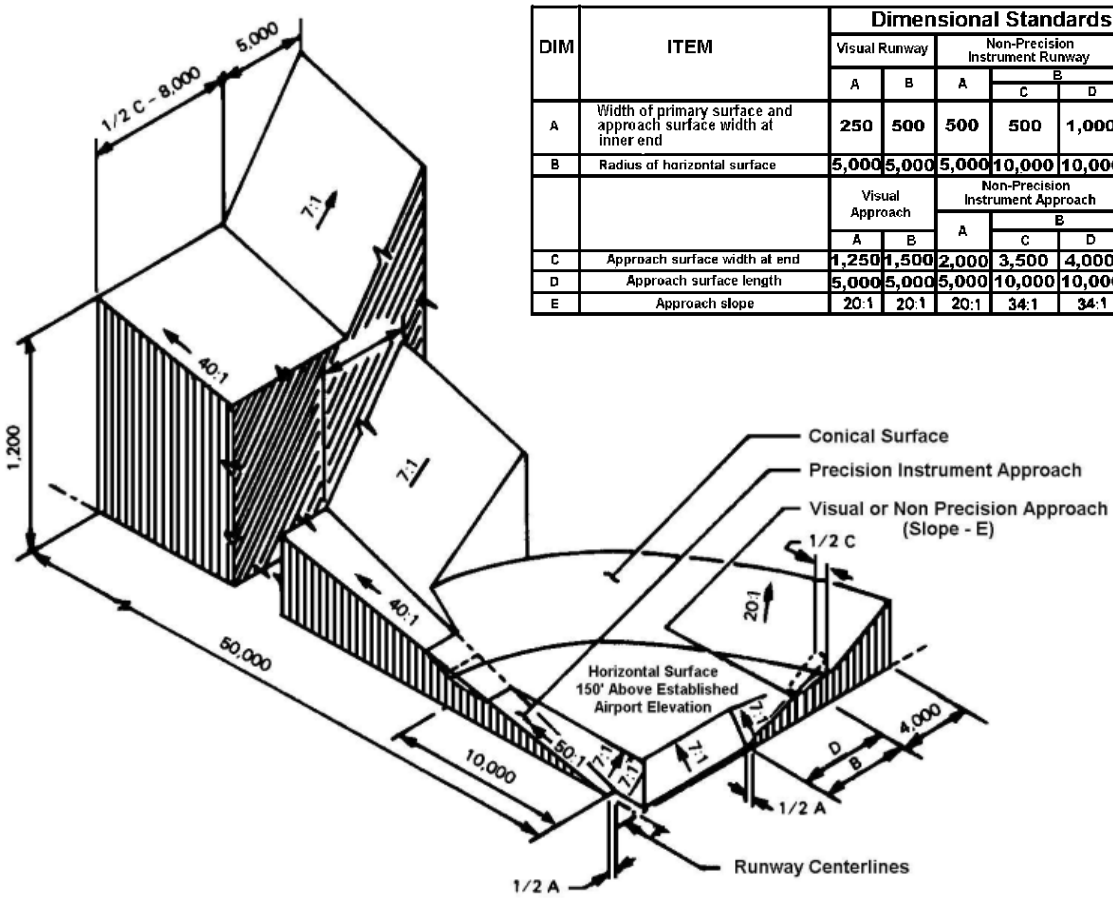
The definition of airspace requirements is primarily accomplished through standards established in Title 14 of the Code of Federal Regulations (CFR). More specifically, 14 CFR Part 77, *Objects Affecting Navigable Airspace*. The standards established in Part 77 relate to the size of the largest aircraft using the runway, the approach type, and the minimum visibility under which the runway can still be used by aircraft. Part 77 standards appear in the form of three dimensional "imaginary surfaces" as illustrated in **Figure O-1.**

FAA Order 8260.3B *Terminal Instrument Procedures* (TERPS) identify airspace standards for instrument approaches and departures. These standards are defined by FAA. Obstructions to TERPS surfaces may result in reduced utility for instrument operations to an airport. These surfaces are reviewed by FAA on a case-by-case basis to ensure compatibility and safety. Other airspace surfaces and review procedures apply from FAA Order 7400.2 *Procedures for*

Handling Airspace Matters including traffic pattern airspace to protect for safe aircraft maneuvering around the airport.

Figure O-1 – CFR Part 77 Imaginary Surfaces

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 Approach		Non-Precision Instrument Approach			Precision Instrument Approach
		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	*



Source: National Geodetic Survey (NGS)

Airspace standards affect land uses within and around the airport. A project proponent is required to file FAA Form 7460-1 *Notice of Proposed Construction* prior to proposing new development on-airport or within the vicinity of the airport as defined in Part 77. Three typical responses include:

- **No Objection/No Hazard[2]:** The proposed construction/alteration did not exceed obstruction standards and lowering, lighting or marking is not required.
- **Conditional Determination/Notice of Presumed Hazard:** The proposed construction/alteration would be acceptable contingent upon implementing mitigating measures (i.e. lowering, lighting or marking the object)

[2] A 'No Hazard' determination may still have an impact on the airport because the FAA may state 'No Hazard' because the hazard can be mitigated by increasing Instrument Approach Procedure minimums or other air traffic procedures.

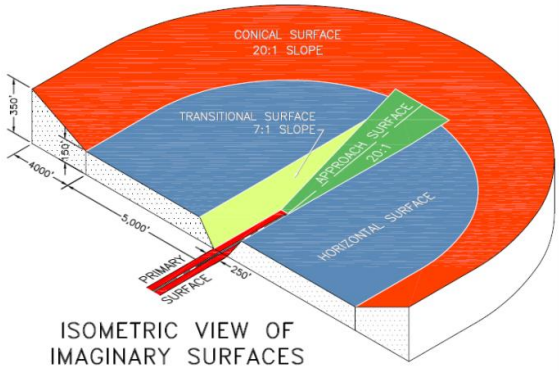
- **Objectionable/Hazard:** The proposed construction/alteration is determined to be a hazard to air navigation and is thus objectionable. The reasons for this determination are outlined to the proponent.

If a Part 77 or TERPS airspace surface would be penetrated by a constructed object, the FAA then performs an extended study to determine whether the object poses an operational problem for the relevant airport. If the penetration does not pose an operational impact, it may be determined not to be a hazard.

Operational impacts are those that affect aircraft operations[3]. Examples of measurable operational impacts include reducing available runway length, increasing the minimum flight altitude in a specific area, increasing the minimum climb gradient for airport departure, diverting air traffic away from an obstacle, or increasing the minimum descent altitude/flight visibility at the obstacle location for airport arrivals.

It is important to acknowledge that the FAA's role is limited to evaluating the aeronautical effects of proposed structures; the FAA has no legal authority to stop the construction of any proposed structure. However, as previously mentioned, FAA grant assurance obligations require sponsors to take reasonable action to prevent and remove hazards to air navigation. Typical examples include local land use zoning for FAR Part 77 and TERPS airspace surfaces.

Existing and Future Conditions



The Rapid City Regional Airport currently has airspace zoning in place at the airport covering FAR Part 77 surfaces for the existing and future airport configurations from the 2010 Airport Land Use. No changes to runway end locations are identified in this Master Plan study. This zoning helps prevent new airspace incompatibilities. FAA recommends airports take steps to adopt zoning that protects both existing and future airport airspace. FAA AC 150/5190-4A, *A Model Zoning Ordinance to Limit Height of Objects Around Airports* provides guidance to develop such an ordinance. The State of South Dakota allows airports to develop zoning ordinances for this purpose.

Specific airspace dimensions and surface slopes are a factor of runway utility and instrument approach type. **Table O-1** identifies the CFR Part 77 approach airspace standards for the existing, future and ultimate configurations at the Rapid City Regional Airport as identified in this Airport Master Plan. Other airspace surfaces include primary, transitional, horizontal and conical airspace surfaces that are identified in the Airport Layout Plan.

[3] The operational impact reviewed by the FAA is typically only based on existing Instrument Approach Procedures and may not consider future Instrument Approach Procedures that the airport intends to be in place in the future.

Table O-1 – CFR Part 77 Approach Surface Standards

Runway End	Phase	Utility	Approach Type (Visibility Minimums)	Inner Surface Dimensions	Surface Slope
14	Existing	OTU	Non-Precision (1 mile)	500' x 3,500' x 10,000'	34:1
14	Future-Ultimate	OTU	Precision (< ¾ mi.)	1,000' x 16,000' x 50,000'	50:1/40:1
32	Existing-Ultimate	OTU	Precision (< ¾ mi.)	1,000' x 16,000' x 50,000'	50:1/40:1
5	Existing-Ultimate	U	Non-Precision (1 mile)	500' x 2,000' x 5,000'	20:1
23	Existing-Ultimate	U	Non-Precision (1 mile)	500' x 2,000' x 5,000'	20:1

Source: 14 CFR Part 77, KLJ Analysis.
Note: OTU = Other-Than-Utility Runway, U = Utility Runway

There are also FAA approach surfaces used in airport design which must be clear for the runway end and approach type to meet minimum safety and compatibility standards. Additional details regarding these approach surfaces are found in **Appendix L - Instrument Procedures and Airspace**. **Table O-2** identifies the FAA approach airspace standards for the existing, future and ultimate configurations at the Rapid City Regional Airport as identified in this Airport Master Plan. There are no changes from the 2010 Land Use Plan.

Table O-2 – FAA Approach Surface Standards

Runway End	Phase	FAA Surface #	Runway Type	Inner Surface Dimensions	Surface Slope
14	Existing	5	Instrument Night > CAT B	800' x 3,800' x 10,000'	20:1
14	Future-Ultimate	7	Lower than ¾ mile Vis.	800' x 3,800' x 10,000'	34:1
32	Existing-Ultimate	7	Lower than ¾ mile Vis.	800' x 3,800' x 10,000'	34:1
9	Existing-Ultimate	4	Instrument Night CAT A/B	400' x 3,800' x 10,000'	20:1
27	Existing-Ultimate	4	Instrument Night CAT A/B	400' x 3,800' x 10,000'	20:1

Source: FAA AC 150/5300-13A (Change 1), KLJ Analysis
Note: The most restrictive surfaces are shown.

In some cases, the FAA Departure Surfaces and operator-specific one-engine departure surfaces are more restrictive than FAR Part 77 standards. FAA Departure Surfaces standards identify a 40:1 obstacle clearance surface for all instrument runways. This surface is 1,000 feet wide and typically begins at the departure runway end. The one-engine inoperative departure surface slope was 62.5:1 in previous FAA guidance[4]. Air carrier airports like Rapid City should work with individual operators to determine their minimums standards. A comprehensive airspace surface identified in an airport zoning ordinance protects all airspace compatibility standards from new obstructions. Preventing new obstacles will maintain the

[4] FAA is currently working to develop revised one-engine inoperative obstacle identification surface standards for airports (per April 28 and June 10, 2014 Federal Register Notices). Comment period closed July 28, 2014.

utility of the airport by preventing new operational restrictions such as increased climb rates. To achieve an increased climb rate aircraft operators may have to reduce aircraft fuel, passenger and cargo loads which causes operational limitations. **Table O-3** identifies the FAA departure airspace standards for the existing, future and ultimate configurations at the Rapid City Regional Airport as identified in this Airport Master Plan.

Table O-3 – FAA Departure Surface Standards

Runway Ends	Phase	FAA Surface #	Approach Type (Visibility Mins.)	Surface Dimensions	Surface Slope
14,32,5,23	Existing-Ultimate	9	Instrument Operations	1,000' x 6,466' x 10,200'	40:1

Source: FAA AC 150/5300-13A (Change 1), KLJ Analysis

Existing obstacles to FAR Part 77, FAA Approach Surface, FAA Departure Surface and operator-specific one-engine inoperative surfaces should be addressed on a case-by-case basis based on an FAA aeronautical study in the Airport Layout Plan. Information regarding any existing obstructions can be found in **Appendix L – Instrument Procedures and Airspace**. This will help achieve compatible airspace around the airport. Obstructions may cause operational limitations if not removed, lowered, lighted or marked.

Land Use Controls

Local land use controls help control the creation of new airspace obstructions and hazards beyond airport property boundary.

The Rapid City Regional Airport completed a Land Use Compatibility Plan in 2010 for the Airport and surrounding area. The report was provided to all affected jurisdictions and the status of action by those jurisdictions are as follows:

Pennington County

Airspace protection is provided for Rapid City Regional Airport in Pennington County's Section 301 – Airport Height and Hazard Zoning (http://docs.pennco.org/docs/Ordinances/Planning/ZoneOrd.pdf). The 2010 Land Use Compatibility Plan recommended that several changes be made to zoning to better protect the Airport; these changes were incorporated into the County's zoning ordinance; therefore ***no additional changes are required at this time***.

Rapid City

Rapid City Municipal Code (RCMC) Chapter 17.58 - Airport Zoning District (http://www.rcgov.org/pdfs/Growth-Management/growth_management/RCMC-Chapter-17.pdf) establishes zoning authority over the Airport Zoning District, which encompasses Rapid City Regional Airport property. In Chapter 17.58, an Airport Encroachment Area and Height Regulations section are established in reference to Part 77.19, but do not adequately define the restrictions. In addition, the terminology used in RCMC Chapter 17.58 and Part 77.19 do not exactly match. Rapid City Municipal Code Chapter 17.58 does not adequately protect airspace surrounding the Airport.

It is recommended that airspace protection language similar to Pennington County's Section 301 be adopted by Rapid City. It is important that the ordinance protects Rapid City Regional Airport airspace beyond the Airport Zoning District as well.

City of Box Elder

At this time, the City of Box Elder has adopted a zoning ordinance No. 478 (last revised in May 2013). The zoning ordinance includes language specific to protecting Ellsworth Air Force Base which were developed through a 2008 AICUZ[5] Study. There are some portions of the ordinance that reference the Rapid City Regional Airport but these were primarily based on the protective surfaces as used by the Department of Defense and not the FAA. ***The land use and height restrictions in place with this ordinance appear sufficient to protect the Rapid City Regional Airport from incompatible land uses that may arise under the jurisdiction of Box Elder.***

Meade County

At this time, Meade County has not adopted zoning that protects Rapid City Regional Airport airspace. It was also found that Meade County has no zoning. Recognizing that Meade County is over six miles north of RAP it is highly unlikely a land use will be proposed that will impact the Rapid City Regional Airport without it being identified through existing FAA notification procedures or would more substantially impact Ellsworth AFB. ***If there are efforts to establish zoning for the protection of Ellsworth Air Force Base it is recommended that Rapid City Regional Airport be included with language similar to Pennington County's Section 301.***

Wildlife Hazards

The wildlife element is focused on minimizing risks associated with wildlife in the vicinity of an airport. Hazardous wildlife use natural or artificial habitats on or near an airport for food, water or cover. Wildlife in the area of airport operations may result in an aircraft-wildlife strike. FAA AC 150/5200-33, *Hazardous Wildlife Attractants On or Near Airports*, recommends wildlife attractants be located at least 10,000 feet away from the Air Operations Area (AOA) for airports primarily serving turbine-powered aircraft. The AOA is any area of an airport used or intended to be used for landing, takeoff, or surface maneuvering of aircraft. For all airports, the FAA recommends a distance of 5 statute miles between the furthest edges of the airport's AOA and the hazardous wildlife attractant if the attractant could cause hazardous wildlife movement into or across the approach or departure airspace.

According to NTSB, 78 percent of bird strikes happen below 1,000 feet and 90 percent occur under 3,000 feet. A 5 statute mile distance from the AOA protects approach, departure and circling airspace.

[5] Air Installation Compatible Use Zone (AICUZ) Study is one conducted by the U.S. Navy in support of Department of Defense (DOD) Facilities to identify and make recommendations for land use and development for the areas surrounding these DOD facilities.

Examples of potential wildlife hazards include storm water management facilities (unless designed to minimize wildlife attractiveness), wetlands that attract wildlife, artificial bodies of water, golf courses (unless they have a wildlife management program) and confined livestock operations within 10,000 feet of runways serving turbine-powered aircraft. Facilities not recommended within 5 miles of the AOA include new wastewater treatment facilities and new landfills.

The FAA recommends that public-use airport sponsors implement the standards and practices contained in AC 150/5200-33. The FAA also recommends the guidance in this Advisory Circular for land-use planners, and developers of projects, facilities, and activities on or near airports. **Table O-4** identifies the land uses that are not recommended and acceptable according to this FAA guidance.

Table O-4 – FAA Hazardous Wildlife Attractants On or Near Airports

Land Use Guidance as Related to Wildlife Attractants
Typically not recommended within 10,000 feet of airports primarily serving turbine-powered aircraft:
1. New landfills (prohibited within 6 statute miles of airports) 2. Underwater waste discharges 3. Storm water management facilities (unless modified/designed so as to minimize attractiveness to wildlife) 4. Wastewater treatment facilities 5. Artificial marshes, stock ponds and recreational lakes 6. Wastewater discharge and sludge disposal 7. Wetlands that attract wildlife 8. Dredge spoil containment areas (if they contain materials that could attract wildlife) 9. Confined livestock operations (feedlots, dairy operations hog/chicken production facilities, etc.) 10. Aquaculture (unless they can show it does not pose a bird hazard) 11. Golf courses (allowed if they develop a program to reduce wildlife attractiveness)
Typically not recommended within 5 mile radius of airport:
1. Any items listed above if they would cause wildlife movement across approach/departure surface. 2. New wastewater treatment facilities 3. New golf courses 4. New landfills
Typically compatible with airports:
1. Enclosed trash transfer stations 2. Composting operations (yard waste; does not include food/municipal solid waste) 3. Recycling centers 4. Construction and demolition debris facilities 5. Fly ash disposal

Source: FAA AC 150/5200-33B

Certificated airports under FAR Part 139 that have detected wildlife hazards are required to complete a year-long Wildlife Hazard Assessment (WHA) and associated Wildlife Hazard Mitigation Plan (WHMP). The purpose of this study is to provide the airport with information to identify hazardous species/attractants, prevent future strikes and evaluate wildlife risk level. The WHA identifies the observed wildlife species, identifies attractants, hazards and

provides recommendations to reduce wildlife hazards. The WHMP develops a plan to mitigate wildlife risks. The WHA required to be completed by a qualified wildlife biologist. WHA/WHMP requirements are an FAA priority and are trickling down to general aviation airports.

Existing and Future Conditions

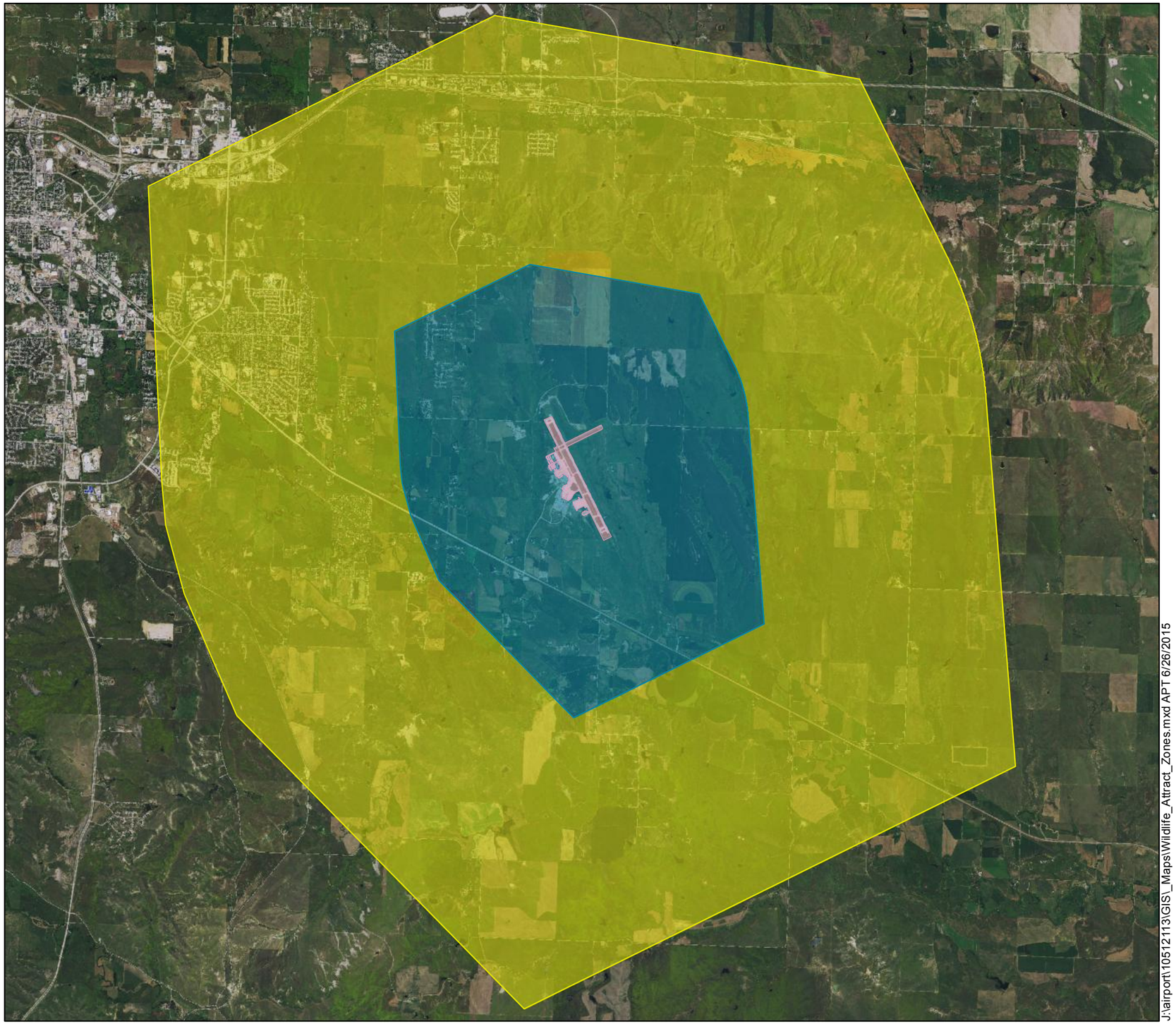
Wildlife, particularly birds, is of concern for aircraft operating within the central migration flyway in which Rapid City Regional Airport is located. Activity by migrating birds is especially intense during spring and fall migration periods and extra vigilance to monitor bird numbers and movements is required of pilots, the Rapid City Regional Airport FAA Air Traffic Control (ATC) Tower, and approach/departure radar operators located at Ellsworth Air Force Base. Rapid City Regional Airport is operated according to the requirements of a 2003 Wildlife Hazard Management Plan. This plan was prepared using data on actual wildlife activity recorded in a Wildlife Hazard Assessment prepared by the USDA Wildlife Services.

It is important to note that the Wildlife Hazard Assessment and Wildlife Hazard Management Plan focused on wildlife activity within Rapid City Regional Airport property, whereas land use compatibility, the subject of the present effort, deals primarily with land surrounding the Airport. Where land use compatibility is addressed in the Wildlife Hazard Management Plan, the action specified is that the Airport Director would be vigilant regarding development proposals that may cause the attraction of wildlife activity near the Airport. The 2010 Land Use Compatibly Plan identified several features that need to be monitored:

a. Wetlands and stock ponds around Airport property
b. Drainage area for Rapid Creek south of the Airport (approximately 5,700 feet from Runway 32)
c. Waste water treatment plant (approximately 12,700 feet from Runway 32)
d. Potential golf course and housing development along Rapid Creek south of the Airport
e. Planting of corn and other incompatible row crops next to Airport property

In discussions with Airport Management a, b and c are items that the Airport monitors. The potential golf course and housing development (item d) was not constructed and the airport monitors this situation. For item e (planting of corn or other crops) the Airport continues to work with the local land owners to ensure that wildlife concerns are at a minimum.

A new Wildlife Hazard Assessment is currently underway; it is being conducted by Loomacres. Discussions with Loomacres revealed that as of June 2015, the quarterly reports have been completed and they have noted Canadian Geese in the corn fields around the airport (particularly during migration season). Loomacres is working with South Dakota Game Fish & Parks and the U.S. Fish & Wildlife Service to determine control and hazing options.



Legend

- Aircraft Operations Area
- Wildlife Critical Zone (10,000 feet)
- Wildlife General Zone (5 miles)

N

0 5,000 10,000 20,000 Feet

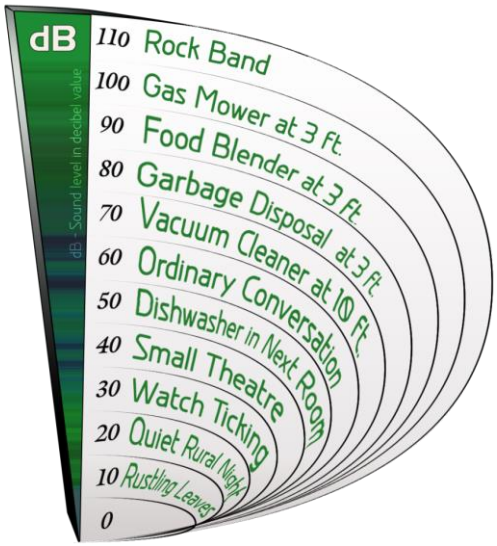
*Intended for Planning Purposes Only

KLJ

Rapid City Regional Airport
Rapid City, South Dakota
Wildlife Attractant Zones
Exhibit O-1

Noise

The noise element is focused on minimizing the number of people exposed to high frequency aircraft noise and high event levels of aircraft noise. Noise emitted from aircraft can affect the well-being of persons living or working near an airport. While there are several effects of aircraft noise upon people, the most common is annoyance. Annoyance can be defined as the overall adverse reaction of people to noise. Other effects of aircraft noise include sleep disturbance and speech interference. Noise affects each individual differently.



COMMON SOUNDS AND THEIR ASSOCIATED DECIBEL LEVELS

Noise analysis for airports is typically conducted using FAA's Integrated Noise Model (INM) software. The noise measurement recommended by FAA for use in the analysis of aircraft noise is the Day-Night Average Sound Level (DNL). The DNL is defined as the average annual weighted sound level produced by aircraft at a location during a 24-hour period. It is not a measure of an individual noise event. An additional 10 decibel (dB) weight is applied to aircraft noise occurring between 10 p.m. and 7 a.m., when aircraft noise is more likely to create an annoyance. Land use compatibility guidelines for DNL average sound levels has been established by FAA for residential, public, commercial manufacturing and recreational land uses. The FAA has accepted a maximum of 65 dB DNL as the threshold of concern for noise impacts over residential areas without mitigation. The FAA has determined that a significant noise impact would occur if a detailed noise analysis indicates an action would result in an increase of 1.5 dBs or greater within the DNL 65 dB contour over a noise sensitive area.

Federal Aviation Regulation (FAR) Part 150 *Airport Noise Compatibility Planning* identifies rules and guidelines and authorizes Federal financial assistance for the preparation of airport noise compatibility programs. FAR Part 150 is a voluntary program that airports may complete to seek compatible land uses. The Part 150 Study process identifies aircraft traffic mix, creates Noise Exposure Maps, identifies land use incompatibilities around the airport as a result of noise exposure, and recommends measures to mitigate existing and prevent future land use incompatibilities as part of a Noise Compatibility Program.

Existing & Future Conditions

The Rapid City Regional Airport chose not to complete noise analysis as part of this Airport Master Plan. The 2010 Land Use Compatibility Plan used the noise contours which were developed out of the 2008 Airport Master Plan. The 2008 Airport Master Plan developed two noise contours 2005 and 2025. Both the 2005 and 2025 noise contours do not extend off of airport property. ***There are no incompatible land uses within the noise contours***.

Airport Compliance related to Land Use

Airports that receive FAA funds are subject to FAA grant assurances (obligations). These assurances typically last a period of 20 years since the last FAA grant was accepted by the airport sponsor. Land identified for use as an airport is also subject to conditions. Currently, there are 39 grant assurances identified by FAA. FAA has published Order 5190.6B *Airport Compliance Manual* to assist FAA personnel and airport sponsors to maintain compliance with grand and land obligations. Airports that do not abide by grant assurances are subject to withholding of FAA grant funding.

Common airport compliance issues relating to land use include non-aeronautical land uses, airport land releases and "through-the-fence" operations.

Non-Aeronautical Use of Airport Property

Airport property is to be used for aeronautical purposes. In order for an airport to develop land for non-aeronautical use, the FAA must first approve of the change in airport property use from aeronautical to non-aeronautical. All airport property is identified in the Exhibit "A"/Airport Property Map.

Land Releases

To maintain compatibility, airports may release land to de-obligate land identified on their Exhibit "A"/Airport Property Map from federal requirements. FAA will consider a release, modification, reform, or amendment of any airport agreement to the extent that such action has the potential to protect, advance, or benefit the public interest in civil aviation. Such action may involve only relief from specific limitations or covenants of an agreement or it may involve a complete and total release that authorizes subsequent disposal of federally obligated airport property. Major considerations in granting approval of a release request include:

- The reasonableness and practicality of the sponsor's request,
- The effect of the request on needed aeronautical facilities,
- The net benefit to civil aviation,
- The compatibility of the proposal with the needs of civil aviation.

Common types of release requests include:

- **Concurrent Use:** If aeronautical land is to remain in use for its primary aeronautical purpose but also used for a compatible revenue producing non-aeronautical purpose, no formal release request is required. This is considered a concurrent use of aeronautical property and requires FAA approval. Aeronautical property may be used for a compatible non-aviation purpose while at the same time serving the primary purpose for which it was acquired. An example is the concurrent use of runway clear zone land and low growing crops to generate revenue, or a manufacturing facility under the Part 77 airspace surfaces on airport property.

- **Request for Change in Use:** For releases other than land, such as a request for change in use from aeronautical to non-aeronautical, the sponsor must begin with a formal request signed by an authorized FAA official addressing the major considerations.

- **Sale or Disposal of Airport Property:** If the airport desires to remove property from the land obligated in the ALP and Exhibit "A"/Airport Property Map, they would need to request a total release permitting sale or disposal of federally obligated land. In addition to the requirements of a request for change in use, the airport sponsor must address several elements identified in FAA Order 5190.6B including fair market value, net proceeds, and benefits to the airport. FAA consent shall be granted only if it is determined that the property is not needed for present or foreseeable public airport purposes.

Through-the-fence Operations

Agreements that permit access to the airfield by aircraft based on land adjacent to, but not a part of, the airport property are commonly referred to as a "through-the-fence" operation (even though a perimeter fence may not be visible). "Through-the-fence" arrangements can encumber[6] the airport property and reduce an airport's ability to meet its federal obligations.

The FAA compatibility guidelines on through-the-fence operations depends on whether they are related to off-airport aeronautical businesses or property used as a residence.

Off-Airport Aeronautical Businesses

As a general principle, the FAA does not support airport requests to enter into any agreement that grants "through-the-fence" access to the airfield for aeronautical businesses that would compete with an on-airport aeronautical service provider such as a Fixed-Based Operator (FBO). Exceptions may be granted on a case-by-case basis where operating restrictions ensure safety and equitable compensation for use of the airport and subordinate the agreement to grant assurances and grant agreements.[7]

Residential Property

The most up-to-date guidance on through-the-fence access to residential property comes from section 136 of the FAA Modernization and Reform Act of 2012 and a July 2013 FAA Policy Statement.[8] Commercial service airports are not permitted to enter into residential through-the-fence arrangements. These standards will be applied, on a case-by-case basis, in FAA's evaluation of whether each airport with existing residential through-the-fence access meets the above requirements to the fullest extent feasible for that airport.

Existing Conditions

Rapid City Regional Airport property is officially identified in Exhibit "A"/Airport Property Map. Airport property is designed for aeronautical use unless otherwise approved by FAA. Airport facilities directly relating to the use of or supporting aviation are considered to be aeronautical. Facilities should be used for available for aeronautical purposes. For this

---

[6] What occurs with "Through-the-Fence" arrangements is that often times access is granted with no viable means of the airport being compensated for the use of airport facilities. Any time that through-the-fence is considered the airport must assure that compensation rates are sufficient, commensurate with similar property uses on the airport, and adjustable at the discretion of the airport over time.
[7] FAA Order 5190.6B, *FAA Airport Compliance Manual*
[8] Airport Improvement Program (AIP): Policy Regarding Access to Airports From Residential Property (76 FR 42419; July 16, 2013)

review, existing facilities directly tied to the South Dakota Army National Guard are considered aeronautical in nature.

There are no incompatible land uses on the Rapid City Regional Airport.

Recommendations

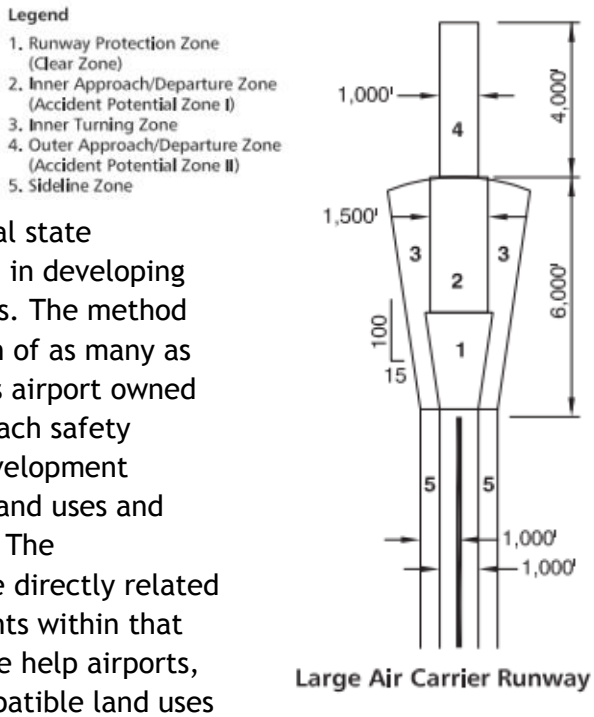
Recommendations to promote airport compatibility include:

- **Identify potential non-aeronautical land uses in the Airport Layout Plan and Exhibit "A"/Airport Property Map for FAA review and approval.**
- **Continue to control development that occurs on airport and consult with FAA as needed to verify compliance with FAA rules and regulations.**

Other Land Use Resources

Communities typically use FAA airport design standards and safety compatibility guidelines developed by state aeronautical agencies to formulate safety policies. A good source for safety compatibility guidelines is the California Airport Land Use Planning Handbook. The guidelines in this document have been used as the foundation for land use compatibility planning nationwide. Several state aeronautical agencies have adapted it for use in developing their own airport land use planning handbooks. The method used in these handbooks involves the creation of as many as six safety compatibility zones that encompass airport owned property and lands surrounding the airport. Each safety compatibility zone is assigned compatible development criteria involving acceptable and prohibited land uses and acceptable maximum development densities. The development criteria for each safety zone are directly related to noise levels and the risk of aircraft accidents within that zone. These identified standards and guidance help airports, communities and jurisdictions prevent incompatible land uses around airports.

EXAMPLE CALIFORNIA AIRPORT LAND USE COMPATIBLITY ZONES



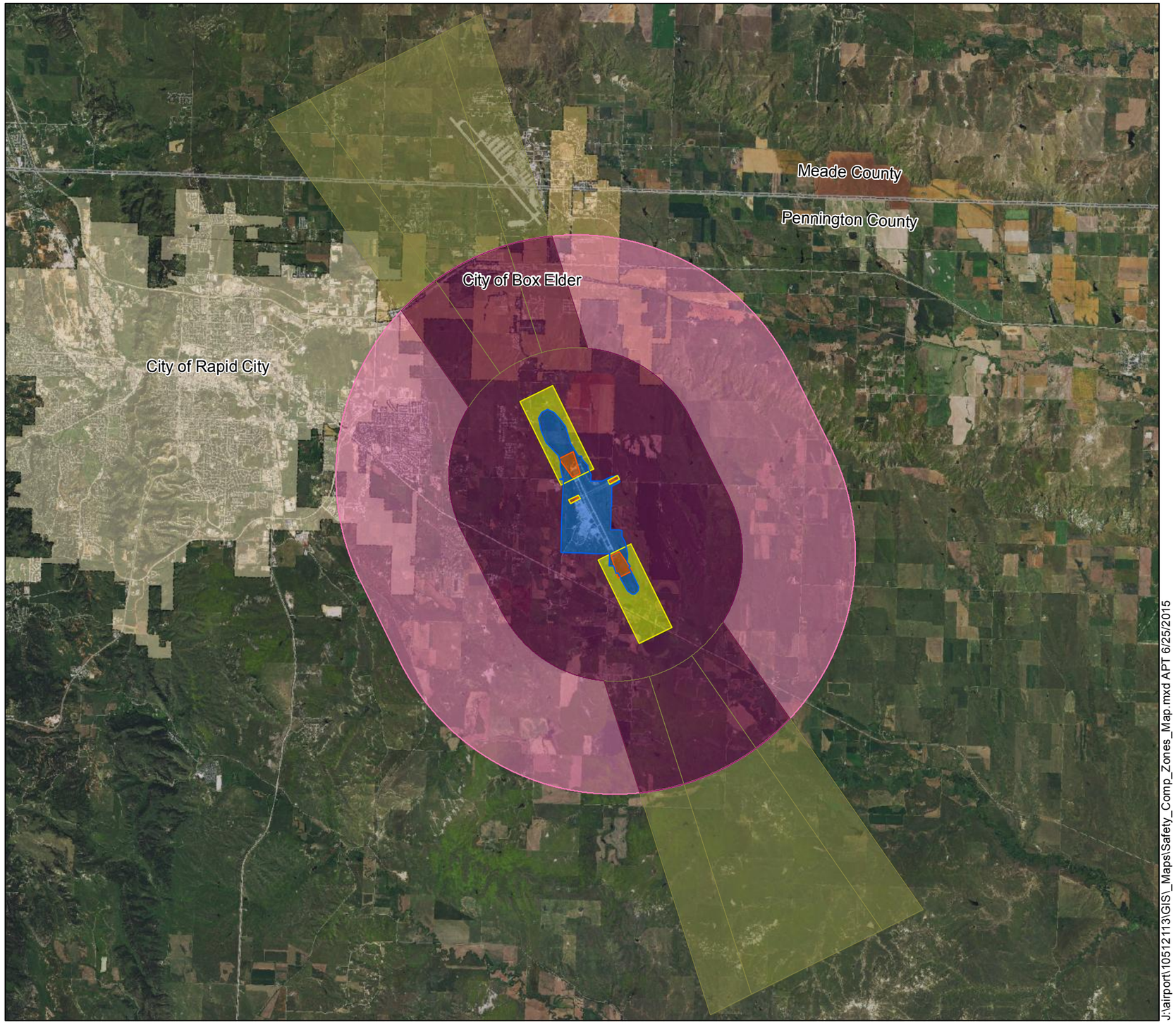
Airports and States have recognized the need to protect land use around airports beyond the Runway Protection Zones. Some states including California, Washington and Minnesota have developed land use compatibility guidebooks and created minimum airport zoning standards. Minnesota, for example, requires a minimum level of land use and airspace zoning to receive aviation funding. No such minimum land use standards exist in South Dakota.

Summary of Land Use Controls

The 2010 Land Use Compatibility Plan recommended that Rapid City, City of Box Elder, Pennington County and Meade County adopt the Safety Compatibility Zones identified in **Exhibit O-2**. The zones are described in further detail in **Table O-5**. ***Adherence to these summarized land use controls should continue***.

Table O-5 – Safety Compatibility Zone Criteria

Safety Zone		Maximum People Per Acre		Additional Criteria	
		Average	*Single Acre*	Unacceptable Uses	Other Development Conditions
1	Runway Protection Zone	Not Applicable	Not Applicable	• All structures except ones with location set by aeronautical function • Assemblages of people • Storage of hazardous materials • Hazards to flight	• Airport should acquire fee ownership of land within RPZ's or acquire adequate land use control through avigation easements
2	Inner Approach/Departure Zone	25	50	• Children's schools, child care centers, libraries, hospitals and nursing homes • Above ground bulk storage of hazardous materials • Highly noise-sensitive outdoor non-residential uses • "Hazardous Wildlife Attractants" as defined by FAA AC 150/5200-33B • Commercial Wind Energy Systems • Hazards to flight	• Locate structures maximum distance from extended runway centerline • Critical community infrastructure facilities generally unacceptable • Maximum of one dwelling unit per 10 acres • Minimum lot size of 10 acres
3	Circling Traffic Pattern Protection Zone	150	450	• Highly noise-sensitive non-residential uses • "Hazardous Wildlife Attractants" as defined by FAA AC 150/5200-33B • Commercial Wind Energy Systems • Hazards to flight	• Children's schools, hospitals, nursing homes and similar uses should be avoided • Major spectator-oriented facilities, amphitheaters, concert halls generally unacceptable
4	Precision Flight Corridor Zone	No Restriction		• Commercial Wind Energy Systems • Hazards to flight	• Major spectator-oriented facilities, amphitheaters, concert halls generally unacceptable
5	Aviation Hazard Zones	No Restriction		• "Hazardous Wildlife Attractants" as defined by FAA AC 150/5200-33B • Commercial Wind Energy Systems • Hazards to flight	



J:\airport\1051211 3\GIS_Maps\Safety_Comp_Zones_Map.mxd APT 6/25/2015

Legend

- ZONE 0 = Airport Property
- ZONE 1 = Runway Protection Zone
- ZONE 2 = Inner Approach/Departure
- ZONE 3 = Circling Traffic Patterns
- ZONE 4 = Precision Flight Corridor
- ZONE 5 = Aviation Hazards
- Rapid City Jurisdiction
- Box Elder Jurisdiction
- County Lines

N

0 7,500 15,000 30,000 Feet

*Intended for Planning Purposes Only

KLJ

Rapid City Regional Airport
Rapid City, South Dakota
Safety Compatibility Zones
Exhibit O-2

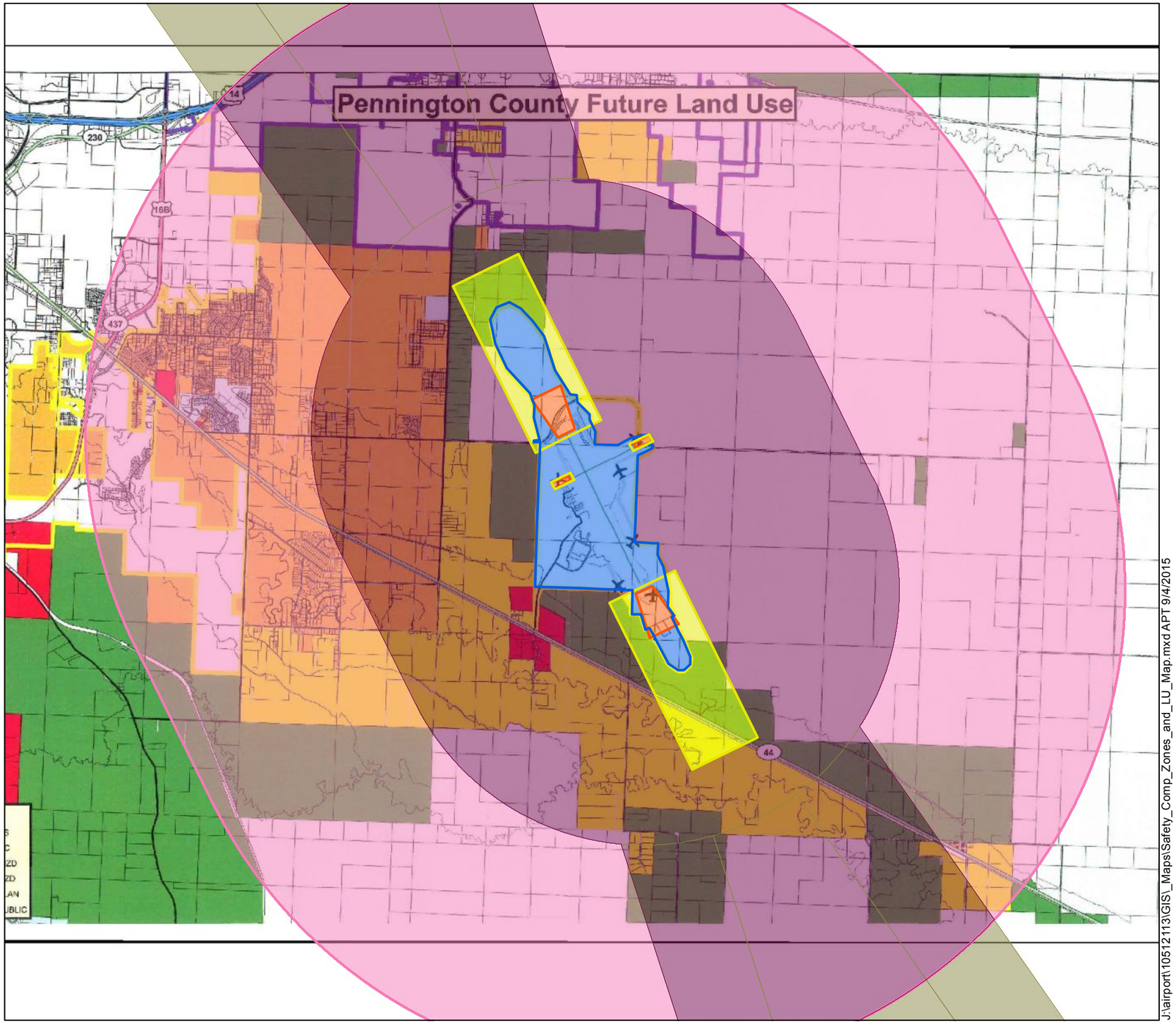
Comprehensive Planning Review

Jurisdictions develop comprehensive plans to direct land use and community infrastructure to best serve the overall population. The airport is both an infrastructure element and existing land use within several jurisdictions. As noted from many of the previous exhibits, for the airport to function safely and efficiently, land use far beyond the airport property must be considered. This final section of this Appendix will simply identify the comprehensive planning in place in the various jurisdictions. Any recommendations for changes, which often have been made previously may be repeated in this section.

Surrounding Land Use Overview

The Rapid City Regional Airport is situated in an agricultural area with residential developments in various locations to the west of the airport. Terrain is generally grasslands with low plateaus, ravines and broad valleys.

The Airport is part of Rapid City, but is surrounded by unincorporated parcels in Pennington County. The Box Elder city limits lie less than a mile north of the Airport property line and Meade County is located approximately 5 miles north of the Airport property line. Consequently, plans within the following jurisdictions were reviewed: Rapid City, Box Elder, Pennington County and Meade County. Surrounding land uses/zoning as compared with Airport Land Use zones are identified in **Exhibit O-3.**



Safety Compatibility Zones

- ZONE 0 = Airport Property
- ZONE 1 = Runway Protection Zone
- ZONE 2 = Inner Approach/Departure
- ZONE 3 = Circling Traffic Patterns
- ZONE 4 = Precision Flight Corridor
- ZONE 5 = Aviation Hazards

County Land Use Zoning Area

- General Agriculture
- Limited Agriculture
- Low Density Residential
- Surburban Residential
- General Commercial

City Limits

- Box Elder - City Limits
- Rapid City - City Limits

N

0 3,000 6,000 12,000 Feet

*Intended for Planning Purposes Only

KLJ

Rapid City Regional Airport
Rapid City, South Dakota
Safety Compatability Zones
and Land Use
Exhibit O-3

Comprehensive Development Plans

"Plan Rapid City" Comprehensive Plan

Rapid City adopted their Comprehensive Plan in April 2014 (http://planrapidcity.com/images/uploads/documents/Rapid_City_Comprehensive_Plan_Adopted_April_2014_with_Maps__Appendices.pdf). This comprehensive land use plan provides for the orderly development of Rapid City by using seven core values. These seven core values are listed below and items specific to the Airport[9] are included:

1. A balanced pattern of growth
    - No items specific to the Airport
2. A vibrant, livable community
    - Extending the City's core near East Omaha Street to the Airport (ref LC-1.3B)
    - Future Interstate 90 connection to Rapid City Regional Airport (ref LC-1.3C)
3. A safe, healthy, inclusive, and skilled community
    - Avoid development in airport encroachment zones, as established by the Rapid City Regional Airport Master Plan Land Use Compatibility Plan, which poses immediate or long-term risks to flight safety or building occupants, such as tall buildings, excessive reflectivity or lighting, landscaping that attracts wildlife, wind turbines, landfills, and residential or high-occupancy uses. Pursue the future relocation of Long View Road/Radio Tower Road to a location outside of the airport's Runway Protection Zone to enhance safety and compatibility of this roadway with airport operations. (ref SHIS-2.1C)
4. Efficient transportation and infrastructure systems
    - Invest in additional infrastructure to include the Rapid City Regional Airport in the City's water and wastewater systems, and to support additional growth and development at the airport and in the nearby areas. (ref TI-1.2D)
    - Preserve opportunities to expand the Rapid City Regional Airport to the east, and support the development of facilities near the airport, in accordance with the Rapid City Regional Airport Master Plan, that take advantage of air service and help expand the intermodal freight network. (ref TI-3.1D)
    - Use the Rapid City Regional Airport Master Plan to guide future capital and facility improvements at and near the airport. Pursue a future connection between Interstate 90 and the airport, in cooperation with Box Elder. Enhance this future access corridor in a manner similar to other gateways, as designated on the Future Land Use Plan. Also, pursue the future relocation of Long View Road/Radio Tower Road to a location outside of the airport's Runway Protection Zone. (ref TI-3.1H)
    - Coordinate with railroad providers, the Rapid City Regional Airport, and other regional stakeholders to enhance the regional rail network to improve rail access and effectiveness for the region and to minimize rail impacts, such as noise and delays, to the local community. (ref TI-3.2A)
5. Economic stability and growth

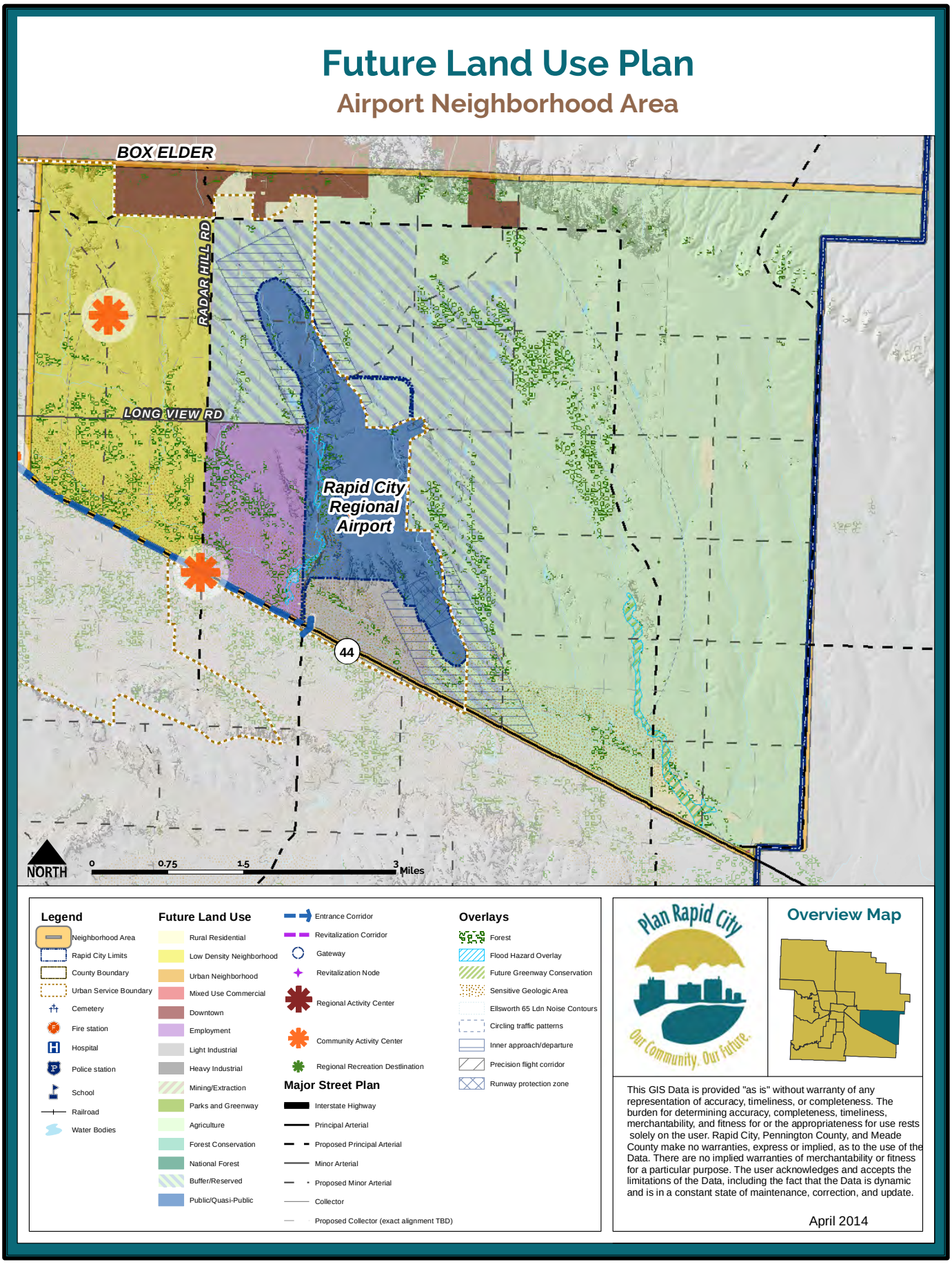
[9] Reference numbers included are from the 2014 Rapid City Comprehensive Plan

- No items specific to the Airport

6. Outstanding recreational and cultural opportunities
    - No items specific to the Airport
7. Responsive, accessible and effective governance
    - No items specific to the Airport

Exhibit O-4 is an excerpt of the Future Planning Exhibit for the airport area. As can be seen from this exhibit the area surrounding the airport is anticipated to either remain compatible with the airport by staying agricultural (green), reserved (green/blue diagonal),or become a focus employment area (purple), which will also be compatible with airport operations. The orange asterisk designates a future Community Activity Center (i.e. a focal point within the community identified for neighborhood retail type uses), and this activity is also compatible with the Airport.

Exhibit O-4 - Comprehensive Plan - Airport Study Area



Source: 2014 Rapid City Comprehensive Plan

City of Box Elder

The City of Box Elder does not have a comprehensive plan. The city does have a zoning map, but it does not include the Rapid City Regional Airport.

Pennington County Comprehensive Plan

Pennington County adopted their comprehensive land use planning document in 2003 (http://docs.pennco.org/docs/PZ/comprehensiveplan.pdf). This report discusses the airport sparingly, mainly focusing on connecting a passenger rail line (called Dunrail[10]) from the Rapid City Regional Airport to Whitewood, SD. No future plans regarding the airport were discussed and the maps/exhibits did not specifically call out airports within the County.

Meade County Comprehensive Plan

Meade County adopted their comprehensive land use planning document in 2010 (http://static1.1.sqspcdn.com/static/f/893024/16991533/1331088386503/MeadeCountyComprehensivePlan.pdf?token=mSxkRMF%2FYwsqDHSAGyl2sR4i%2BFA%3D). The Meade Comprehensive Plan does not specifically discuss the Rapid City Regional Airport in the plan, but it does mention that noise attenuation guidelines for construction of habitable dwellings and construction of buildings in elevated noise areas would be established by the Department of the Navy.

Regional Transportation Plans

Long Range Transportation Plan

The Rapid City Metropolitan Planning Organization (MPO) is in the process of updating the Long Range Transportation Plan in 2015. This is done every five years. The plan is referred to as RapidTrip2040 and information regarding the plan can be found at http://www.rapidtrip2040.com. The plan assesses the needs and desires of users of the regional transportation system and provides project recommendations. KLJ and the airport have provided input to the MPO for projects in the Long Range Transportation Plan.

Special Surface Transportation Study

In 2012 the Pennington County Highway Department, Rapid City Metropolitan Planning Organization and the Federal Highway Administration developed CHAPS (Connecting Hills and Plains Study- http://www.sddot.com/transportation/highways/planning/specialstudies/docs/11-096PennFinalReport.pdf). This report looked into ways to provide for the anticipated transportation needs (mostly roads) for Pennington County. Specific long range plans within this document call for Long View Road to be paved east of the airport and for better bus service to the Airport. ***Discussion should be had to incorporate the relocation (outside of future RPZ) of Long View Road into the long range plans***.

[10] Dunrail was a plan to provide a passenger rail system for tourism and transportation purposes in support of development in the Deadwood area. The project would have connected Rapid City with Whitewood SD but was identified as abandoned by 2008.

Summary Recommendations

Recommendations to promote safety compatibility include:

Overall

- **Ensure that Rapid City, Pennington County, Meade County and Box Elder fully adopt the 2010 Land Use Compatibility Plan.**

Wildlife Hazards

- **Implement the recommendations of the WHA/WHMP completed for the Rapid City Regional Airport for specific areas of concern for wildlife hazards.**
- **Land uses should be restricted through the local zoning, plan review and permitting process to reduce the risk of wildlife strikes.**

Appendix P - Environmental

Introduction

FAA Advisory Circular 150/5070-6B, Airport Master Plans, includes an environmental review as one of the elements of effective planning. The purpose behind this element of the airport master planning process is to help the sponsor thoroughly evaluate airport development alternatives and to provide information for subsequent environmental processing.

This environmental review is not intended to fulfill the requirements of environmental review required by National Environmental Policy Act (NEPA) or provide a definitive determination of whether an Environmental Assessment may be required for the proposed improvements. The purpose of this environmental review is to provide community, airport sponsor, and regulatory awareness of the importance of minimizing the environmental impacts of proposed airport development and to provide a general indication of the likely need for further investigation.

The proposed improvements have been identified in the Capital Improvement Program for Rapid City Regional Airport, found in **Chapter 6 – Implementation**. Unless otherwise noted, the remaining actions described in **Chapter 6 – Implementation** are anticipated to require a Categorical Exclusion.

Environmental Categories

Descriptions of the impacts associated with the proposed improvements are discussed by the impact categories identified in FAA Order 1050.1E, Environmental Impacts: Policies and Procedures. Additional consultation regarding the proposed improvements would be warranted in the future.

Impact Categories

Air Quality

Rapid City Regional Airport is not located in a Clean Air Act non-attainment or maintenance area. The emission inventories at the Airport are at low operation levels and are not likely to predict pollutant discharges high enough to cause degradation to the existing air quality. Temporary increases due to construction will be mitigated through the use of Best Management Practices (BMPs).

Coastal Resources

The project area is not located in a coastal zone as defined in the Coastal Zone Management Act of 1972. No further analysis is required.

Compatible Land Use

Compatible land uses are those that typically are not influenced by normal airport operations. The compatibility of existing land uses in the vicinity of an airport is usually associated with the extent of noise impacts off of airport property and safety concerns, such as whether the area contains land uses that would attract hazardous wildlife.

FAA AC 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports, recommends wildlife attractants be located 10,000 feet away from airport operation areas for turbine-powered aircraft. Land uses that could be considered wildlife attractants may include small wetlands, freshwater ponds, and agricultural crops that surround the Airport. See Attached **Exhibit P-1:** ***United States Fish and Wildlife Service (USFWS) National Wetlands Inventory Map***. Rapid Creek located approximately 1.14 miles southwest of the airport could also considered a wildlife attractant.

Construction Impacts

Specific impacts are anticipated to occur as a result of construction activities. These include impacts such as noise from construction equipment on the site, noise and dust from delivery of materials, and potential water pollution from erosion. These impacts are temporary and do not usually produce long-term impacts.

The proposed improvements at the Rapid City Regional Airport may involve activities that would produce some amount of airborne material or dust, temporary construction noise, and short-term water quality impacts. Mitigating measures to control and limit the amount of dust would be required by the project specifications, as recommended by the South Dakota Department of Environment and Natural Resources (SD DENR).

Overall, construction impacts associated with the proposed improvements would be minimized through the use of BMPs. Further, the Contractor responsible for the proposed improvements would be advised of the provisions in Advisory Circular 150/5370-10E, Standards for Specifying Construction of Airports, Item P-156 Temporary Air and Water Pollution, Soil Erosion, and Siltation Control, and the need to abide by these specifications throughout the construction of the proposed projects. No further analysis is required.

Department of Transportation Act Section 4(f)

Federal Law 23 CFR 774, commonly known as Section 4(f) of the Department of Transportation Act of 1966, as codified in the 49 U.S.C. § 303, provides that the Secretary shall not approve any program or project which requires the use of publicly-owned land from a public park, recreation area, or wildlife and waterfowl refuge of national state, or local significance, or land of an historic site of national, state, or local significance as determined by the officials having jurisdiction thereof, unless: (1) there is no feasible or prudent alternative to the use of such land, and (2) such program or project includes all possible planning to minimize harm resulting from the use.

There are structures located on the Airport that are 50 years old and so therefore could be potentially eligible for the NRHP. There are no publicly owned lands from parks, recreation areas, refuge areas, or historic sites within the vicinity of the proposed improvements. However, further review regarding potential historic sites may be required at the environmental documentation phase.

Farmlands

The Farmland Protection Policy Act of 1981 provides protection to prime and unique farmlands. The Act defines prime farmland as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses. Unique farmland is farmland that is used for production of specific high value food, feed, and fiber crops.

Information from the Natural Resources Conservation Service (NRCS) Web Soil Survey, **Exhibit P-2: Farmland Classification Map**, for Pennington County, SD indicates the land on and adjacent to the airport property contains some areas classified as prime farmland if drained. NRCS Form AD-1006, Farmland Conversion Impact Rating, would need to be completed for any land being purchased to determine the level of impacts to farmland. Section 658.4(c)(3) of the Farmland Protection Policy Act (FPPA) states that sites receiving a score totaling 160 or more be given increasingly higher levels of consideration for protection. No farmland is being acquired and so no further analysis will be required.

Fish, Wildlife, and Plants

Pursuant to the Fish and Wildlife Coordination Act, if the proposed improvements would affect water resources (i.e. wetlands; groundwater; impoundment, diversion, deepening, controlling, modifying, polluting, dredging, or filling of any stream or other water body), then consultation with the US Fish and Wildlife Service (USFWS) and the state agency having administration over wildlife resources must be initiated.

In addition, threatened and endangered species are protected under the Endangered Species Act. This Act requires federal agencies to ensure that any action funded or carried out by such agencies is not likely to jeopardize the continued existence of any federally-listed endangered or threatened species or species proposed to be listed, or likely to result in the destruction or adverse modification of habitat of such species which is determined to be critical by the Secretary of the Interior. In accordance with Section 7 of the Endangered Species Act, consultation with USFWS to determine the potential for occurrences of federally-listed threatened and endangered species in the project area would be necessary. Prior to project implementation, further analysis is required to identify the potential for fish, wildlife and plant impacts as a result of the project.

Floodplains

Floodplains constitute lands situated along rivers and their tributaries that are subject to periodic flooding on the average interval of 100 years or less. The Airport is located in an area that has a .2% annual chance of flood as well as areas that have a 1% chance of annual flood, as shown on the attached **Exhibit P-3: FEMA FIRM Map** (Panel 46103C0812H).

Hazardous Materials, Pollution Prevention, and Solid Waste

FAA Order 5050.4B requires an analysis of the proposed improvements and their associated solid waste impacts as they relate to waste from the airfield development, waste from terminal area development, and the location of local waste disposal facilities.

The proposed improvements at Rapid City Regional Airport are not likely to produce any significant increases in solid waste collection, control, or disposal, other than what is associated with construction activity. The Airport Manager has not recorded any spills and no signs or evidence of any spills are prevalent upon visual examination, so there are no hazardous materials believed to be in the area. If hazardous materials are encountered project work will be suspended in the impacted area and the SDDENR will be notified within 24 hours. No further analysis is required.

Historical, Architectural, Archaeological, and Cultural Resources

Section 106 of the National Historic Preservation Act of 1966, as amended, requires that federally funded projects be evaluated for the effects on historic and cultural properties included in, or eligible for listing in, the National Register of Historic Places. The Archaeological and Historic Preservation Act of 1974 provides for the survey, recovery, and preservation of significant scientific, prehistoric, archaeological, or paleontological data when such data may be destroyed or irreparably lost due to a federal, federally licensed, or federally funded project.

Before a project that involves land disturbance is implemented, an analysis to identify the potential for cultural resources would need to be conducted for the project area. Coordination with the State Historic Preservation Office (SHPO) is necessary for projects involving land disturbance. Additionally, any project affecting buildings that have the potential to be listed in the National Register of Historic places would require coordination with SHPO. Further analysis is required prior to project implementation, including a Class III survey.

Light Emissions and Visual Impacts

Light emissions from the various types of lighting installed on an airport can be a potential annoyance for people living or working in the vicinity of the installation. Simple shielding, changing a beam angle, or considering the location of lighting systems can avoid such an annoyance. The proposed improvements may include additional lighting for Runways and also may include updates to lights presently there. These lights are not anticipated to significantly increase light emissions or cause visual impacts to the area. The aesthetic value of an area is influenced by its landscape and the viewer's response to the view, scenic resource, or man-made feature. No visual impacts are anticipated. No further analysis is required.

Natural Resources and Energy

Impacts on energy supplies and natural resources are related to changes of stationary facilities, such as airfield lighting or terminal building heating and expansion, as well as any increase of fuel consumption by aircraft or ground vehicles. Proposed improvements at Rapid City Regional Airport would require additional energy, but are not anticipated to cause impacts to energy supplies or natural resources. No further analysis is required.

Noise

Noise emitted from aircraft can significantly affect the well-being of people living or working near an airport. The FAA requires noise studies for certain projects. If a project involves

Airplane Design Groups I and II and have forecasted operations of less than 90,000 annual propeller operations or 700 annual adjusted jet operations, than no further noise analysis is required. Rapid City Regional Airport does not exceed the annual propeller operations but does exceed the annual adjusted jet operations, therefore a noise analysis may be required.

Secondary (Induced) Impacts

Induced impacts primarily involve the potential for induced or secondary impacts on surrounding communities. The proposed improvements are not anticipated to significantly affect shifts in patterns of population movement and growth or public service demands. The proposed improvements are not anticipated to encourage growth in the community. No further analysis would be required for secondary impacts.

Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks

Social impacts from a project depend on how that project affects the character, habits, and economic conditions of the people living within the affected area of the project. The project's effects on business, employment, transportation, utilities, etc. are factors that affect the social climate of a community. Any action that would either adversely or beneficially affect the factors stated above would be considered as having some type of social impact on the residents of a particular community. The proposed improvements do not have the potential to result in social impacts. No further analysis is required.

Water Quality

The Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, provides the authority to establish water quality standards, control discharges into surface and subsurface waters, develop waste treatment management plans and practices, issue permits for discharges (Section 402) and for dredged or fill material (Section 404).

Airport activities can affect water quality. This is mainly due to stormwater runoff from paved areas. Providing treatment for stormwater runoff from runway and taxiway areas through the use of best management practices and grassed swale areas would minimize potential impacts to water quality.

A General Permit for Storm Water Discharges Associated with Construction Activities may be required from the SD DENR for the proposed improvements if the area of disturbance exceeds one acre. Permit requirements would need to be reviewed during the environmental documentation phase. Further coordination with the SD DENR may be needed.

Wetlands

Wetlands are defined in Executive Order 11990, Protection of Wetlands, as those areas that are inundated by surface or groundwater with a frequency to support, and under normal circumstances does or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Three parameters that define a wetland as outlined in the US Army Corps of Engineers Wetland Delineation Manual are hydric soils, hydrophytic vegetation, and hydrology.

Analysis of the National Wetlands Inventory data indicates the presence of wetlands within the study area. Please refer to **Exhibit P-1: *USFWS National Wetlands Inventory map***. Wetlands in the area would serve a variety of functions, including groundwater recharge, flood control, sediment removal, and nutrient cycling. A wetland delineation and coordination with applicable resource agencies may be necessary prior to project implementation to further analyze the impacts the proposed improvements would have on wetlands. Further analysis is required.

Wild and Scenic Rivers

The Wild and Scenic Rivers Act of 1968, as amended, identified rivers within the United States that are eligible to be included in a system afforded protection, which are free flowing and possessing outstandingly remarkable scenic recreational, geologic, fish and wildlife, historic, cultural or other similar values. Rapid City Regional Airport is not located near a wild or scenic river. Therefore, no further analysis is required.

Environmental Summary

Table P-1 - Environmental Review Summary, summarizes the potential environmental impacts identified in the prior sections of this appendix. This table is intended to give a general indication of the likely need for further environmental analysis. According to this table, additional environmental investigation is necessary to determine possible impacts associated with the proposed improvements.

At the appropriate time, the FAA would decide whether, and to what extent, any additional investigation would be performed. Based on the findings of this environmental review, it is estimated that further environmental analysis is required for the proposed improvements at Rapid City Regional Airport.

Table P-1 - Environmental Review Summary

Impact Category	Further Analysis Required (*)
Air Quality	*
Coastal Resources	
Compatible Land Use	
Construction Impacts	
Department of Transportation Act Section 4(f)	
Farmlands	
Fish, Wildlife, and Plants	*
Floodplains	
Hazardous Materials, Pollution Prevention, and Solid Waste	
Historical, Architectural, Archaeological, and Cultural Resources	*
Light Emissions and Visual Impacts	
Natural Resources and Energy Supply	
Noise	
Secondary (Induced) Impacts	
Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks	
Water Quality	*
Wetlands	*
Wild and Scenic Rivers	

Exhibit P-1 - USFWS National Wetlands Inventory map

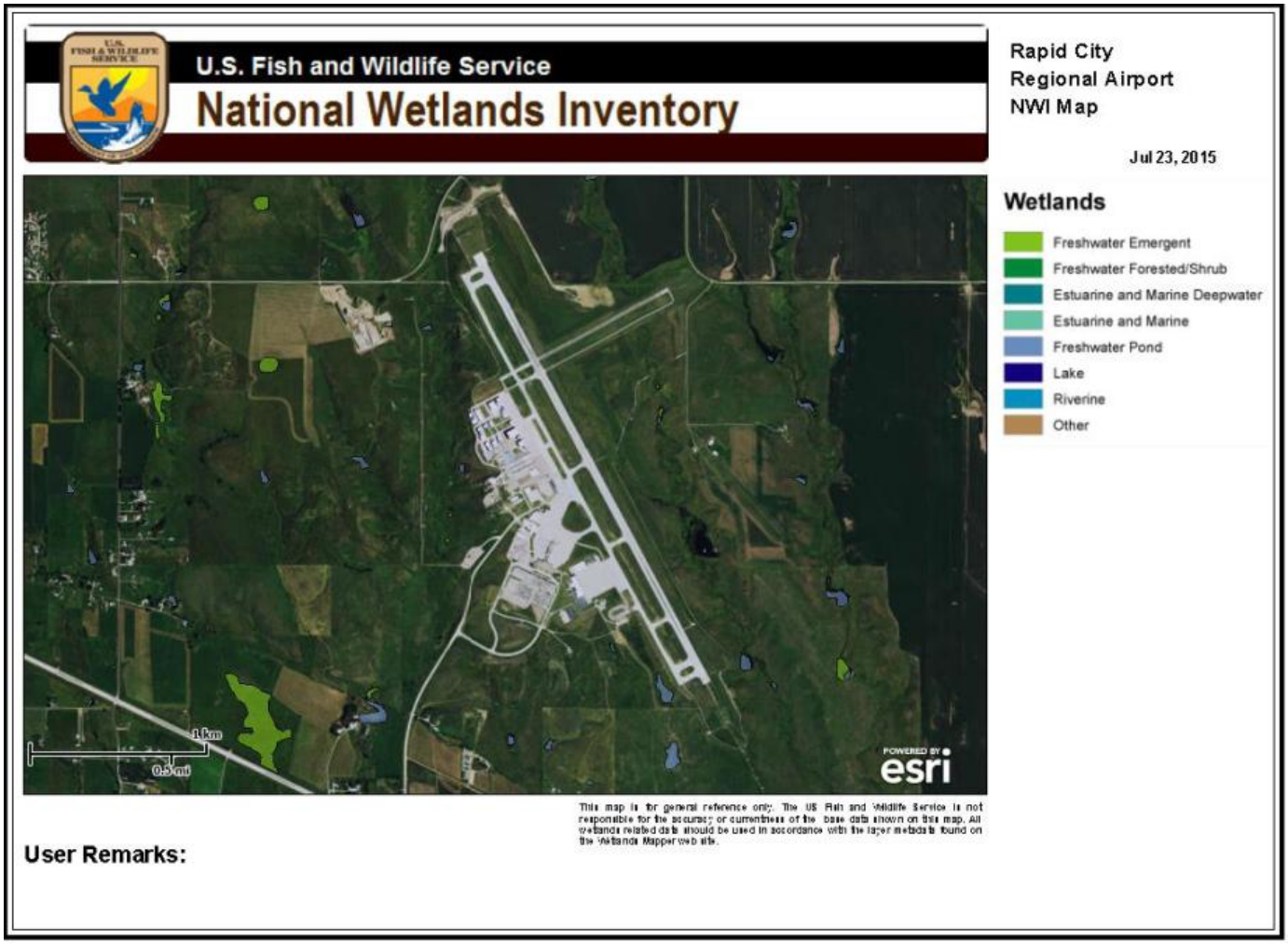
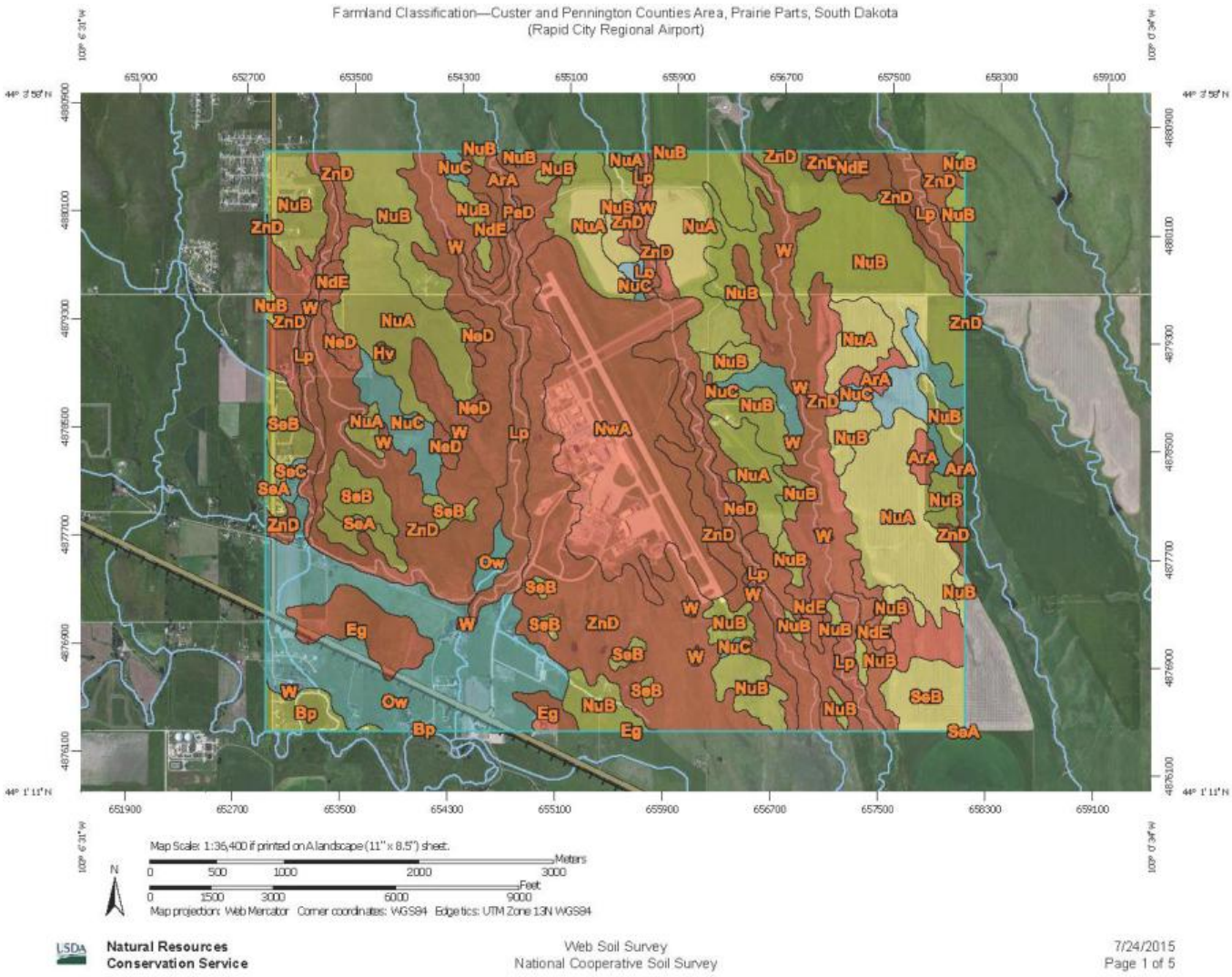


Exhibit P-2 - Farmland Classification Map



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Points

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Water Features

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Custer and Pennington Counties Area, Prairie Parts, South Dakota
Survey Area Data: Version 6, Sep 25, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 28, 2011—Sep 10, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — Custer and Pennington Counties Area, Prairie Parts, South Dakota (SD606)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
ArA	Arvada loam, 0 to 3 percent slopes	Not prime farmland	51.4	0.9%
Bp	Bridgeport silt loam	Prime farmland if irrigated	42.4	0.8%
Eg	Egas silty clay loam	Not prime farmland	107.4	1.9%
Hv	Hoven silt loam	Not prime farmland	4.1	0.1%
Lp	Lohmiller silty clay, channeled	Not prime farmland	349.2	6.3%
NdE	Nihill gravelly loam, 6 to 40 percent slopes	Not prime farmland	71.8	1.3%
NeD	Nihill very gravelly loam, 0 to 25 percent slopes	Not prime farmland	58.8	1.1%
NuA	Nunn loam, 0 to 2 percent slopes	Prime farmland if irrigated	763.4	13.8%
NuB	Nunn loam, 2 to 6 percent slopes	Prime farmland if irrigated	922.9	16.7%
NuC	Nunn loam, 6 to 9 percent slopes	Farmland of statewide importance	181.8	3.3%
NwA	Nunn-Urban land complex, 0 to 3 percent slopes	Not prime farmland	510.4	9.2%
Ow	Owanka clay loam	Farmland of statewide importance	460.1	8.3%
PeD	Pierre clay, 6 to 20 percent slopes	Not prime farmland	3.5	0.1%
SeA	Satanta loam, 0 to 2 percent slopes	Prime farmland if irrigated	42.3	0.8%
SeB	Satanta loam, 2 to 6 percent slopes	Prime farmland if irrigated	195.0	3.5%
SeC	Satanta loam, 6 to 9 percent slopes	Farmland of statewide importance	9.8	0.2%
W	Water	Not prime farmland	20.0	0.4%
ZnD	Zigweid-Nihill complex, 6 to 15 percent slopes	Not prime farmland	1,745.9	31.5%
Totals for Area of Interest			**5,540.2**	**100.0%**

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Exhibit P-3: FEMA FIRM Map

Appendix T - Terminal Facilities

Introduction

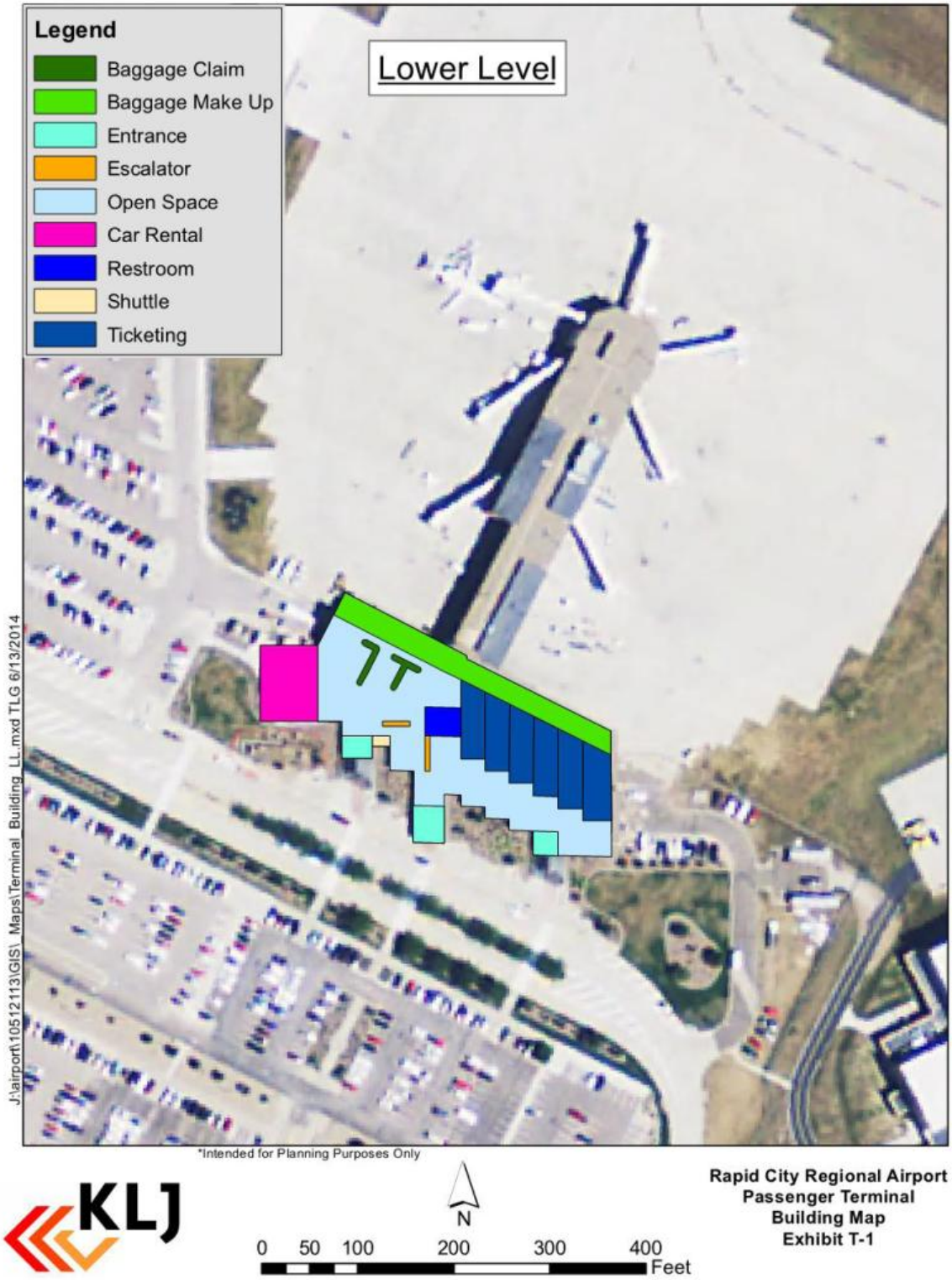
This appendix discusses the commercial service terminal and its supporting facilities. Existing issues are reviewed and current data, combined with forecast requirements, are used to establish the terminal design necessary to meet projected requirements.

Terminal Requirements

The passenger terminal area is located on the west side of the airport along the southern portion of the airports primary runway, Runway 14-32. The terminal area consists of the passenger terminal building, terminal curb front, commercial aircraft parking apron, the road network, public parking areas, car rental parking and servicing areas, and the airport administrative offices. The terminal area is accessed using Terminal Road. Parking is located in front of the terminal with public parking just south of the terminal, rental car parking west of the terminal and limited employee parking on the east end of the terminal. The majority of terminal employees park in a portion of the public parking lot to the south. Users can enter the lot either before or after the terminal curbside. The apron directly north of the terminal building is designated for airline use. Nine aircraft parking positions are marked on this pavement, with seven boarding bridge gates. The apron also provides for airline ground support equipment (GSE).

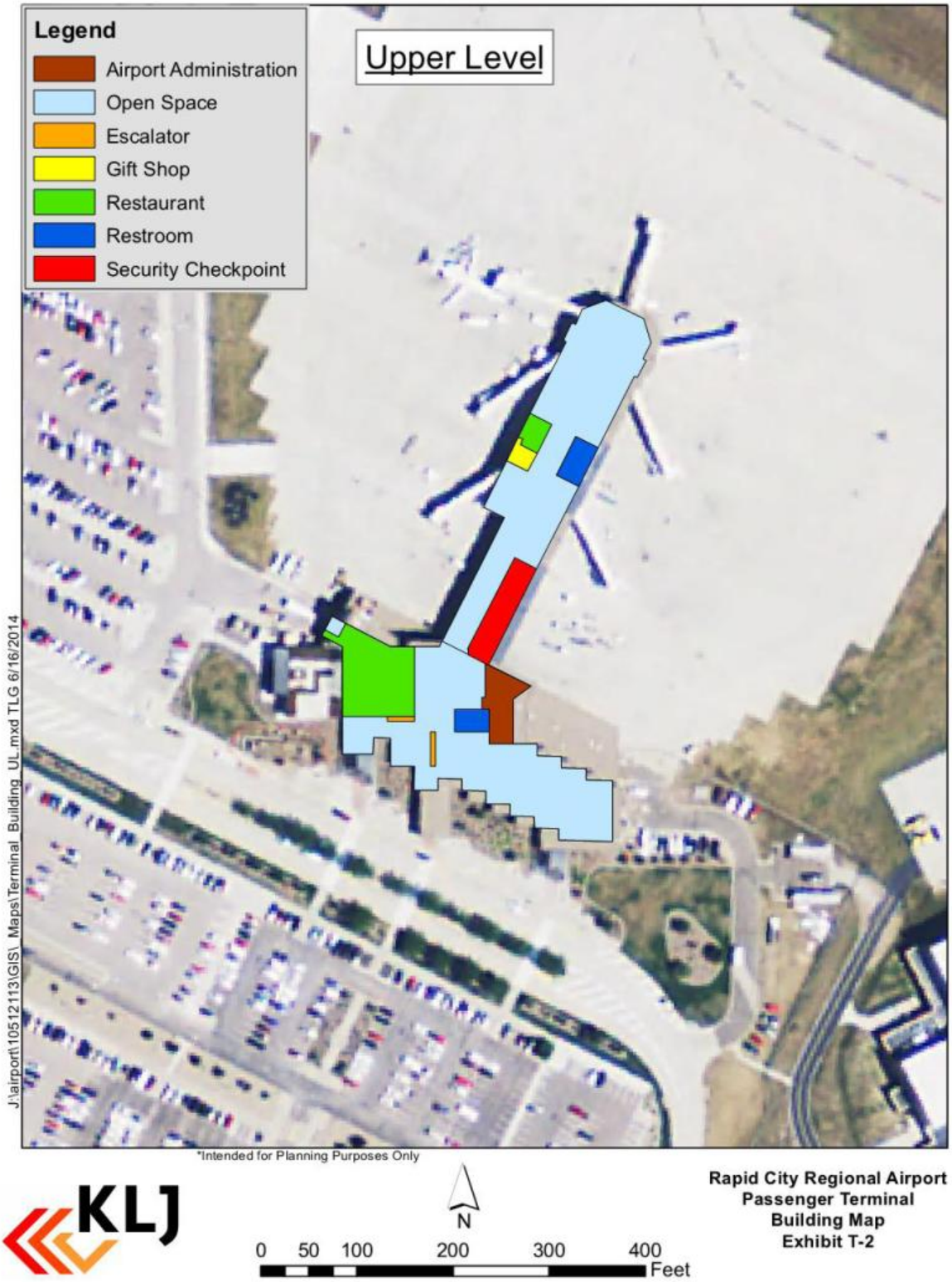
The Rapid City Regional Airport Terminal is two levels with one concourse totaling approximately 90,000 square feet. The terminal was constructed in 1989 and was designed to reflect the natural beauty of the surrounding area. A terminal renovation was completed in 2013. The renovation included three new boarding bridges with corresponding passenger seating areas, new TSA operations offices and expanded three lane security check point area, all new ADA restrooms, a new food cafe, an internet cafe, and a new gift shop. Renovation was done to existing offices, the six ticketing areas, a new kitchen and restaurant area, a fully remodeled baggage claim area, and a 3,000 square foot addition which includes a new rental car wing and upper level outdoor patio. Mechanical, electrical, IT and security components were also upgraded throughout the entire terminal. **Exhibit T-1 Passenger Terminal Building Map (Lower Level)** and **Exhibit T-2 Passenger Terminal Building Map (Upper Level)** present the types of uses in the terminal.

Exhibit T-1 Passenger Terminal Building Map (Lower Level)



Rapid City Regional Airport
Passenger Terminal
Building Map
Exhibit T-1

Exhibit T-2 Passenger Terminal Building Map (Upper Level)



Rapid City Regional Airport
Passenger Terminal
Building Map
Exhibit T-2

Passenger Terminal Building Requirements

Within the passenger terminal building, services are required for processing passengers arriving and departing on commercial flights. Enplaning services include ticketing, baggage, passenger service areas, and airline offices. Processing services typically include passenger and bag screening facilities operated by the Transportation Security Administration (TSA). Deplaning services include baggage claim, rental car counters, and parking prepay facilities. Other services necessary to plan for in a terminal building include concessions (restaurants and gift shops), restrooms, advertising and display areas, mechanical and utility rooms, and janitorial service and storage areas.

The Airport is currently served by Allegiant, American, Delta and United which offer twelve to twenty-one commercial flights per day with the higher number of flights in the summer tourism season.

The terminal building lower level provides airline ticket counters, passenger check-in, airline office space, passenger baggage claim, baggage handling, car rental counters and offices, and airport security offices. The upper level consists of airport administration office, passenger screening checkpoints, airport offices and conference room, and restaurant concessions and the terminal concourse area consisting of seven aircraft gates and hold rooms, restaurant and gift shop concessions. The following **Table T-1** breaks down the terminal space by category and building level. **Table T-3** provides a list of the existing and future space requirements.

The Transportation Research Board established a research program known as the Airport Cooperative Research Program (ACRP). One notable project from this has been ACRP Report 25 "Airport Passenger Terminal Planning and Design" which included Volumes 1 and 2 and spreadsheets. ACRP Report 25 Volumes 1 and 2 and Terminal Planning Spreadsheet and Design Hour Determination Spreadsheet were used to determine the size of the terminal. Applicable printouts from these spreadsheets are found at the end of this Appendix. The following discussion provides details on the facility requirements for the terminal at Rapid City Regional Airport.

Table T-1 - Passenger Terminal Space Breakdown

Passenger Terminal Space (Square Feet)			
Space Category	**Lower Level**	**Upper Level**	**Total**
Airline Exclusive			
Ticketing	2,640		2,640
Office/Work Area	3,350		3,350
Storage	6,270		6,270
Airline Common			
Ticket Queuing	3,487		3,487
Boarding Gates		8,644	8,644
Baggage Claim Area	8,800		8,800
Baggage Makeup (departing)	6,476		6,476
Baggage Sorting (arrival)	3,428		3,428
Airline Sub-Total	**34,451**	**8,644**	**43,095**
Public Space			
Ticket/Meeter Greeter	12,411	4,2001	16,611
Concourse Circulation		5,247	5,247
Restrooms	1,017	2,038	3,055
Public Sub-Total	**13,428**	**12,875**	**26,303**
Concessions Space			
Rental Car	1,554		1,554
Rental Car Queuing/Corridor	1,756		1,756
Restaurant/Food		5,476	5,476
Gift Shop		875	875
Concessions Sub-Total	**3,310**	**6,342**	**9,652**
TSA Space			
Office/Storage	651	224	875
Bag Inspection	With Airlines		
Security Checkpoint		5,666	5,666
TSA Sub-Total	**651**	**5,890**	**6,541**
Airport Management		2,408	2,408
Utility/Custodial	2,546	585	3,131
Total	**54,386**	**36,744**	**91,130**

Source: Rapid City Regional Airport

Passenger Enplaning Facilities

The terminal building serves multiple functions including general circulation, ticketing, passenger security screening, baggage screening, baggage claim, airport administration, concessions and restrooms. The terminal serves airlines and their affiliates; Allegiant Air, American Eagle, Delta Air Lines, Delta Connection (Compass Airlines, Endeavor Air, ExpressJet, SkyWest Airlines), United Airlines, and United Express (Republic Airlines, ExpressJet and SkyWest Airlines). While there are a variety of regional carriers which serve Rapid City it is important to note that arrangements with regional carriers are mostly made based upon aircraft type. A major airline contracts with several different regional carriers each with a certain mix of aircraft. Depending on the demand for services in a particular season or even a time of day, there will be different regional carriers flying into a single airport for one airline on any given day.

The terminal should provide ticket counter space and check-in kiosks for 5-6 airlines to accommodate the forecast activity levels and allow for future expansion.

Each airline will also require office space for administrative staff, employee break/locker areas, and air cargo offices. Space requirements for these are included in the calculations under the airline offices heading in **Table T-2**.

Additionally each airline will need baggage make-up space. This space includes the area needed to move the bags from the counters to the area where they are loaded onto carts to transport to the aircraft. Prior to, but adjacent to, these bag make-up spaces, a bag screening facility will need to be provided. This facility, operated by TSA, needs to be sufficient to accommodate the equipment and personnel necessary to screen peak-hour baggage.

The checked baggage at Rapid City Regional Airport is currently screened by TSA behind each ticket counter. There are dedicated pieces of equipment located behind each of the four ticket counters including Explosive Detection Systems and Explosive Trace Detectors. TSA staff must also reposition from one ticket counter to another. This current layout requires more staffing and more equipment and is not able to be augmented for heavy passenger loads. An in-line baggage screening system would be ideal allowing for optimized equipment and staffing and improved ability to augment to handle heavy loads. Determining the location of such an in-line baggage screening area and how baggage would be routed to and from this location is a challenge. The options available for the layout of an in-line baggage screening and makeup facility is detailed in **Chapter 5: Alternative Analysis** on pages 5-15 through 5-20.

Passenger Screening Checkpoint Facilities

Once passengers are ticketed, they proceed to the passenger-screening checkpoint. In 2013 there was expansion of the terminal which also included expansion of the screening checkpoint. There are currently three processing lane at the Airport with a theoretical capacity of accommodating up to 200 passengers per hour per lane. One lane has recently been dedicated to TSA Pre-Check. The screening checkpoint also includes an observation area for supervisory staff and a separate room for private screening.

Gate area

Once ticketed and through security, passengers proceed to the hold room/gate area to await aircraft boarding. This area is approximately 280 feet long by 85 feet wide for a total area of 17,128 square feet including concession and restrooms. This area requires sufficient seating for 60 percent of the peak-hour passengers. The space in the concourse is generally allocated as follows:

- 8,644 square feet for seating, departure podium and queuing
- 5,247 square feet for concourse circulation
- 1,812 square feet for concessions
- 1,425 square feet for restrooms

The passenger boarding bridges provide shelter from outside weather and are suitable for the turboprops, regional jets and narrow body jets which serve Rapid City Regional Airport. The boarding bridges are basic and are not equipped with HVAC for the corridor leaving the temperature roughly equal to the outside temperature in either summer or winter. The bridges have Ground Power Unit (GPU) connections but do not have other Ground Support Equipment (GSE) connections (i.e. potable water or pre-conditioned air).

Concessions

There are concessions located on each side of the security checkpoint. Prior to security screening there is a full service restaurant on the second level. This area is often used as meeters/greeters wait for their friends/family to arrive. It is also used by employees at the airport. There is not a gift shop area prior to security screening. On the secure side of the checkpoint is a gift shop and a café style restaurant with cold and heated food choices. This area is mostly used by passengers prior to departure.

Café inside Security

Baggage Claim

The baggage claim area for the Rapid City Regional Airport is on the lower level and is accessible to deplaning passengers by convenient stairs, an elevator and escalator. The area has two baggage conveyors but typically only one is used. There is also a doorway between the two baggage conveyors for large luggage items. Since it is between the two conveyors there is not a large amount of space for many oversize luggage items.

Baggage Claim

Rental Car

The rental car area was newly expanded at Rapid City with a 3,000 square foot building expansion in 2013. There are four counter areas with sufficient queuing space for passengers waiting in line for rental car services. The exit to the car rental spaces is a set of automatic sliding doors which are set perpendicular to each other rather than the typical in line configuration. The doors in this vestibule, which are each single sliding doors, do not allow much space for passengers to walk and also maneuver with luggage. Included in the vestibule are mailboxes, trash receptacles and express package drop off.

Rental Cars

Table T-2 - Terminal Space Requirements

Passenger Terminal Space							
		Existing	Base	Projected Need			
				PAL 1	PAL 2	PAL 3	PAL 4
Annual enplanements			256,191	275,634	296,254	318,133	341,298
Peak hour passengers			295	317	341	366	393
Peak hour airline departures			5.1	5.0	5.4	5.5	5.6
Facility Requirements							
Passenger Ticketing and Queuing	s.f.	6,127	4,357	4,788	4,949	5,119	5,300
Airline offices	s.f.	3,350	4,000	4,000	5,000	5,000	5,000
Airline baggage make-up	s.f.	6,476	5,700	5,900	5,900	8,100	8,100
Pre-Security Concessions	s.f.	4,530	2,500	2,750	2,960	3,180	3,380
TSA baggage screening	s.f.	1,155*	2,580	2,580	3,380	3,380	3,380
Circulation	s.f.	9,100	5,100	5,500	5,900	6,300	6,800
Total enplaning requirements	s.f.	**29,583**	**24,237**	**25,518**	**28,089**	**31,079**	**31,960**
Passenger security lanes	#	3	2	2	3	3	3
Screening area	s.f.	2,400	1,250	1,250	1,875	1,875	1,875
Passenger queuing area	s.f.	3,266	1,875	1,875	2,813	2,813	2,813
TSA Administration	s.f	875	600	600	800	800	800
Total security requirement	s.f.	**6,541**	**3,725**	**3,725**	**5,488**	**5,488**	**5,488**
Gates	#	7	6	6	6	7	7
Gate Seating Area	s.f.	8,644	6,200	6,600	6,600	6,600	8,400
Restrooms	s.f.	1,425	496	496	558	558	558
Concessions	s.f.	1,812	1,700	1,900	2,000	2,200	2,400
Circulation	s.f.	5,247	4,600	4,600	5,000	5,000	5,000
Total gate area requirement	s.f.	**17,128**	**12,996**	**13,596**	**14,158**	**14,358**	**16,358**
Concourse Exit Corridor	s.f.	1,390	1,390	1,390	1,390	1,390	1,390
Meeter/Greeter Waiting Area	s.f.	4,200	3,840	4,125	4,440	4,770	5,110
Baggage claim devices	#	2	2	2	2	2	2
Baggage claim/waiting area	s.f.	8,800	3,425	4,277	4,613	4,950	5,306
Airline baggage make-up	s.f.	3,428	3,400	3,400	3,400	3,400	3,400
Circulation	s.f.	3,311	3,070	3,300	3,500	3,800	4,100
Rental Car Counter Length	l.f.	66	66	66	66	8	82
Rental Car Counter Area	s.f.	651	648	648	648	810	810
Rental Car Customer Queuing	s.f.	1,756	1,200	1,200	1,200	1,500	1,500
Rental Car Offices	s.f.	903	900	900	900	1,125	1,125
Total deplaning requirement	s.f.	**24,439**	**17,873**	**19,240**	**20,091**	**21,745**	**22,741**
Airport Management	s.f.	2,408	2,408	2,408	2,408	2,408	2,408
Airline Storage/Break Area	s.f.	6,270	7,600	7,600	11,400	11,400	11,400
Mechanical/Electrical	s.f.	2,151	2,151	2,151	2,151	2,151	2,151
Restrooms	s.f.	1,630	680	748	748	816	884
Janitorial	s.f.	980	980	980	980	980	980
Total other requirement	s.f.	**13,439**	**13,819**	**13,887**	**17,687**	**17755**	**17,823**
Total terminal requirement	s.f.	**91,130**	**72,650**	**75,966**	**85,513**	**90,425**	**94,370**

Source KLJ, Rapid City Regional Airport
** Area is part of Airline Ticketing/Queuing*

Automobile and Ground Vehicle Access

The information regarding ground vehicle access is detailed in **Appendix J - Support Facilities.** In general access to the Terminal area is from South Dakota State Highway 44 via

Airport Road to Terminal Road. Terminal Road is a one way, multilane road which makes a complete loop around the parking areas and provides direct access to the Rental Car and Employee parking areas.

Automobile Parking

Motorcycles Parked during 2015 Sturgis Rally

Public automobile parking is provided in the lot on the southwest side of the passenger terminal. This lot has 881 parking spaces, 17 of which are handicapped accessible. To the immediate northwest of the terminal is a parking lot for rental cars with 340 spaces. The airport currently experiences limited parking for rental cars during the fleeting and de-fleeting time period in the spring and fall. A Rental Car Quick Turn Around Facility was added in 2014, which resulted in the loss of approximately 50 parking spaces, will exasperate the limited space during fleeting and de-fleeting. See **Table T-3** and **Exhibit T-3**.

Table T-3 Terminal Area Parking Needs

Terminal Area Parking						
	Existing		Projected Need			
		Base	PAL 1	PAL 2	PAL 3	PAL 4
Short Term*	312	193	208	224	240	258
Long Term*	709	452	486	523	561	602
Employee*	27	10	11	12	13	14
Rental	340	203	221	237	255	273
Total	1,388	858	926	996	1,069	1,147

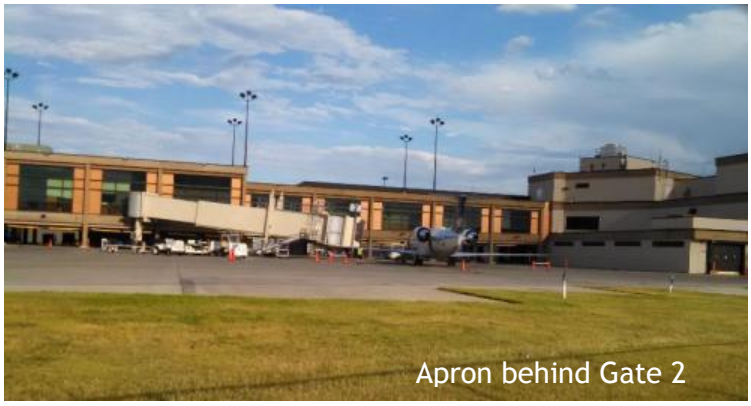
Source: KLJ, 2014

* Most employees in the terminal park in the short term and long term lots and not in the smaller employee lot.

Rental Car Parking

Terminal Apron

The existing commercial aircraft apron provides space for nine aircraft parking positions that can accommodate the variety of aircraft serving Rapid City Regional Airport. These are all designed for power-in, push-back aircraft operations. In addition, the terminal apron has space allocated for taxi lanes, area for ground servicing the aircraft, and storage of the ground service equipment (GSE).


Apron behind Gate 2

Recommendation

Gate 2 has a narrow apron behind the gate and therefore aircraft pushing back must be pushed past Gate 7 before being released. Squaring off this apron behind Gate 2 and also Gate 1 are included in the Capital Improvement Plan.

Deicing Facilities

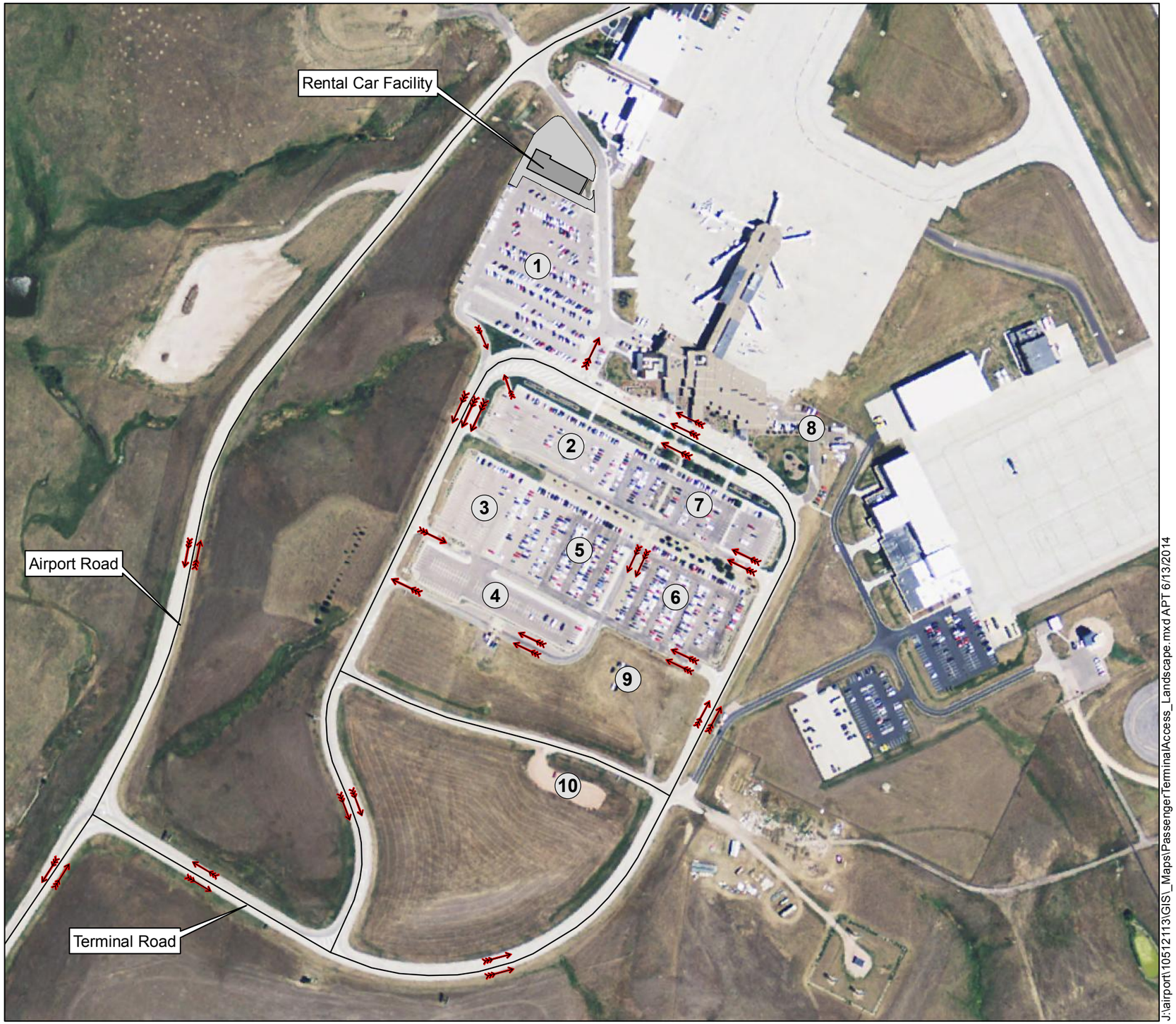
Deicing for Rapid City Regional Airport is conducted for the airlines on a portion of apron immediately north of the terminal apron and west of taxiway T1. The deicing is conducted by each individual airline with their own dedicated equipment. When the equipment is not in use or when it is warming up for use it is parked on the terminal apron at the north end of the terminal building adjacent to the baggage claim and car rental area of the terminal building.

Deicing fluids are stored in an area north of the terminal and west of the WestJet FBO complex. Each of the airlines maintains a storage tank for their deicing fluids. There are currently a total of six tanks for storing deicing fluids.

The deicing fluids are sprayed onto the aircraft and any excess fluid drains into the airports storm sewer system. The airport regularly monitors discharges from the storm sewer system in compliance with the Storm Water Discharge permit from the South Dakota Department of Environment and Natural Resources.

Recommendation

Additional deicing pads are necessary to provide sufficient space for airline winter operations. A layout of three deicing positions is identified in the Preferred Alternative and construction has been included in phases in the Capital Improvement Plan.



Legend

- Roadway Access Direction
- Roads
- Airport Property

Total Parking Spaces Available:
Public - 881
Employee - 167
Rental Car - 340

1. Rental Car Ready/Return (340 spaces)
2. Employee Parking (140 spaces)
3. Long-Term Parking (133 spaces)
4. Long-Term Parking (109 spaces)
5. Long-Tem Parking (238 spaces)
6. Long-Tem Parking (229 spaces)
7. Short-Term Parking (172 spaces)
8. Employee Parking (27 spaces)
9. Gravel Area for Overflow and Trailers/Buses
10. Cell Phone Lot

N

0 200 400 800 Feet

Intended for Planning Purposes Only

KLJ

Rapid City Regional Airport Pasenger Terminal Access and Parking Map Exhibit T-3

Appendix U: Airport Solid Waste & Recycling

Introduction

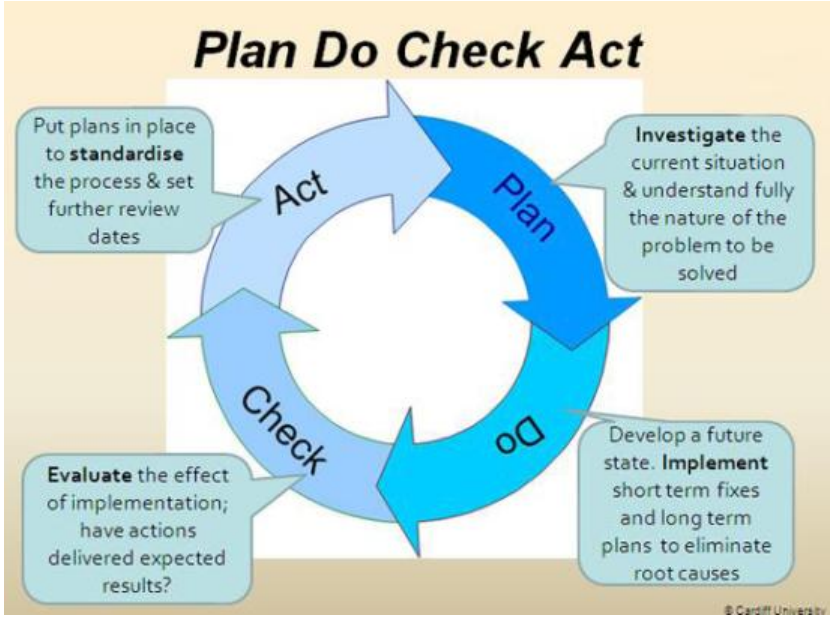
In the FAA Modernization and Reform Act of 2012 (Public Law 112-95), the Airport Improvement Program language was amended (49 USC Section 47106(a)) to include the evaluation of airport solid waste recycling. The change stipulates that the following issues will be addressed:

- Feasibility of Solid Waste Recycling at the Airport,
- Minimizing the Generation of Solid Waste at the Airport,
- Operation and Maintenance Requirements Related to Solid Waste,
- Review of Waste Management Contracts, and
- Potential Cost Savings or Generation of Revenue from Solid Waste Recycling.

To accomplish these objectives this appendix will include:

- Examination of Existing Solid Waste Handling and Recycling
    - Existing Practices including Operations and Maintenance Issues
    - Existing Waste Management Contracts
- Examination of Recycling Opportunities
- Alternatives to Minimize Generation of Solid Waste and
- Cost Savings/Revenue Potential from Recycling.

The FAA published "Recycling, Reuse and Waste Reduction at Airports – A Synthesis Document" April 24, 2013 which is an available resource for this plan. Please note, a Solid Waste Recycling plan is one element of an Environmental Management System (EMS). This appendix will not address all elements of an EMS but information regarding an EMS can be found in FAA AC 150/5050-8 "Environmental Management Systems for Airport Sponsors". The EMS concept follows the "Plan, Do, Check, Act" model which will also be the manner in which the Solid Waste Recycling can be continually evaluated and improved.



Existing Solid Waste Handling and Recycling

There are seven types of waste typically generated at an airport. These are: 1) municipal solid waste; 2) construction/demolition waste; 3) green waste; 4) food waste; 5) waste from aircraft flights; 6) lavatory waste; 7) spill cleanup/remediation waste; and 8) hazardous materials. These are further described in **Table U-1 - Waste Types**.

Table U-1 – Waste Types

Waste Types	
Waste Type	**Description**
Municipal Solid (MSW)	Consists of everyday items that are used and then discarded, such as product packaging, furniture, clothing, bottles, food scraps, and newspapers.
Construction /Demolition (C&D)	Generally categorized as MSW. However, as it can be a major component of airport waste, it has been separated into its own category in this document. C&D waste is any non-hazardous solid waste from land clearing, excavation, and/or the construction, demolition, renovation or repair of structures, roads, and utilities. C&D waste commonly includes concrete, wood, metals, drywall, carpet, plastic, pipes, land clearing debris, cardboard, and salvaged building components. In some instances, C&D waste may be subject to special requirements (e.g., tar impregnated roofing materials, asbestos containing building materials, etc.).
Green	Categorized as MSW and is also referred to as yard waste. Green waste consists of tree, shrub and grass clippings, leaves, weeds, small branches, seeds, pods and similar debris generated by landscape maintenance activities.
Food	Food that is not consumed or is the waste generated and discarded during food preparation activities. Food wastes are considered part of the MSW waste stream.
Deplaned	A type of MSW removed from passenger aircraft. These include bottles and cans, newspaper and mixed paper, plastic cups and service ware, food waste, food soiled paper, and paper towels. Waste that comes off the airplanes after flights can represent 20% of an airport's total municipal solid waste stream. The composition is roughly 30% each of paper waste, compostable food material, and non-recyclable materials, with the balance consisting of cups and beverage containers.
Lavatory	A type of special waste generated when the lavatory tanks of airplanes are emptied via hose and pumped into a lavatory service vehicle, which can be either a self-powered truck or a lavatory cart pulled by a tug. After the aircraft's lavatory tanks are emptied, they are refilled with a mixture of water and disinfecting concentrate, commonly called "blue juice." The lavatory waste removed from the aircraft is transported to a triturator facility, generally located airside near airline operations, for pretreatment prior to discharge to the sanitary sewage system and publicly owned treatment works (POTW). In the U.S., waste from international flights, except Canada, needs to be processed separately as the waste can potentially introduce plant pests and diseases. International waste is governed by the U.S. Department of Agriculture and must follow the handling procedures found in the Manual for Agricultural Clearance.
Spill Cleanup /Remediation	Another type of special waste. This is generated during cleanup of spills and/or remediation of contamination from various sites on an airport. Care must be taken to ensure that these waste materials are not co-mingled with other waste streams and that storage and disposal procedures comply with applicable regulatory requirements.
Hazardous	Must be handled in accordance with stringent federal regulations. Wastes designated as "hazardous" are covered by regulations outlining legal handling, treatment or disposal. Hazardous wastes are either specifically "listed" in the regulation (40 CFR 261.31-.33), or are ignitable, corrosive, toxic or reactive (as defined in 40 CFR 261.21 -.24). For details, see the Resource Conservation and Recovery Act ("RCRA") and its amendments and the regulations 40 CFR Subtitle C, Parts 260–270.

Source: FAA "Recycling, Reuse and Waste Reduction at Airports - A Synthesis Document" April 24, 2013

For the Rapid City Regional Airport waste is generated from the terminal area, construction projects and the general aviation area. This waste is generated from normal activities around the airport and collected by airport staff and various contractors.

Existing Practices

In the terminal area custodial services are provided by airport staff and solid municipal waste is collected by Kieffer Sanitation. The waste and recyclables collected in the terminal area include the public areas as well as individual leased space. Not all tenants who operate outside of the terminal area were interviewed but it was identified that a variety of solid waste haulers provide services at the airport. For existing conditions, KLJ contacted the airport staff, SDARNG personnel and the Rapid City Solid Waste staff.

Existing Terminal Waste/Recycling Receptacles

The lavatory carts for the airlines and FBO are disposed at a waste dump adjacent to the Airport Maintenance facility which is connected to the sanitary sewer. Used oil from the airport and tenants is taken by various private entities who primarily use the oil to heat buildings off the airport.

Existing Waste Management Contracts

The disposal of waste is a specialized service not regularly performed by airports. There are many solid waste haulers and recyclers in the Rapid City area so there are several choices for consumers to choose. Current information regarding solid waste haulers and recyclers is available at www.rcgov.org/Public-Works/solid-waste. The primary solid waste haulers and recyclers that collect trash from the airport are listed in **Table U-2 - Waste Management & Recycling Handlers**.

Table U-2 - Waste Management & Recycling Handlers

Waste Management & Recycling Handlers			
Type of Waste	**Contractor(s)**	**Containers/Locations**	**Tenants**
MSW	Keiffer Sanitation www.gokieffer.com	2 to 8 yds/Various 1-8 yd compactor/Terminal	Terminal & Various Tenants
	Red River Waste www.rrwastesolutions.com	4 and 8 yds/Various	Various Tenants
	Sander Sanitation Sandersanitation.com	Unknown	SDARNG
Plastic, Glass, Aluminum, Steel	Rapid City Solid Waste www.rcgov.org/Public-Works/solid-waste	1 recycling trailer/Fuel Farm	All
Paper & Cardboard	Pacific Steel & Recycling www.pacific-steel.com	Unknown	SDARNG
Grease (Restaurant)	A-1 Septic	Unknown	Restaurant
Oil/Diesel	Bill Reishus	Unknown	Airport & L&D
	Quality Transmission	Unknown	Airlines
	Lube Tech	Unknown	SDARNG
	Red Giant	2-55 gallon drums	FedEx

Source: Airport Staff & Tenants

Solid Waste and Recycling Opportunities

Terminal Area Tenants

In the initial assessment it was found that the airport provides 2 types of trash containers in the terminal for customers. One for waste using a dark can liner and one for recyclables using a clear can liner. All trash was collected from these containers and comingled in the terminal compactor. It was understood that when Kieffer Sanitation picked up this waste and transported it to the city's Municipal Recycling Facility (MRF) that the recyclables were then sorted out. In discussions with city staff it was determined that this is not occurring and all waste in the terminal compactor is being sent to the landfill. This being the case, the reason for the miss-information/miss-communication was not examined but the focus was on correcting recyclable handling so that it would be recycled.

Airport Tenants Outside of Terminal Area

Tenants who operate outside of the terminal area use various haulers to dispose of their solid municipal waste. Centralized recycling containers are available for all tenants to use which collect materials such as plastic, glass, steel and aluminum.

Airport Instituted Efforts in Minimizing the Generation of Solid Waste at the Airport

In addition to other solid waste/recycling, the Rapid City Regional Airport has also instituted a number of conservation measures regarding solid waste. All grass at the airport is mulched (in place) and on infrequent occasions when grass is collected it is composted with all other landscaping debris in an onsite composting area. When construction projects occur, any debris that can be reused in the project such as recycled asphalt it is reused when possible.

The Airport has also constructed a cell phone waiting lot which allows visitors to wait close to the terminal without having to circle through the pick-up/drop-off area. This conservation effort helps curb pollution from automobiles.

Areas Where Gains Can Be Made Within the Terminal Area

It is recommended that the Airport begin a new collection and sorting procedure for recyclables and solid waste. The waste/recycle streams are portrayed in **Exhibit U-1 Recommended Terminal Area Waste & Recycling Streams.** It is important to note that all planning for recycling must start with the "Disposal/Recycling Destination" in mind and must annually be reassessed in the event that the Disposal/Recycling Destination's change.

The Rapid City Regional Airport should recognize and establish four 'streams' for waste. These are based on the best way that recyclables can be handled to minimize cost and maximize revenue from recyclables. The four streams are:

Trash – all trash not otherwise identified as recyclable. Dispose in standard waste containers and process through a compactor for disposal at the Rapid City landfill.

Typical Recyclables – plastic, aluminum, steel and glass. These items can be comingled and are not affected by any moisture remaining in the container. The Rapid City Municipal Recycling Facility (MRF) can process these products through a single stream and sort them into marketable recyclables.

Example of Terminal Waste/Recycling Receptacles

Paper Products – newspaper, magazines, office paper. These products can be best collected with receptacles that have narrow slotted openings distinguishing these receptacles for paper only. These items are affected by moisture and cannot be comingled with other recyclables that may contain residual moisture. If paper products are exposed to moisture then the quality of the recyclable is lost and may result in landfilling all the paper exposed to moisture. The Rapid City MRF and other private recyclers can bale this into marketable recyclables.

Cardboard Products – boxes and other cardboard. Most cardboard at the airport is generated from deliveries and therefore can be collected by custodial staff with no specific containers for typical airport customers. These items are affected by moisture and cannot be comingled with other recyclables that may contain residual moisture. If cardboard is exposed to moisture then the quality of the recyclable is lost and may result in landfilling all the cardboard exposed to moisture. The Rapid City MRF and other private recyclers can bale this into marketable recyclables.

Example of Cardboard Container

The airlines serving Rapid City should be advised about these waste/recycling streams and asked to sort trash being generated on the aircraft into these same four streams. All terminal tenants should be advised of these waste/recycling streams and containers can be provided by the airport or tenant to facilitate sorting.

The airport should monitor this activity, measure as much as is practical and review/refine annually the waste/recycling handling.

In addition to waste recycling there are other opportunities for conservation such as low energy use lights, smart thermostat settings, electrical generation, geothermal heating. These items are not examined within this study but could be pursued in a comprehensive Environmental & Energy Audit.

Areas Where Gains Can Be Made Outside of the Terminal

Knowing the established waste streams in Rapid City, the airport can disseminate this information to all tenants and coordinate centralized containers or recycling efforts to divert recyclables out of the waste stream.

Other Methods Which Would Reduce Environmental Impacts of the Airport

1. Complete an energy audit to see where improvements in existing buildings could be made.
2. Encourage green building policies and practices. Explore the following methods:
    a. White roofs – reduce heat in the summer
    b. Solar wall heating – reduce cost to heat or cool buildings
    c. Wind and phot-voltaic renewable energy system

3. After one year complete a Comprehensive Waste Audit to assess volume of waste and recyclables and results of recycling program changes.

Potential Cost Savings

While exact numbers are not known at this time taking solid municipal waste, deplaned waste and several other wastes out of the waste stream should help reduce the cost for collection services paid by the Airport and its tenants. It is recommended that the Airport work with the solid municipal waste collectors to develop a baseline of trash and recyclables collected at the Rapid City Regional Airport. A monthly report would show potential areas of improvement and should lead to cost savings in trash collection.

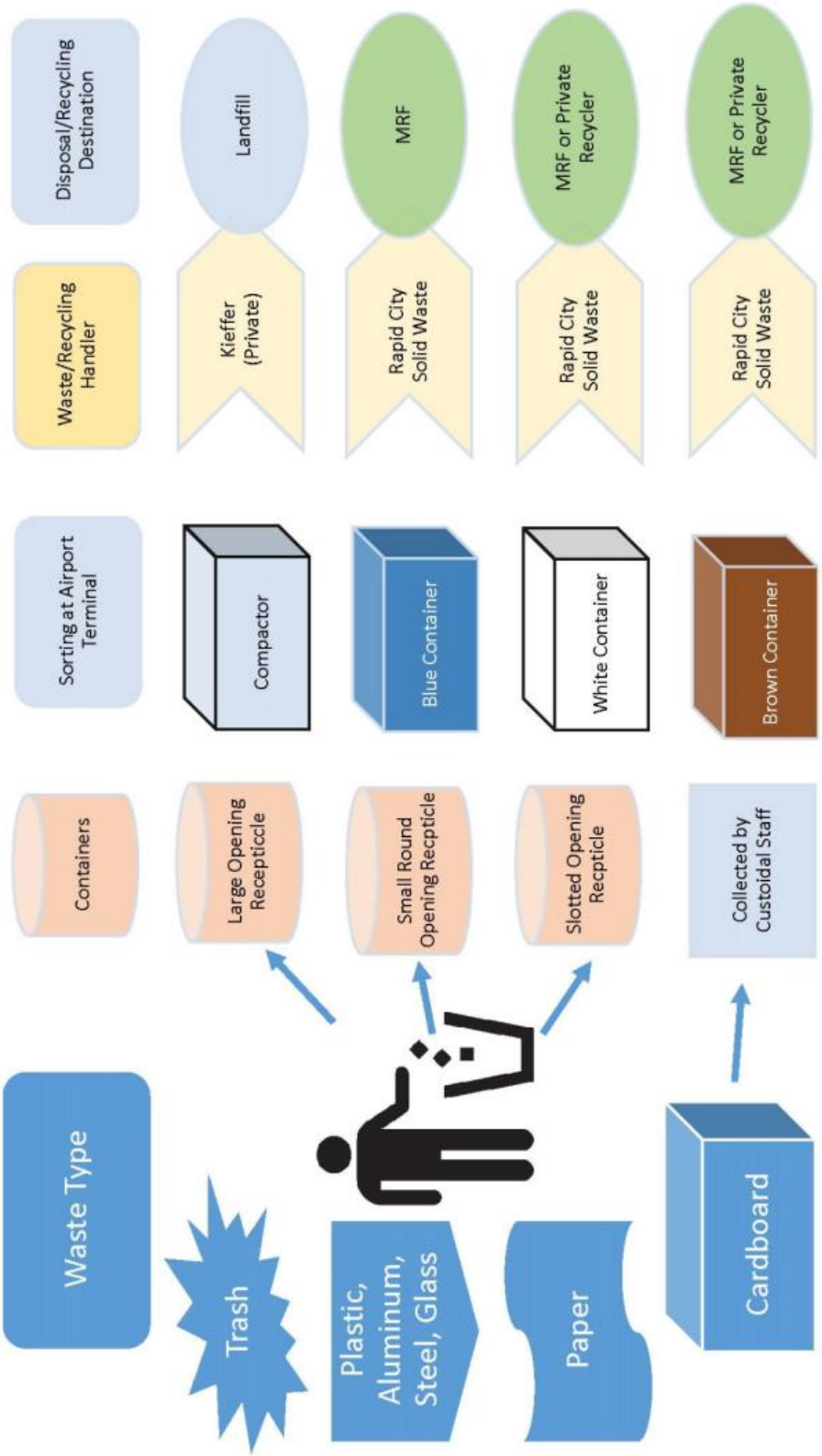



Exhibit U-1 – Recommended Terminal Area Waste & Recycling Streams for Rapid City Regional Airport