APPENDICES

APPENDIX A
AVIATION GLOSSARY OF TERMS

AVIATION GLOSSARY OF TERMS

Above Ground Level (AGL). An altitude that is measured with respect to the underlying ground.

Accelerate-stop distance available (ASDA). The runway plus stopway length declared available and suitable for the acceleration and deceleration of an airplane aborting a takeoff.

Administrator. Federal Aviation Administrator or any person to whom he has delegated his authority in the matter concerned.

Advisory Circular (AC). External communications or publications issued by the FAA to provide non-regulatory guidelines for the recommendations relative to a policy, and guidance and information relative to a specific aviation subject matter.

Air Carrier. A person or company who undertakes directly by lease, or other arrangement, to engage in air transportation.

Aircraft. A device that is used or intended to be used for flight in the air.

Airplane. An engine-driven fixed-wing aircraft heavier than air that is supported in flight by the dynamic reaction of the air against its wings.

- ***Large Airplane.*** An airplane of more than 12,500 pounds maximum certified takeoff weight.
- ***Small Airplane.*** An airplane of 12,500 pounds or less maximum certified takeoff weight.

Balloon. A lighter-than-air aircraft that is not engine-driven, and that sustains flight through the use of either gas buoyancy or an airborne heater.

Glider. A heavier-than-air aircraft that is supported in flight by the dynamic reaction of the air against its lifting surfaces and whose free flight does not depend principally on an engine.

Heavy Aircraft. Aircraft capable of takeoff weight of more than 255,000 pounds whether or not they are operating at this weight during particular phase of flight.

Helicopter. A rotorcraft that, for horizontal motion, depends principally on its engine-driven rotors.

Large Aircraft. Aircraft of more than 41,000 pounds maximum certified takeoff weight, up to 255,000 pounds

Regional Jet (RJ). There is no regulatory definition for an RJ; however, for FAA use, an RJ is a commercial jet airplane that carries fewer than 100 passengers.

Rocket. An aircraft propelled by ejected expanding gases generate in engine from self-contained propellants and not dependants on the intake of outside substances.

Rotorcraft. A heavier-than-air aircraft that depends principally for it support in flight on the lift generated by one or more rotors.

Small Aircraft. Aircraft of 41,000 pounds or less maximum certified takeoff weight.

Aircraft Accident Safety Zone. This zone represents data clusters of historical aircraft accidents. The data is collected from the NTSB and analyzed in several studies to first determine the shape of the zone based on the greatest cluster of accident sites per acre and second on the ratio of accidents per acre changes.

Aircraft Approach Category. An alphabetical classification of an aircraft based upon 1.3 times the stall speed in a landing configuration at their maximum certified 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 166 knots or more.

Aircraft Deicing Pad. *See Deicing Pad.*

Aircraft Operation. *See Operation.*

Aircraft Rescue and Fire Fighting (ARFF). A special category of fire fighting that involves the response, hazard mitigation, evacuation and possible rescue of passengers and crew of an aircraft involved in (typically) an airport ground emergency.

ARFF Building. A facility located at an airport that provides emergency vehicles, extinguishing agents, and personnel responsible for minimizing the impacts of an aircraft accident or incident.

Airplane. *See Aircraft*

Airplane Design Group (ADG). A numerical classification aircraft based on wingspan or tail height. Where an airplane is in two categories, the most demanding category should be used. The groups are as follows:

Group I: Up to but not including 49 feet wingspan or tail height up to but not including 20 feet. (e.g. Cessna 172)

Group II: 49 feet up to but not including 79 feet wingspan or tail height from 20 up to not including 30 feet. (e.g. Cessna Citation Business jet).

Group III: 79 feet up to but not including 118 feet wingspan or tail height from 30 up to but not including 45 feet. (e.g. Boeing 737)

Group IV: 118 feet up to but not including 171 feet wingspan or tail height from 60 up to but not including 66 feet. (e.g. Boeing 767)

Group V: 171 feet up to but not including 214 feet wingspan or tail height from 60 up to but not including 66 feet. (e.g. Boeing 747)

Group VI: 214 feet up to but not including 262 feet wingspan or tail height from 66 up to but not including 80 feet. (e.g. Airbus A380)

Table: Airplane Design Groups (ADG)

Group #	Tail Height (ft.)	Wingspan (ft.)
I	<20	<49
II	20 ≤30	49 ≤79
III	30 ≤45	79 ≤118
IV	45 ≤60	118≤171
V	60 ≤66	171≤214
VI	66 ≤80	214 ≤262

Airport. An area of land or water that is used or intended to be used for the landing and takeoff of aircraft, and includes its buildings and facilities, if any.

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 million pounds.

Certificated Airport. An airport that has been issued an Airport Operating Certificate by the FAA under the authority of FAR Part 139, Certification and Operation.

Commercial Service Airport. A public airport providing scheduled passenger service that enplanes at least 2,500 annual passengers.

General Aviation Airport. An airport that provides air service to only general aviation.

Hub Airport. An airport that an airline uses as a transfer point to get passengers to their intended destination. It is part of a hub and spoke model, where travelers moving between airports not served by direct flights change planes en route to their destinations.

Large Hub Airport. An airport that handles over 1% of the country's annual enplanements.

Medium Hub Airport. An airport that handles 0.25% ≥ 1% of the country's annual enplanements.

Small Hub Airport. An airport that handles 0.05% ≥ 0.25% of the country's annual enplanements.

Non-Hub Airport. An airport that handles over 10,000 enplanements, but less than 0.05% of the country's annual enplanements.

Incursions. *See Runway Incursion.*

International Airport. Relating to international flight, it means:

- An airport of entry which has been designated by the Secretary of Treasury or Commissioner of Customs as an international airport for customs service.
- A landing rights airport at which specific permission to land must be obtained from customs authorities in advance of contemplated use.
- Airports designated under the Convention on ICAO as an airport for use by international commercial air transport and/or international general aviation.

Primary Airport. A commercial service airport that enplanes at least 10,000 annual passengers.

Reliever Airport. General aviation airports in a major metropolitan area that provides pilots with attractive alternatives to using congested hub airports.

Uncontrolled Airport. An airport without an air traffic control tower at which the control of VFR traffic is not exercised. Pilots "see and avoid" other traffic without the aid of air traffic control.

Airport Authority. A quasi-government public organization responsible for setting the policies governing the management and operation of an airport or system of airports under its jurisdiction.

Airport Capital Improvement Plan. The planning program used by the FAA to identify, prioritize, and distribute funds for airport development and the needs of National Airspace System (NAS) to meet specified national goals and objectives.

Airport Elevation. The highest point of an airport's usable runway(s) expressed in feet above mean sea level (MSL).

Airport Facility Directory. A publication with information on all airports, seaplane bases, and heliports open to the public. This publication is issued in seven volumes according to geographical area, and includes communications data, navigational facilities, and certain special notices and procedures.

Airport Improvement Program (AIP). A program authorized by the Airport and Airway Improvement Act of 1982 that provides funding for the airport planning and development.

Airport Influence Area. The area defined by overlaying the FAR Part 77 Imaginary Surfaces, Aircraft Accident Safety Zone data, and Noise Contour data over the top of an existing land use map, critical areas map or other base map.

Airport Layout Plan (ALP). A scaled drawing of the airport showing the layout of existing and proposed facilities necessary for current and future operation and development of the airport.

Airport Layout Plan Drawing Set. A set of planning drawings that depicts existing airport facilities and proposed development as determined from the planners' review of the aviation activity forecasts, facility requirements, and alternative analysis. Minimum components of the set are:

- Cover Sheet
- Airport Layout Plan (ALP)
- Data Sheet
- Facilities Layout Plan
- Terminal Area Plan(s)
- Airspace Drawing
- Inner Approach Surface Drawing(s)
- Departure Surface Drawing(s)
- On-Airport Land Use Drawing
- Off-Airport Land Use Drawing
- Airport Property (also known as the Exhibit A)
- Utility Drawing(s)

Airport Lighting. Various lighting aids that may be installed on an airport. Types of airport lighting include:

ALS. *See Approach Light System.*

Boundary Lights. Lights defining the perimeter of an airport or landing area.

Runway Centerline Lighting. Flush centerline lights spaced at 50-foot intervals beginning 75 feet from the landing threshold and extending to within 75 feet of the opposite end of the runway. Only used on Category II/III ILS Runways.

Runway Edge Lights. Lights used to outline the edges of the runways during periods of darkness or restricted visibility conditions. They are usually uniformly spaced at intervals of approximately 200 feet, and intensity may be controlled or preset. These light systems are classified according to the intensity they are capable of producing:

- ***High Intensity Runway Lights (HIRLs).***
- ***Medium Intensity Runway Lights (MIRLs).***
- ***Low Intensity Runway Lights (LIRLs).***

Runway End Identifier Lights (REIL).Provides rapid and positive identification of the approach end of particular runway. The system consists of a pair of synchronized flashing lights, one on each side of the runway threshold.

Threshold Lights. Fixed lights arranged symmetrically left and right of the runway centerline, identifying the runway threshold. Lights are green for arriving aircraft and red for departing aircraft.

Touchdown Zone Lighting. Two rows of transverse light bars located symmetrically about the runway centerline normally at 100 foot intervals. Only used on Category II/III ILS Runways.

Airport Markings. Markings used on runway and taxiway surfaces to identify a specific runway, a runway threshold, a centerline, a hold line, etc. A runway should be marked in accordance with its present usage such as: 1) Visual, 2) Nonprecision instrument, 3) Precision Instrument.

Airport Master Plan. A comprehensive study of an airport that focuses on the short-, medium-, and long-term development plan to meet future aviation demand of the airport.

Airport Obstruction Chart. A scaled drawing depicting the FAR Part 77 imaginary airspace surfaces, a representation of objects that penetrate these surfaces, runway, taxiway, and ramp areas, navigational aids, buildings, roads, and other detail in the vicinity of the airport.

Airport Operations Area (AOA). An area of an airport used or intended to be used for landing, takeoff, or surface maneuvering of aircraft. An AOA includes such paved areas or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiways, or apron.

Airport Operator. The operator (private or public) or sponsor of a public-use airport.

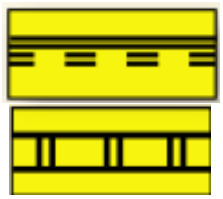
Airport Reference Code (ARC). A coding system used to relate the airport design criteria to the operational and physical characteristics of the airplanes intended to use the airport or the critical aircraft. It is a two character code consisting of the Aircraft Approach Category and the Airplane Design Group.

Airport Reference Point (ARP). The latitude and longitude of the approximate center of the runway(s) at an airport.

Airport Signs. Signs used to identify items and locations on the airport.

Boundary Sign. These signs are used to identify the location of the boundary of the RSA/ROFZ

or ILS critical areas for a pilot, or an existing the runway. These signs have a black inscription on a yellow background.

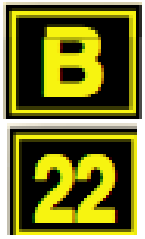


Destination Sign. These signs indicate the general direction to a remote location. They have black inscriptions on a yellow background and ALWAYS contain an arrow.

Direction Sign. These signs indicate directions of taxiways leading out of an intersection. They may also be used to indicate a taxiway exit from a runway. These signs have black inscriptions on a yellow background and ALWAYS contain arrows.

Information Sign. These signs are installed on the airside of an airport and are considered to be signs other than mandatory signs. They have black inscriptions on a yellow background.

Location Sign. These signs identify the taxiway or runway upon which the aircraft is located. The sign has a yellow inscriptions on a black background with a yellow border and does NOT use arrows.



Mandatory Instruction Sign. They denote taxiway/runway intersections, runway/runway intersections, ILS critical areas, OFZ boundaries, runway approach areas, CAT II/II operations areas, military landing zones, and no entry areas. These signs have white inscriptions with a black outline on a red background.

Roadway Sign. These signs are located on the airfield and are solely intended for vehicle operators. They should conform to the categorical color codes established by the Manual on Uniform Traffic Control Devices (MUTCD).

Runway Distance Remaining Signs. These signs are used to provide distance remaining information to pilots during takeoff and landing operations. These signs have a white numeral inscription on a black background.

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 Surveillance Radar (ASR). A radar system used at airports to detect and display the position of aircraft in the terminal area.

Air Route Traffic Control Centers (ATRCC). A facility responsible for en route control of aircraft operating under IFR in a particular volume of airspace (within its area of jurisdiction) at high altitudes between airport approaches and departures. Approximately 26 such centers cover the United States.

Airside. The portion of an airport that contains the facilities necessary for the operations of aircraft.

Air Taxi. An aircraft operating under an air taxi operating certificate for the purpose of carrying passengers, mail, cargo for revenue in accordance with FAR 121 or FAR Part 135.

Air Traffic. Any aircraft operating in the air or on an airport surface, exclusive of loading ramps and parking areas.

Air Traffic Control (ATC). A service provided by ground-based controllers who direct aircraft on the ground and in the air. The primary purpose of ATC systems is to *separate* aircraft to prevent collisions, to organize and expedite the flow of traffic, and to provide information and other support for pilots when able.

Air Traffic Control Tower (ATCT). A facility in the terminal air traffic control system located at an airport which consists of a tower cab structure and an associated instrument flight rules rooms, if radar equipped, that uses ground-to-air and air-to-ground communications and radar, visual, signaling, and other devices to provide for the safe and expeditious movement of terminal area air traffic in the airspace and airports within its jurisdiction.

Annual Service Volume (ASV). The number of annual operations that can reasonably be expected to occur at the airport based on a given level of delay.

Anti-Icing. Following aircraft deicing, anti-icing chemicals can applied to protect against the accumulation of ice or snow for a limited period of time, known as the holdover time.

Approach (or Departure) Airspace. The airspace, within five statue miles of an airport, through which aircraft more during landing and takeoff.

Approach Surface. *See Imaginary Surfaces.*

Approach Light System (ALS). An airport lighting facility aids in runway identification during the transition from instrument flight to visual flight for landing. Typical approach lighting systems used at airports include:

Approach Light System with Sequenced Flashing (ALFS).

Lead-in-light System (LDIN). Consists of one or more series of flashing lights installed at or near ground level that provides positive visual guidance along an approach path, either curving or straight, where special problems exist with hazardous terrain, obstructions, or noise abatement procedures.

Medium-Intensity Approach Light System with Runway Alignment Indicator (MALSR). A lighting system installed on the approach end of a runway and consists of a series of lightbars, strobe lights, or a combination that extends outward from the runway end. It usually serves a runway that has an instrument approach procedure associated with it and allows the pilot to visually identify and align self with the runway environment once the pilot has arrived at a prescribed point on the approach.

Omnidirectional Approach Lighting System (ODALS). Consist of seven omnidirectional flashing lights located in the approach area of a non-precision runway. Five lights are located on the runway centerline extended with the first light located 300 feet from the threshold and extending at equal intervals up to 1,500 feet from the threshold. The other two lights are located on each side of the runway, with a lateral distance of 40 feet from the runway edge, or 75v feet from the runway edge when installed on a runway equipped with VASI.

Runway Alignment Indicator Lights (RAILS). Sequenced Flashing Lights which are installed only in combination with other lighting systems.

Apron. A specific portion of the airfield used for passenger, cargo or freight loading and unloading, aircraft parking, and the refueling, maintenance and servicing of aircraft. Also referred to as ramp or tarmac.

Approach (or Departure) Airspace. The airspace, within five statue miles of an airport, through which aircraft more during landing and takeoff.

Approach Surface. *See Imaginary Surfaces.*

Arrival Time. The time an aircraft touches down on arrival.

Automated Flight Service Station (AFSS). An automated air traffic facility that provides information and services to aircraft pilots before, during, and after flights, but it is not responsible for giving instructions or clearances or providing separation.

Automated Surface Observation System (ASOS). Similar data reporting as an AWOS, but usually owned and maintained by the National Weather Service.

Automated Weather Observation System (AWOS). An automated sensor suite which is voice synthesized to provide a weather report that can be transmitted via VHF radio, NDB, or VOR ensuring that pilots on approach have up-to-date airport weather for safe and efficient aviation operations. Most AWOS observe and record temperature and dew point in degrees Celsius, wind speed and direction in knots, visibility, cloud coverage and ceiling up to 12,000 feet, freezing rain, thunderstorm (lightning), and altimeter setting.

Avigation Easement. A contractual right or a property interest in land over which a right of unobstructed flight in the airspace can occur.

Balloon. *See Aircraft.*

Baggage Claim. *A*n area where passengers obtain luggage that was previously checked at an airline ticket counter at the departing airport.

Based Aircraft. The general aviation aircraft that use a specific airport as a home base.

Base Leg. *See Traffic Pattern.*

Benefit-Cost Analysis (BCA). An analysis of the cost, benefit, and the uncertainty associated with a project or action. A formal BCA is required for capacity projects of $5 million or more AIP discretionary funds.

Birds Balls. High-density plastic floating balls that can be used to cover ponds and prevent birds from using the sites.

Blast Fence. A barrier used to divert or dissipate jet blast or propeller wash.

Boundary Lights. *See Airport Lighting.*

Boundary Sign. *See Airport Signs.*

Building Restriction Line (BRL). A line that identifies suitable building area locations on airports to limit building proximity to aircraft movement areas. Typically base on the FAR Part 77 Airport Imaginary Surfaces.

Capacity (Throughput Capacity). A measure of the maximum number of aircraft operations or their airport components which can be accommodated on the airport.

Capital Improvement Plan (CIP). The planning program used by the FAA to indentify, prioritize, and distribute AIP funds for airport development and the needs of the NAS to meet specified national goals and objectives.

Cargo Service Airport. *See Airport.*

Ceiling. The height above the earth's surface of the lowest layer of clouds or obscuring phenomena that is reported as broken, overcast or obscured.

Certificated Airport. *See Airport.*

Citizen's Advisory Committee (CAC). A group of individuals that weight recommendations against community goals, values, and needs, typically during a Master Plan.

Clear Zone. Former term for Runway Protection Zone.

Clearway (CWY). A defined rectangular area beyond the end of the runway cleared or suitable for use in lieu of runway to satisfy take off distance requirements.

Commercial Service Airport. *See Airport.*

Common Traffic Advisory Frequency (CTAF). The VHF radio frequency used for air-to-air communication at uncontrolled airports or where no control tower is currently active. Pilots use the common frequency to coordinate their arrivals and departures safely, give position reports, and acknowledge other aircraft in the airfield traffic pattern.

Compass Rose. A circle, graduated in degrees, printed on some charts or marked on the ground at an airport. It is used as a reference to either true or magnetic direction. When marked on the ground it is used to calibrate an aircraft's compass.

Conical Surface. *See Imaginary Surfaces.*

Consultant. A firm, individual, partnership, corporation, or joint venture that performs architectural, engineering or planning service as defined in AC150/5100-14D, employed to undertake work funded under an FAA airport grant assistance program.

Controlled Airspace. Airspace of defined dimensions within which air traffic control service is provided to IFR flight and to VFR flights in accordance with the airspace classification. Controlled airspace is a generic term that covers Class A, Class B, Class C, Class D, and Class E Airspace.

Critical (Design) Aircraft. The most demanding aircraft with at least 500 annual operations that operates, or is expected to operate, at the airport.

Crosswind. A wind that is not parallel to a runway centerline or to the intended flight path of an aircraft.

Crosswind Component. The component of wind that is at a right angle to the runway centerline or the intended flight path of an aircraft.

Crosswind Leg. *See Traffic Pattern.*

Decision Height (DH). This is associated with precision approaches and the aircraft is continually descending on final approach. When the aircraft reaches the DH, the pilot must make a decision to land or execute the missed approach procedure.

Deicing. The removal, though application of a max of heated water and propylene or ethylene glycol, of frost, ice, slush, or snow from the aircraft in order to provide clean surfaces.

Deicing Pad. A facility where an aircraft received deicing or anti-icing.

Delay. The difference between constrained and unconstrained operating time.

Demand. The number of aircraft operations, passengers, or other factors that are required in a specific period of time.

Department of Transportation (DOT). The United States federal department that institutes and coordinates national transportation programs; created in 1966. The FAA is an organization within the DOT.

Departure Airspace. *See Approach Airspace.*

Destination Sign. *See Airport Signs.*

Detention Ponds. Storm water management ponds that hold storm water for short periods of time, a few hours to a few days.

Direction Sign. *See Airport Signs.*

Discretionary Grant Funds. Annual Federal grant funds that may be appropriate 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. *See Threshold.*

Distance Measuring Equipment (DME). *See Navigation Aid.*

Downwind Leg. *See Traffic Pattern.*

Emergency Locator Transmitter (ELT). A radio transmitter attached to the aircraft structure that aids in locating downed aircraft by radiating a audio tone on 121.5 MHz or 243 MHz.

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

Entitlement Grant Funds. Annual federal funds for which all airports in the NPIAS are eligible for.

Environmental Assessment (EA). An environmental analysis performed pursuant to the Nation Environmental Policy Act to determine whether an action would significantly affect the environment and thus require a more detailed environment al impact statement.

Environmental Impact Statement (EIS). A document required of federal agencies by the National Environmental Policy Act (NEPA) for major projects or legislative proposals affecting the environment. It is a tool for decision-making describing the positive. If no significant impact is found a Finding of No Significant Impact (FONSI) is issued.

Federal Aviation Administration (FAA). An agency of the United States Department of Transportation with authority to regulate and oversee all aspects of civil aviation in the United States.

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 U.S. Code of Federal Regulations (CFR).

Federal Grant Agreement. A Federal agreement that represents an agreement made between the FAA (on the behalf of the United States) and an airport sponsor for the grant of Federal Funding.

Federal Grant Assurance. A provision within a Federal grant agreement to which the recipient of Federal airport development assistance has agreed to comply in consideration of the assistance provided.

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 business enterprise located on the airport property that provides services to pilots including aircraft rental, training, fueling, maintenance, parking, and the sale of pilot supplies.

Flight Service Station (FSS). An air traffic facility that provides information and services to aircraft pilots before, during, and after flights, but unlike ATC, is not responsible for giving instructions, clearances, or providing separation.

Flight Standards District Office (FSDO). An FAA field office serving an assigned geographical area and staffed with Flight Standard personnel who serve the aviation industry and the general public on matters relating to the certification and operation of air carrier and general aviation aircraft. Activities include general surveillance of operation safety, certification of airmen and aircraft, accident prevention, investigation, enforcement, etc.

Foreign Object Debris (FOD). Any object found on an airport that does not belong in or near airplanes, and as a result can injure personnel and damage aircraft.

Form 7460-1, Notice of Proposed Construction or Alternation. Federal law requires filing a Notice of Proposed Construction or Alteration (Form 7460) for all structures over 200 feet AGL or lower if closer than 20,000 feet to a public use airport with a runway over 3,200 feet in length.

Form 7480-1, Notice of Landing Area Proposal. Submitted to the FAA Airport Regional Division Office or ADO as formal written notification for project involving the construction of a new airport; the construction, realigning, altering, activating, or abandoning of a runway, landing strip, or associated taxiway; or the deactivation or abandoning of an entire airport.

Fuel Flowage Fee. A tax assessed on the user, which is paid at the pump. Fuel flowage fee revenues are sent to the airport governing body, usually the board or authority and are then used for airport improvements or other expenses.

Gap Analysis. *See Safety Management System.*

Gate. An aircraft parking position used by a single aircraft loading or unloading passengers, mail, or cargo, etc.

General Aviation (GA). The segment of aviation that encompasses all aspects of civil aviation except certified air carriers and other commercial operators, such as airfreight carriers.

General Aviation Airport. *See Airport.*

Geographic Information System (GIS). A technology that manages, analyzes, and disseminates geographic data.

Glider. *See Aircraft.*

Glideslope. *See Instrument Landing System.*

Global Positioning System (GPS). A satellite based navigational system that provides signals in the cockpit of aircraft defining aircraft position in terms of latitude, longitude, and altitude.

GPS Runway. *See Runway.*

Grant Agreement. *See Federal Grant Agreement.*

Ground Access. The transportation system on and around the airport that provides access to and from the airport by ground transportation vehicle for passengers, employees, cargo, freight, and airport services.

Hazard. *See Safety Management System.*

Hazardous Wildlife. Species of wildlife (birds, mammals, reptiles) including feral animals and domesticated animals not under control, that are associated with aircraft strike problems, are capable of causing structural damage to airport facilities, or act as attractants to other wildlife that pose a strike hazard.

Heavy Aircraft. *See Aircraft.*

Helicopter. *See Aircraft.*

Helipad. A small, designated area, usually with prepared surface, on a heliport, airport, landing/takeoff area, apron/ramp, movement area used for takeoff, landing, or parking of helicopters.

Heliport. An area of land, water, or structure used or intended to be used for the landing and takeoff of helicopters.

High Intensity Runway Lighting (HIRL). *See Airport Lighting.*

Holdover Time. The estimated time the application of anti-icing fluid will prevent the formation of frozen contamination on the protected surfaces of an aircraft. With a one-step deicing/anti-icing operation, the holdover beings at the start of the operations; with a two-step operations, the holdover beings at the start of the final anti-icing application.

Horizontal Surface. *See Imaginary Surfaces.*

Hub Airport. *See Airport.*

Imaginary Surfaces. Are surfaces defined in FAR Part 77, and are in relation to the airport and each runway. The size of these imaginary surfaces is based on the category of each runway for current and future airport operations. Any objects which penetrate these surfaces are considered an obstruction and affects navigable airspace.

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 upon the type of available or planned approach by aircraft to a runway.

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.

Horizontal Surface. An imagery 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 dimension of this surface is a function of the types of approaches existing or planned for the runway.

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 function of types of approaches existing or planned for the runway.

Transitional Surface. An imaginary obstruction-limiting surface defined in FAR Part 77 that extends outward and upward at right angles to the runway centerline and the runway centerline extended at a slope of 7 to 1 from the slides of the primary surface.

Incursion. The unauthorized entry by an aircraft, vehicle, or obstacle into the defined protected area surrounding an active runway, taxiway, or apron.

Information Sign. *See Airport Signs.*

Inner Marker (IM). *See Instrument Landing System.*

Instrument Approach. 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 (VFR) weather minimums. The term IFR is often also used to define weather conditions and type of flight plan under which an aircraft is operating. IFR is defined as the weather condition that occurs whenever the cloud ceiling is at least 500 feet above ground level, but less than 1,000 feet and/or visibility is at least one statue mile, but less than 3 statute miles.

Instrument Landing System (ILS). A precise ground based navigation system for aircraft that provides precision guidance to an aircraft approaching a runway. It uses a combination of radio signals and, in many cases, high-intensity lighting arrays to enable a safe landing during instrument meteorological conditions. Normally consists of the following components and visual aids:

> ***Localizer.*** The component of an ILS which provides horizontal guidance to the runway.
>
> ***Glideslope.*** An independent ILS subsystem that provides vertical guidance to aircraft approaching a runway. It is an antenna array that is usually located on one side of the runway touchdown zone.
>
> ***Outer Marker (OM).*** A marker beacon at or near the glideslope intercept altitude of an ILS approach and it keyed to transmit two dashes per second.
>
> ***Middle Marker (MM).*** A marker beacon that defines a point along the glideslope of an ILS normally located at or near the point of DH (CAT I). It is keyed to transmit alternate dots and dashes.
>
> ***Inner Marker (IM).*** A marker beacon use with an ILS (CAT II & CAT III) precision approach located between the middle marker and the end of the ILS runway, transmitting a radiation pattern keyed at six dots per second, and

indicating that the pilot, both aurally and visually, is at the DH

Approach Lights. *See Approach Lighting Systems.*

ILS Categories:

Precision Approach Category I (CAT I). An instrument approach procedure which provides for an approach to a DH of not less than 200 feet and visibility of not less than ½ mile or RVR 2,400 (RVR 1,800 with operative touchdown zone and runway centerline lights).

Precision Approach Category II (CAT II). An instrument approach procedure which provides for an approach to a minima less than CAT I to as low as a DH of not less than 200 feet and visibility of not less than 100 feet and RVR of not less than RVR 1,200.

Precision Approach Category III (CAT III An instrument approach procedure which provides for an approach to minima less than CAT II.

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. IMC are defined as period when cloud ceiling are less than 1,000 feet above ground and/or visibility less than three miles

Instrument Runway. *See Runway.*

International Civil Aviation Organization (ICAO). An agency of the United Nations which codifies the principles and techniques of the international air navigation, and fosters the planning and development of international air transport to ensure safe and orderly growth. The ICAO Council adopts standards and recommended practices concerning air navigation, prevention of unlawful interference, and facilitation of border-crossing procedure for international civil aviation.

Itinerant Operations. *See Operation.*

Knot. A unit of speed equal to one nautical mile per hour, or 1.15 statue mile per hour.

Land and Hold Short Operations (LAHSO). To increase airport capacity, efficiency, and safety, LAHSO clearances usually instruct an aircraft to land, and then hold short of an intersecting runway, taxiway, or predetermined point.

Large Hub Airport. *See Airport.*

Landside. The portion of an airport that provides the facilities necessary for the processing of passengers, cargo, freight, and ground transportation vehicles.

Large Airplane. *See Aircraft.*

Lead-In-Light System (LDIN). *See Approach Light System.*

Localizer. *See Instrument Landing System.*

Local Operations. *See Operation.*

Location Sign. *See Airport Signs.*

Low Intensity Airport Lighting. *See Airport Lighting.*

Magnetic (Compass) Heading. The heading relative to the magnetic poles of the Earth. Is the heading indicated by a magnetic compass.

Mandatory Instruction Sign. *See Airport Signs.*

Maximum Certified Takeoff Weight (MTOW). The Maximum certificated weight for the airplane at takeoff, i.e. the airplane's weight at the start of the takeoff run.

Mean Sea Level (MSL). The average or mean height of the sea, with reference to a suitable reference surface.

Medium Hub Airport. *See Airport.*

Medium Intensity Approach Light System with Runway Alignment Indicator (MASLR). *See Approach Light System.*

Medium Intensity Runway Lights (MIRL). *See Airport Lighting.*

Middle Marker (MM). *See Instrument Landing System.*

Military Operations. *See Operation.*

Minimum Descent Altitude. This is associated with non-precision approaches and is the lowest altitude an aircraft can fly until the pilot sees the airport environment. If the pilot has not found the airport environment by the Missed Approach Point (MAP) a missed approach is initiated.

Missed Approach Point (MAP). The point prescribed in an instrument approach at which a missed approach procedure shall be executed if visual reference of the runway environment is not in sight or the pilot decides it is unsafe to continue. The MAP is similar in principle to the Decision Height.

Movement Area. The runway, taxiways, and other area of an airport an airport/heliport which are utilized for taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports with a tower, specific approval for entry onto the movement area must be obtained from ATC.

National Airspace System (NAS). The network of air traffic control facilities, air traffic control areas, and navigational facilities throughout the U.S.

National Environmental Policy Act (NEPA). Federal legislation that established environmental policy for the nation. It requires an interdisciplinary framework for federal agencies to evaluate environmental impacts and contains action-forcing procedures to ensure that federal agency decision makers take environmental factors into account.

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 investigatory board whose mandate is to ensure safe public transportation. As part of the DOT, the NTSB investigates accidents, conducts studies, and makes recommendations to federal agencies and the transportation industry.

Navigation Aid (NAVAID). Any visual electronic device, airborne or on the surface, which provides point-to-point guidance information or position data to aircraft in flight.

Distance Measuring Equipment (DME). Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME NAVAID.

Non-Directional Beacon (NDB). A radio transmitter at a known location used as a NAVIAD. The signal transmitted does not include inherent directional information, in contrast with other NAVIADS such as VOR and TACAN.

Precision Approach Path Indicator (PAPI). A path indicator that uses a single row of lights arranged to provide precision descent guidance information during approach to a runway.

Rotating Beacon. A visual NAVAID used to assist pilots in finding an airport, particularly those flying in IMC or VFR at night. The beacon provides information about the type of airport through the use of a particular set of color filter:

- Green flashed alternated with two quick white flashes: Lighted military land airport.
- Alternating White and green flashes: Lighted civilian land airport.
- Alternating white and yellow flashes: lighted water airport
- Alternating yellow, green, and white: Lighted heliport.

Tactical Air Navigation (TACAN). An ultra-high frequency electronic rho-theta NAVAID which provides suitably equipped aircraft a continuous indication of bearing and distance to the TACAN station.

Visual Approach Slope Indicator (VASI). A system of lights arranged to provide vertical visual approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beam.

VOR (Very High Frequency Omni-directional Radio-range). A ground-based electronic NAVAID transmitting very high frequency navigation signals, 360 azimuth, oriented from magnetic north, used as a basis for navigation in NAS.

> ***VORTAC***. A NAVAID providing VOR azimuth, TACAN azimuth, and TACAN DME at one site.

Night. The time between the end of evening civil twilight and the beginning of morning civil twilight, as published in the American Air Almanac, converted to local time.

Noise Abatement Procedures. Procedures developed by the FAA and community to reduce the level of noise generated by aircraft departing over populated areas.

Noise Contour. A continuous line on a map of the airport vicinity connecting all points of the same noise level. These contours represent noise levels generated from aircraft operations, takeoff and landing of aircraft. They are generated based on mythology developed by the FAA and the data provides information that can be used to identify varying degrees of noise impacts on the surrounding area.

Non-Directional Beacon (NDB). *See Navigation Aid.*

Non-Hub Airport. *See Airport.*

Non-Movement Area. Taxilanes and apron areas not in the movement area and therefore no under the control of traffic control.

Nonprecision Approach Procedure. A standard instrument approach procedure in which no electronic glideslope is provided.

Nonprecision Runway. *See Runway.*

Notice to Airmen (NOTAM).A notice containing information concerning the establishment, condition, or change in any component (facility, service, procedure of, or hazard in the NAS) the timely knowledge of which is essential to personnel concerned with flight operations.

Object. Includes, but is not limited to above ground structures, NAVAIDs, people, equipment, vehicles, natural growth, terrain, and parked aircraft.

Object Free Area (OFA). An area on the ground centered on a runway (ROFA), taxiway (TOFA), 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. An existing object which may be expected at a fixed location within prescribed area with reference to the vertical clearance that must be provided during flight operations.

Obstacle Free Zone (OFZ). The OFZ is the airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be 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 protection for aircraft landing or taking off from the runway, and for missed approaches.

Obstruction. An object of greater height than any of the surfaces presented in FAR Part 77. (Obstructions to air navigation are presumed to

be hazards to air navigation until an FAA study has determined otherwise.)

Omnidirectional Approach Lighting System (ODALS). *See Approach Light System.*

Operation. The landing, takeoff, or touch-and-go procedure by an aircraft on a runway at an airport. Operations can be categorized into the following categories:

> ***Itinerant Operations.*** Operations by aircraft that leaves the local airspace.
>
> ***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.
>
> ***Military Operations.*** Aircraft operations performed in military aircraft. May be itinerant or local operations.
>
> ***Transient Operations***. Operations by aircraft that are not based at a specified airport.

Outer Marker (OM). *See Instrument Landing System.*

Parallel Runways. *See Runway.*

Parallel Taxiways. *See Taxiway.*

Passenger Facility Charge (PFC). The collection of PFC fees for every enplaned passenger at commercial airports controlled by public agencies to be used to fund FAA-approved projects that enhance safety, security, or Capacity; reduce noise; or increase air carrier competition.

Peak Hour (PH). An estimate of the busiest hour in a day. This is also known as the design hour.

Performance-Based Navigation (PBN). It specifies that aircraft RNP and RNAV systems performance requirements be defined in terms of accuracy, integrity, availability, continuity and functionality required for the proposed operations in the context of a particular airspace, when supported by the appropriate navigation infrastructure.

Area Navigation (RNAV). A method of navigation that permits aircraft operations on any desired flight path.

Required Navigation Performance (RNP). A type of Performance-Based Navigation (PBN) that allows an aircraft to fly a specific path between two, 3 dimensionally defined points in space.

Planning Activity Level (PAL). Selected activity levels that may trigger the need for additional facilities or improvements.

Precision Approach Categories I, II, III (CAT I, CAT II, CAT III). *See Instrument Landing System.*

Precision Approach Procedure. A standard precision approach procedure in which an electronic glideslope is provided, such as ILS or PAR.

Primary Airport. *See Airport.*

Primary Surface. *See Imaginary Surfaces.*

Poor Visibility and Ceiling (PVC). Is a condition that exists whenever the cloud ceiling is less than 500 feet and/or the visibility is less than one statue mile.

Precision Approach Path Indicator (PAPI). *See Navigational Aid*

Ramp. Synonymous with Apron. *See Apron.*

Record of Decision (ROD). A public document that reflects the FAA's final decision of an EIS, rationale behind that decision, and commitments to enforce and monitor mitigation.

Regional Jet. *See Aircraft.*

Regression Analysis. A statistical technique that seeks to identify and quantify the relationships between factors associated with a forecast.

Reliever Airport. *See Airport.*

Retention Ponds. Storm water management ponds that hold water for several months.

Risk Assessment. *See Safety Management System.*

RNAV. *See Performance Based Navigatio.n*

RNP. *See Performance Based Navigation.*

Roadway Sign. *See Airport Signs.*

Rocket. *See Aircraft.*

Rotating Beacon. *See Navigation Aid.*

Rotorcraft. *See Aircraft.*

Runway (RW). Defined as rectangular surface on an airport prepared or suitable for the landing and takeoff of airplanes. Runways can be classified as the following:

> ***Instrument Runway.*** A runway equipped with electronic and visual navigation aids for which a precision or nonprecision approach procedure having straight-in landing minimums has been approved.
>
> ***GPS Runway.*** A runway having a precision or nonprecision approach procedure using GPS navigational guidance with or without vertical guidance.
>
> ***Nonprecision Instrument Runway.*** A runway having an existing instrument approach procedure utilizing air navigation facilities with only horizontal guidance for which a straight-in or side-step nonprecision approach procedure has been approved.
>
> ***Nonprecision Runway.*** A runway with only horizontal guidance available.
>
> ***Parallel Runways.*** Two or more runways at the same airport whose centerlines are parallel. In addition to runway number, parallel runways are designated as L (left) and R (right) or, if three parallel runways exist, L (left), C (center), and R (right).
>
> ***Precision Instrument Runway.*** A runway having an existing instrument approach procedure utilizing air navigation facilities with both horizontal and vertical guidance for which a precision approach procedure has been approved.
>
> ***Utility Runway.*** A runway that is constructed for and intended to used by propeller driven aircraft of 12,500 pounds maximum gross weight and less.
>
> ***Visual Runway.*** A runway without an existing or planned straight-in instrument approach procedure and no instrument approach procedure/equipment.

Runway Alignment Indicator Lights (RAILS). *See Approach Light System.*

Runway Blast Pad. A surface adjacent to the ends of the runways provided to reduce the erosive effect of jet blast and propeller wash.

Runway Centerline Lighting. *See Airport Lighting.*

Runway Distance Remaining Sign. *See Airport Signs.*

Runway Edge Lights. *See Airport Lighting.*

Runway End Identifier Lights (REIL). *See Airport Lighting.*

Runway Environment. The physical runway and the areas surrounding the runway out to the hold position marking.

Runway Gradient. The ratio of the change in elevation divided by the length of the runway expressed as a percentage.

Runway Heading. The magnetic direction that corresponds with the runway centerline extended.

Runway Incursion. Any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft.

Runway Lights. *See Airport Lighting.*

Runway Protection Zone (RPZ). A trapezoidal area off the runway end intended to enhance the protection of people and property on the ground.

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 Visual Range (RVR). The distance over which a pilot of an aircraft on the centerline of the runway can see the runway surface markings delineating the runway or identifying its centerline. RVR is normally expressed in feet.

Safety Assessment. *See Safety Management System.*

Safety Assurance. *See Safety Management System.*

Safety Management System. The formal top-down business-like approach to managing safety risk. It includes systematic procedures, practices, and policies for the management of safety (including safety risk management, safety policy, safety assurance, and safety promotion).

> ***Gap Analysis.*** Identification of existing safety components, compare to SMS program requirements. Gap analysis provides an airport operator an initial SMS development plan and Safety roadmap to compliance.
>
> ***Hazard.*** Any existing or potential condition that can lead to injury, illness, or death to people; damage to or loss of a system, equipment, or property, or damage to the environment. A hazard is a condition that is a prerequisite to an accident or incident.

Risk Assessment. Assessment of the system or component to compare the achieved risk level with the tolerable risk level.

Safety Assessment. A systematic, comprehensive evaluation of an implemented system.

Safety Assurance. SMS process management functions that systematically provides confidence that organizational products/services meet or exceed safety requirements.

Safety Policy. Defines the fundamental approach to managing safety that is to be adopted within an organization. Safety policy further defines the organization's commitment to safety and overall safety vision.

Safety Promotion. A combination of safety culture, training, and data sharing activities that supports the implementation and operation of an SMS in an organization.

Safety Risk Control. Anything that mitigates the safety risk of a hazard. Safety risk controls necessary to mitigate an unacceptable risk should be mandatory, measureable, and monitored for effectiveness.

Safety Risk Management (SRM). A formal process within the SMS composed of describing the system, identifying the hazards, assessing the risk, analyzing the risk, and controlling the risk. The SRM process is embedded in the operation system: is not a separate/distinct process.

Severity. The consequence or impact of a hazard in terms of degree of loss or harm.

Safety Policy. *See Safety Management System.*

Safety Promotion. *See Safety Management System.*

Safety Risk. *See Safety Management System.*

Safety Risk Control. *See Safety Management System.*

Safety Risk Management (SRM). *See Safety Management System.*

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

Self-Fueling. The fueling of an aircraft by the owner or operator of the aircraft.

Segmented Circle. A circle located on an airport where wind and runway pattern information are located. It performs two function: it aids the pilot in locating the obscure airports, and it provides a centralized location for wind and traffic pattern indicators as may be required on a particular airport.

Separation. The spacing of aircraft to achieve their safe and orderly movement in flight, and while landing and taking off.

Severity. *See Safety Management System.*

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.

Small Airplane. *See Aircraft.*

Small Hub Airport. *See Airport.*

Snow Removal Equipment (SRE). Equipment, such as plow trucks and brooms, to remove snow from the paved surfaces on an airport.

Sponsor. A public agency or private owner of a public-use airport that submits to the Secretary an application for financial assistance for the airport.

Surface Movement Guidance and Control System (SMGCS). Systems providing routing, guidance, surveillance and control to aircraft and affected vehicles in order to maintain movement rates under all local weather condition within the Aerodrome Visibility Operational Level (AVOL) whilst maintaining the required level of safety.

System of Airport Reporting (SOAR). The FAA Office of Airport integrated database that contains airport planning, development, and financial information.

Tactical Air Navigation (TACAN). *See Navigation Aid.*

Tailwind. Any wind more than 90 degrees to the longitudinal axis of the runway.

Takeoff Distance Available (TODA). The TORA plus the length of any remaining runway or clearway (CWY) beyond the far end of the TORA.

Takeoff Run Available (TORA). The runway length declared available and suitable for the ground run of an airplane taking off.

Taxi. The movement of an airplane under its own power on the surface of an airport.

Taxilane (TL). The portion of the aircraft parking area used for access between taxiways and aircraft parking positions.

Taxiway (TW). A defined path established for the taxiing aircraft from one part of an airport to another.

Parallel Taxiway. A taxiway whose centerline is parallel to an adjacent runway.

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.

Technical Advisory Committee (TAC). A group of individual that provide input on technical issues.

Terminal Area. A general term used to describe airspace in which approach control service or airport traffic control service is provided.

Terminal Area Forecast (TAF). The official forecast of aviation activity, both aircraft and enplanements, at FAA facilities. This includes FAA-towered airports, federally contracted towered airports, non-federal towered airports, and many non-towered airports.

Terminal Instrument Procedures (TERPS). Published flight procedure standards for conducting instrument approaches to runways under instrument meteorological conditions. Information on TERPS is contained in FAA Order 8260.3, United States Standard for Terminal Instrument Procedures (TERPS).

Threshold (TH). The beginning of that portion of the runway available for landing. In some instances, the landing threshold may be displaced.

Displaced Threshold. A threshold that is located at a point on the runway other than the designated beginning of the runway.

Threshold Lighting. *See Airport Lighting.*

Through-the-Fence Operations. Those activities permitted by the airport sponsor through an agreement that permits access to the public landing area by independent entities or operator offering an aeronautical activity or to owners of aircraft based on land adjacent to, but not a part of, the airport property. The obligation to make an airport available for the use and benefit of the public does not impose any requirement for the airport sponsor to permit ground access by aircraft from adjacent property.

Throughput Capacity. *See Capacity.*

Touchdown Zone Lighting. *See Airport Lighting.*

Traffic Pattern. The traffic flow that is prescribed for aircraft landing at, taxiing on, or taking off from an airport. The following defines components of a standard traffic pattern:

> ***Base Leg***. A flight path at right angles to the landing runway off its approach end. The base leg extends from the downwind leg to the intersection of the extended runway centerline.
>
> ***Crosswind Leg.*** A flight path at right angles to the landing runway off its upwind end.
>
> ***Downwind Leg.*** A flight path parallel to the landing runway in the direction opposite to landing. The downwind leg normally extends between the crosswind leg and the base leg.
>
> ***Upwind Leg***. A flight path parallel to the landing runway in the direction of the landing.

Transitional Surface. *See Imaginary Surfaces.*

Transient Operations. *See Operation.*

Transportation Security Administration (TSA). An agency established in 2001 to safeguard United States transportation systems and to insure safe air travel. TSA operates under the Department of Homeland Security.

True Heading. A heading relative to the actual North and South Poles of the Earth, rather than the magnetic poles.

Uncontrolled Airport. *See Airport.*

Uncontrolled Airspace. Airspace where an ATC service is not deemed necessary or cannot be provided for practical reasons. Uncontrolled airspace is a generic term that covers Class F and Class G Airspace.

Universal Integrated Communications (UNICOM). An air-ground communication facility operated by a private agency to provide advisory service at uncontrolled airport. Aircraft call the ground station to make announcements of their intentions. In some cases, the ground station is not staffed. If no one is staffing the ground station, pilots broadcast their location and intentions over the UNICOM or CTAF channel. When the ground station is closed this is done without an acknowledgement.

Upwind Leg. *See Traffic Pattern.*

Utility Runway. *See Runway.*

Visibility. A measure of the horizontal opacity of the atmosphere at which prominent unlighted objects may be seen and identified by day and prominent lighted objects may be seen and identified by night; and is expressed in terms of the horizontal distance at which a person should be able to see and identify, is measured in statute miles.

Visual Approach. An approach conducted on an IFR flight plan which authorizes the pilot to proceed visually and clear of clouds to the airport. The pilot, at all times, must have either the airport or the preceding aircraft in sight. Reported weather at the airport must be ceiling at or above 1,000 feet and visibility of three miles or greater.

Visual Approach Slope Indicator (VASI). *See Navigational Aid.*

Visual Flight Rules (VFR). Procedures for the conduct of flight in weather conditions above Visual Flight Rules (VFR) weather minimums. The term VFR is often also used to define weather conditions and type of flight plan under which an aircraft is operating. VFR is defined as the weather condition whenever the cloud ceiling is at least 1,000 feet above ground level and visibility is at least three statue miles.

Visual Meteorological Conditions (VMC). Meteorological conditions expressed in terms of specific visibility and ceiling conditions which are equal to or greater than the threshold values for IMC.

Visual Runway. *See Runway.*

VOR. *See Navigation Aid.*

VORTAC. *See Navigation Aid.*

Wide Area Augmentation System (WAAS). An enhancement of the GPS that includes integrity broadcasts, differential correction, and additional ranging signals for the purpose of providing the accuracy, integrity, availability, and continuity required to support all phases of flight.

Wildlife Attractants. Any human-made structure, land-use practice, or human-made or natural geographic feature that can attract or sustain hazardous wildlife within the approach or departure airspace or the airport's AOA. These attractants can include architectural features, landscaping, waste disposal sites, wastewater treatment facilities, agricultural or aquaculture activities, surface mining, or wetlands.

Wildlife Hazard Assessment (WHA).

Wind Direction. Is the opposite direction in which the windsock is pointing, and is specified in terms of magnetic heading.

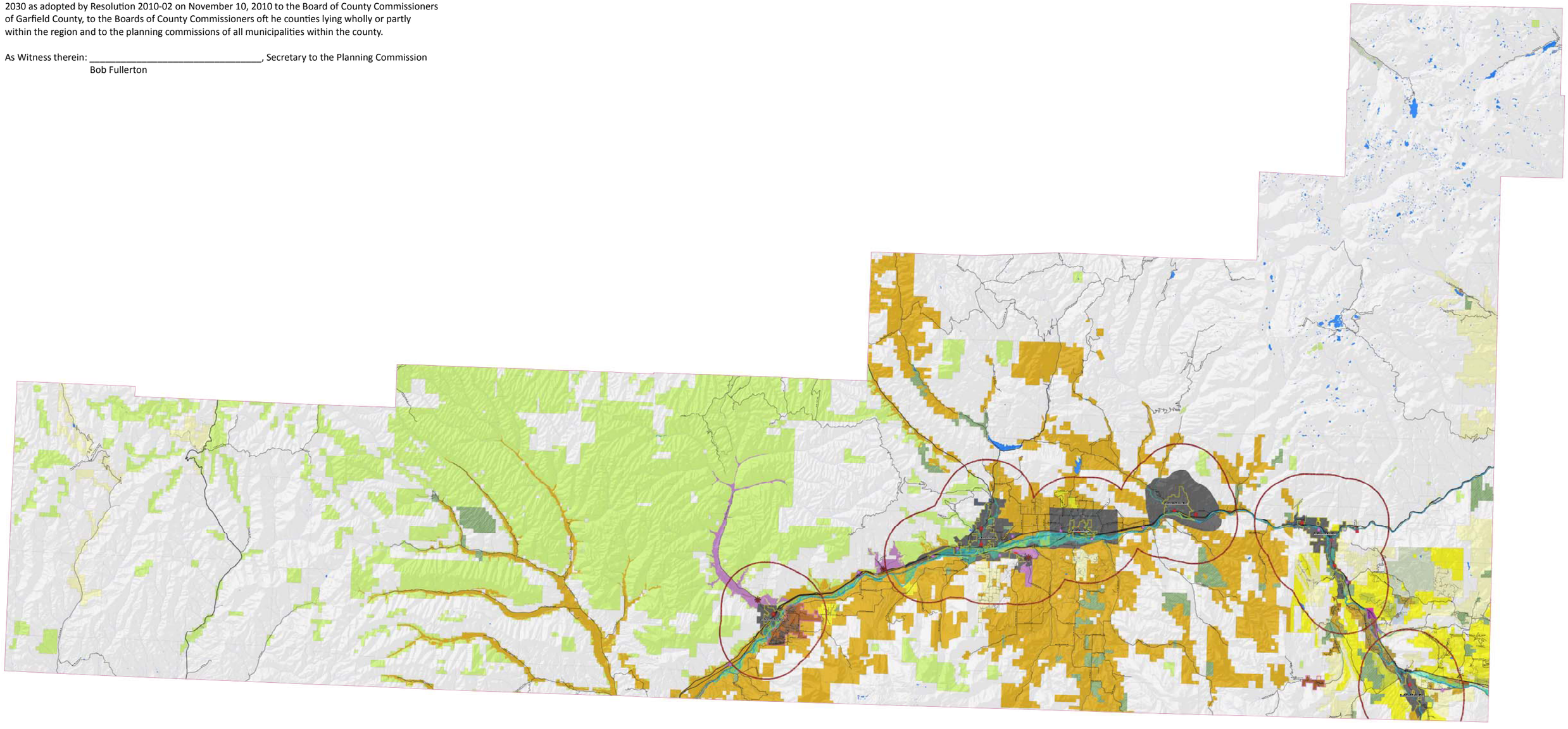
Windsock (Wind Cone). A conical textile tube designed to indicate wind direction and relative wind speed.

APPENDIX B

CITY OF RIFLE AND GARFIELD COUNTY ZONING AND LAND USE EXHIBITS

The Garfield County Planning Commission hereby certifies the Garfield County Comprehensive Plan 2030 as adopted by Resolution 2010-02 on November 10, 2010 to the Board of County Commissioners of Garfield County, to the Boards of County Commissioners oft he counties lying wholly or partly within the region and to the planning commissions of all municipalities within the county.

As Witness therein: _____, Secretary to the Planning Commission
Bob Fullerton



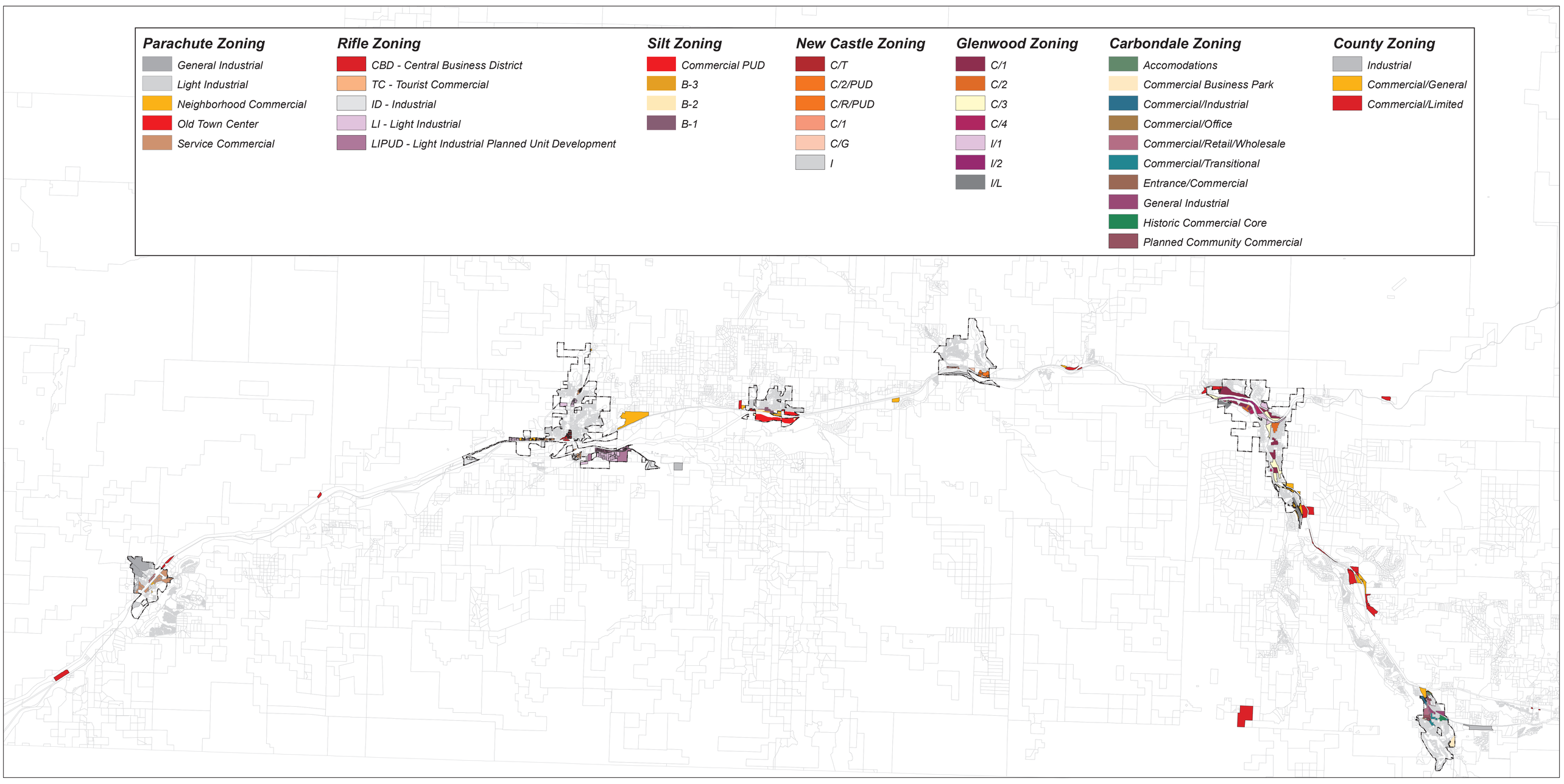
- Greenway Trail
- Floodplain
- Open Space/Public Land
- Conservation Easement
- Town/City Limit
- Unincorporated Community
- Water & Sewer Service Area
- Area of Influence (3 miles)
- Urban Growth Area
- Industrial
- Mixed Use
- Commercial
- Res H (3 Du/Ac TO <2 Ac/Du)*
- Res MH (2 TO <6 Ac/Du)*
- Res M (6 TO <10 Ac/Du)*
- Res L (10+ Ac/Du)
- Agricultural Production/Natural (35+ Ac/Du)
- Regional Employment Center
- Town Center
- Rural Employment Center
- Neighborhood Center

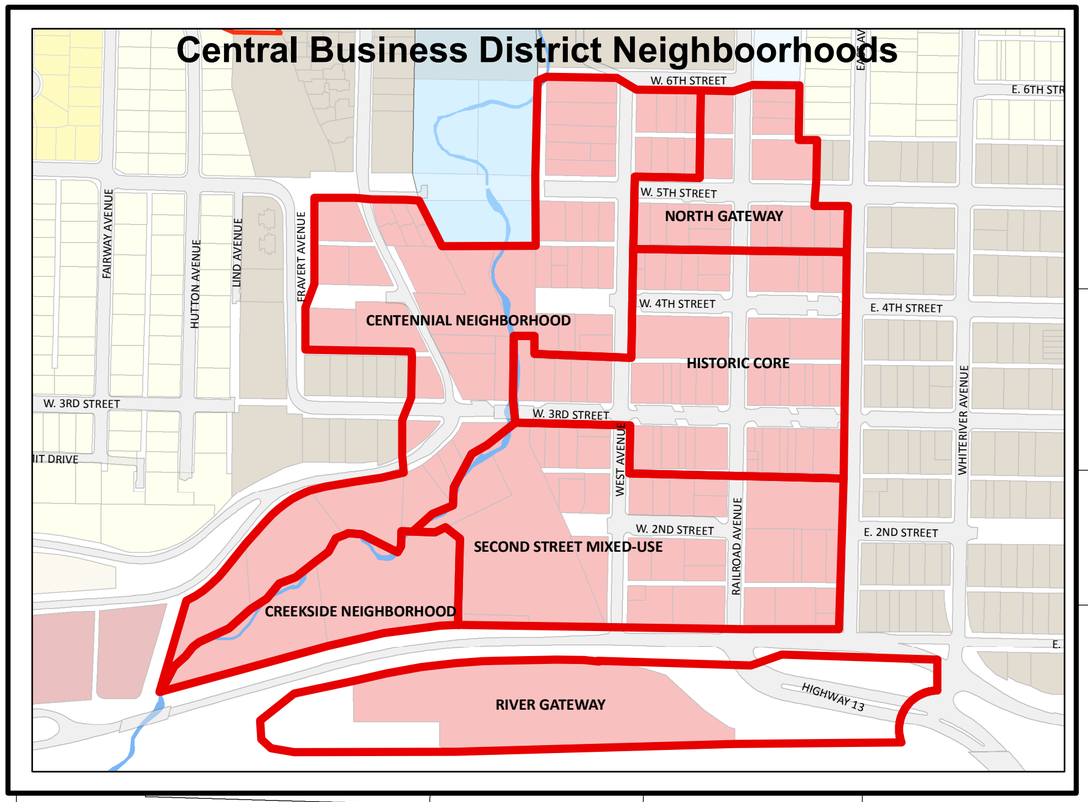
Future Land Use Map

Garfield County
Comprehensive Plan 2030

* Base density is the lowest density in the range, to achieve the highest density in this range, certain criteria must be met.

0 2 4 8 Miles


Parachute Zoning
General Industrial
Light Industrial
Neighborhood Commercial
Old Town Center
Service Commercial
Rifle Zoning
CBD - Central Business District
TC - Tourist Commercial
ID - Industrial
LI - Light Industrial
LIPUD - Light Industrial Planned Unit Development
Silt Zoning
Commercial PUD
B-3
B-2
B-1
New Castle Zoning
C/T
C/2/PUD
C/R/PUD
C/1
C/G
I
Glenwood Zoning
C/1
C/2
C/3
C/4
I/1
I/2
I/L
Carbondale Zoning
Accomodations
Commercial Business Park
Commercial/Industrial
Commercial/Office
Commercial/Retail/Wholesale
Commercial/Transitional
Entrance/Commercial
General Industrial
Historic Commercial Core
Planned Community Commercial
County Zoning
Industrial
Commercial/General
Commercial/Limited



Amended December 15, 2010
Ordinance 7 Series 2009

Legend

*Subdivisions noted on the map are PUDs and require additional information. Please contact the City of Rifle Planning Department for more information. 970-665-6490

- City Limits
- River System
- Railroad
- Rifle Institutional Control Boundary

Restricted Zoning

- No Building Area
- UMTRA Overlay

- CBD - Central Business District
- CS - Community Service
- TC - Tourist Commercial
- LDR - Low Density Residential
- LDRPUD - Low Density Residential Planned Unit Development
- EZ - Estate Zoning
- MDR - Medium Density Residential
- MDRPUD - Medium Density Residential Planned Unit Development
- MDRX - Medium Density Residential Redeveloping
- ID - Industrial
- LI - Light Industrial
- LIPUD - Light Industrial Planned Unit Development
- DR - Developing Resource
- OS - Open Space
- PD - Public Zone District
- Outside the City Limits

City of Rifle 202 Railroad Avenue Rifle, CO 81650

Zone District Map of the City of Rifle

This map, created by the GIS Division for the City of Rifle's Planning Department, utilizes a number of component GIS software and data sources. It is a graphical representation intended to aid in thematic analysis within various City Departments. This map does not guarantee dimensional accuracy and is not to be substituted for legal surveys or City records. Always refer to professionals and/or official cited documents for concerns of a legal interest. This map is continually being updated and/or edited, and is presented to reflect the most current information available. This map is not to be edited or changed without the expressed consent of City of Rifle authorities. The City of Rifle assumes no responsibility for the use of this map outside the outlined intended application.

www.rifleco.org

Zone District Map

Spring 2004 Revised: 11-3-2011

M://GIS/Msps/City Maps/Zoning.mxd

Prepared for: The City of Rifle's Planning Department

by: GIS Division ESG

ZONING

APPENDIX C
RIL INSTRUMENT APPROACH ANALYSIS
(TO BE INCLUDED)

APPENDIX C
RIL INSTRUMENT APPROACH ANALYSIS

RIL INSTRUMENT APPROACH ANALYSIS

The analysis involved in the instrument approach study is based on criteria used primarily by FAA Flight Procedures Division. That division is responsible for developing and updating instrument approach procedures at civil airports. The criteria used by the FAA Flight Procedures Division to develop instrument approach procedures is contained primarily in:

FAA Order 8260.3, *United States Standard for Terminal Instrument Procedures (TERPS)*

14 CFR Part 97, *Standard instrument Procedures*

One source of data that FAA uses to identify objects in the vicinity of airports, when determining the minimums for each approach procedure, is provided by the Airport Geographic Information System (AGIS). It is a requirement promulgated by the FAA and described in various advisory circulars, in which stringent mapping and survey requirements were established as well as a specific review and approval process, resulting in detailed mapping of the airspace around airports. Woolpert prepared an AGIS for Garfield County Airport in 2010, which was uploaded to FAA, reviewed and accepted.

When FAA does not have reliable mapping or survey data for areas covered by the imaginary surfaces described in TERPS, they frequently apply 'assumed adverse obstacle' (AAO), which are points to add additional safety margins when developing approach procedures. The FAA has noted there are a number of AAOs inserted in the vicinity of RIL, even with the AGIS mapping prepared by Woolpert in 2010.

- Definitions of the terms used in this report include:
- AAO – assumed adverse object
- TERPS – FAA Order 8260.3
- ILS – Instrument Landing System Precision Approach
- GPS – Global Positioning System
- LPV – GPS Instrument Approach Procedure with Vertical Guidance
- RNP – Instrument Approach Procedure based on Required Navigation Performance
- LDA - Localizer Type directional Aid Radio Transmitter
- HAT – Height Above Touchdown – Approach Minimums Above the Runway Threshold
- IAP – Instrument Approach Procedure
- IFR – instrument Flight Rules
- VFR – Visual Flight Rules
- RNAV – Area Navigation – Non-Precision Instrument Approach Procedures
- DME – Distance Measuring Equipment
- LOC – Localizer Transmitter (Lateral Guidance)

1.1 CONCLUSIONS AND RECOMMENDATIONS

Garfield County Airport has a clearly stated goal of lowering the minimums on the published instrument approaches as much as safety and FAA regulations will allow, particularly on the ILS 26 approach. Fred Mitchell, Procedures Specialist, FAA Flight Procedures Division, noted that the relatively high minimums on the published instrument approaches to RIL, particularly the ILS 26 approach, were due to obstacles in both the TERPS approach and missed approach surfaces. FAA applied safety margins in developing the minimums for the instrument approaches by locating 'Assumed Adverse Objects' (AAO) in a number of locations in the missed and final approach course areas. Some of the AAOs penetrate the TERPS imaginary surfaces and are factors in the high minimums.

Woolpert completed and uploaded AGIS mapping of RIL in 2010 after the runway was reconstructed, which was accepted by FAA and NGS, and FAA Flight Procedures has used that data. However, the AGIS mapping did not include the FAA TERPS missed approach surfaces. As a result, FAA applied safety margins in the form of AAOs in areas not mapped by AGIS.

FAA Flight Procedures re-examined the objects, and based on information provided by Woolpert determined that one object close to the Runway 26 threshold (ID# KIRLTO26) is lower than shown by FAA. FAA has lowered the object height in their database accordingly. FAA said that based on just the objects in the final approach course that the HAT on the ILS 26 could be lowered to 200' above the runway threshold elevation (i.e. standard Cat. I ILS minimums). If a MALSR were installed on 26 (upgraded from the existing ODALS), the visibility minimums on the ILS 26 could also be lowered by ½ mile. The airport manager noted it would be extremely expensive to install a MALSR on either the 8 or 26 end of the runway.

However, there are numerous penetrations to the TERPS missed approach surface, many of which are AAOs. FAA will provide a list of those objects (ID, lat/long coordinates, elevation) and Woolpert will develop a scope and fee to survey those points. Woolpert talked with Chuck Youngblood, FAA Flight Procedures in Oklahoma City, and Youngblood said that if Woolpert surveys the points in the missed approach surface and documents that they are not there or lower than FAA assumes, that FAA will re-examine and possibly lower the instrument approach minimums.

FAA said that installation of a Localizer Type Directional Aid (LDA) transmitter in the missed approach area of the ILS 26, as recommended previously, may help lower the ILS 26 approach minimums, but FAA had not determined the optimum location of the transmitter, and had not confirmed what specific benefit (reduced minimums) would be derived by installation of an LDA transmitter. RIL Airport would be responsible for the transmitters cost and maintenance.

FOLLOW-ON ACTION ITEMS TO BE COMPLETED AS OF MARCH 2015:

1. Fred Mitchell, Senior Specialist, FAA ATO Western Service Center, Flight Procedures Team, AJV-W24, will provide a map showing the objects (both surveyed and AAOs) penetrating the 40:1 missed approach surface to the ILS 26 approach, with object ID#, latitude/longitude coordinates, and elevations.

2. Fred Mitchell, FAA, will determine what benefits in terms of lower approach minimums would be derived from installing an LDA transmitter in the missed approach area to the ILS 26, and where the optimum location of the LDA antenna should be.

3. Dave Kuxhausen, Woolpert, will develop a scope, fee, and schedule to survey the points identified by Fred in the 40:1 missed approach surface. Woolpert will submit the survey data to FAA Flight Procedures (Fred Mitchell in Renton, WA and Chuck Youngblood Oklahoma City), as well as to RIL Airport.

4. RIL Airport will review the input from FAA and Woolpert's scope and fee, and decide whether to proceed with the survey efforts.

5. Once FAA Flight Procedures has the new survey data they will re-examine the approach minimums and publish revised procedures with lower minimums. FAA will coordinate with Brian Condie, Airport Manager, on their procedure review and update process.

6. No specific time frame has been agreed to by FAA to provide the information to RIL. The follow-on actions listed above will be funded and undertaken separately from the Airport Master Plan. The potential funding sources, project milestones, and implementation schedules are to be determined.

1.2 BACKGROUND

Rifle Garfield County Airport (FAA identifier = RIL) is situated in a valley in the Western Slopes Region of Colorado. RIL Airport serves as a major transportation link for the County, including a primary means of access for skiers and visitors to the County.

The Airport underwent major improvements in 2010, including realigning Runway 8/26, expanding other airport facilities, and adding navigational instruments to better serve existing and future aircraft.

The FAA has published a number of instrument approach procedures (IAP) to both Runway 8 and 26 at the airport. The IAPs are used by general aviation and corporate aircraft, the airlines, as well as by military aircraft. The IAPs are an essential component of RIL's ability to serve its role as a commercial service airport and transportation hub for the county. RIL also serves as an alternate for airlines and corporate aircraft operators when they are unable to land at Aspen (ASE), Eagle County (EGE), and Grand Junction (GJT) Airports due to local weather conditions.

The existing IAPs, however, and in particular the ILS 26 precision approach, have relatively high approach minimums (minimum descent altitudes and visibility), which significantly limits the ability to land at RIL during periods of poor weather. The commercial operators in particular, including air taxi/charters operating under 14 CFR Part 135 and air carriers operating under 14 CFR Part 121, have very stringent requirements in terms of weather conditions and instrument approach minimums. The high instrument approach minimums and regulatory requirements that limit access to RIL in turn directly affect the economy of the county, as well as RIL's ability to serve its role as a transportation hub.

1.3 STUDY GOALS

RIL has set a specific goal of lowering the minimums on the published instrument approaches to the airport, in particular the ILS precision approach to Runway 26.

Specific goals and objectives of the project include:

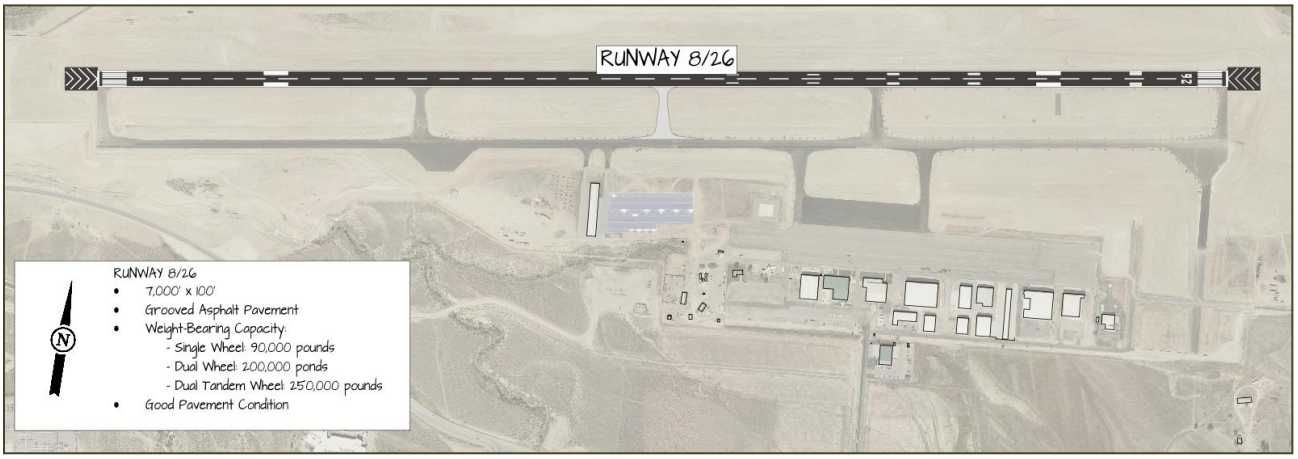
- To the extent possible, lower the published minimums on each of the instrument approaches to RIL, with a particular emphasis on the ILS 26 approach.
- Coordinate with FAA Flight Procedures Division in reviewing and updating the instrument approach procedures.
- Identify any updates to the electronic mapping and/or survey necessary for FAA to identify critical objects and lower the instrument approach minimums.
- Provide a detailed plan for moving forward, including the roles and responsibilities of the various parties involved.

1.4 AIRPORT INFORMATION

Rifle Garfield County Airport is located in the City of Rifle, Colorado, and is classified by the FAA as a general aviation (GA) airport. RIL accommodates both civilian and military aircraft, up to FAA's Airport Reference Code (ARC) D-III - aircraft with wingspans up to but less than 118'. Runway 8/26 is 7,000' x 100', with a full parallel taxiway.

There is a localizer and glide slope antenna on the airport as part of the ILS 26 approach, a very high frequency omni-directional radio (VOR) transmitter situated on the airport, and an omni-directional approach light system (ODALS) to Runway 26. There are also high intensity runway lights (HIRLs) on 8/26.

FIGURE 1-1



Sources: Jviation Inc. and Rifle Garfield County Air

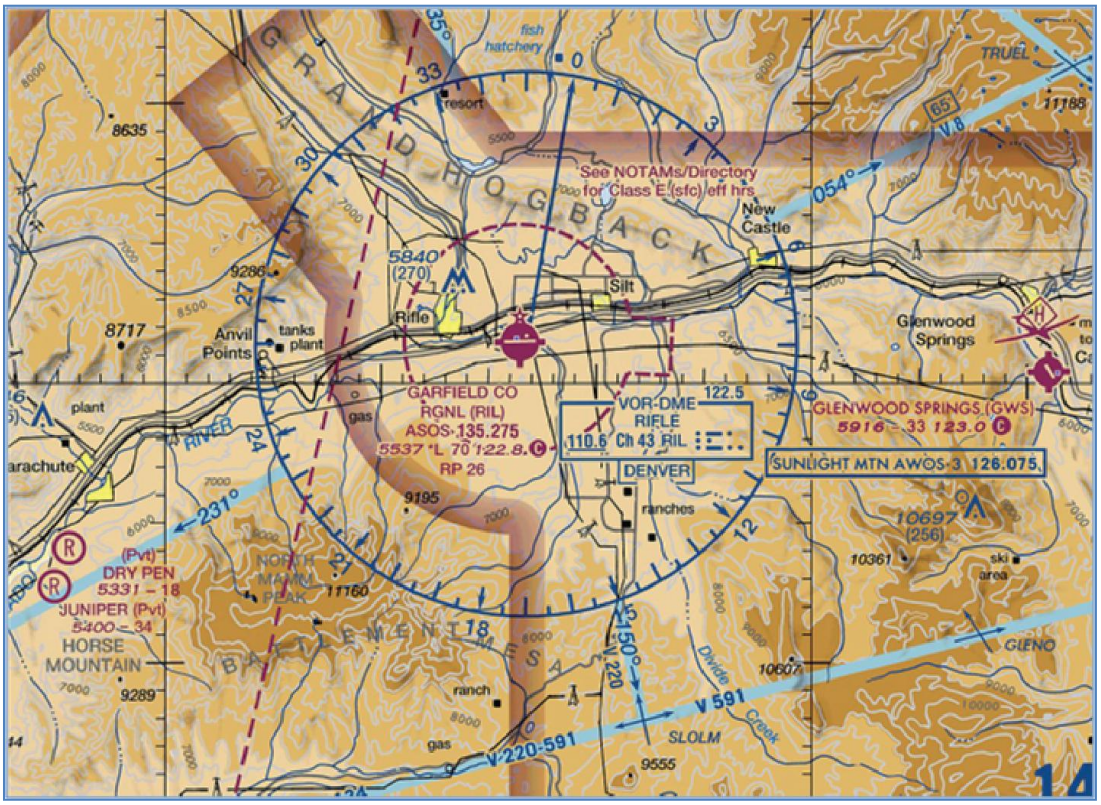
1.5 EXISTING AIRSPACE AND INSTRUMENT APPROACH PROCEDURES

There is no air traffic control tower at RIL, as is the situation at the majority of public-use airports in Colorado. RIL Airport is situated in Class E airspace. There is an extension of the Class E airspace to the east to encompass a portion of the final approach course f the ILS Runway 26 approach. Pilots self announce their position and intentions on the Common Traffic Advisory Frequency (CTAF), also known as the unicom frequency, on 122.8 MHz.

Pilots are not required to contact Denver Center[1] when taking off and landing at RIL when the weather conditions are 3 miles visibility or greater, and clouds are at 1,000' AGL or higher. When weather conditions are lower than that, then a clearance from FAA air traffic is required to operate within Class E airspace (shown as dashed red lines around RIL – **Fig. 1-2**). All of the air carrier and the large majority of air taxi operations are conducted under instrument flight rules (IFR), and those aircraft are therefore in contact with, and operating under a clearance from Denver Center.

[1] Denver Center is the FAA air traffic control facility responsible for the airspace over RIL

FIGURE 1-2 – RIL AIRSPACE



Sources: Sectional Aeronautical Chart, Airnav.com

WIDE AREA MULTILATERATION (WAM) AIRCRAFT SURVEILLANCE SYSTEM

FAA's Denver Center provides air traffic control services (flight following, radar vectoring, etc.) for aircraft arriving and departing RIL. However, due to the limitations of conventional radar and communications systems, Denver Center cannot provide ATC Services to aircraft on or near the ground at RIL.

Because radar signals and most aircraft communications operate on very high frequency (VHF) and are therefore require adequate line-of-sight, radar and communications signals are frequently blocked by the mountains. As a result, airspace capacity is severely reduced because FAA's Denver Center cannot 'see' on radar, or talk directly to, arriving or departing aircraft below certain altitudes. As a result, the Center applies very conservative (i.e. large) separation standards between aircraft, particularly during periods of poor (instrument – IFR) weather. The FAA noted that the normal 'acceptance rate' of aircraft at those airports is approximately 12 to 17 flights per hour, which is reduced to approximately 4 flights per hour due to the radar and communications limitations. That is a reduction in hourly airspace capacity of 67% to 76%.

In the fall of 2013, the FAA implemented a new aircraft monitoring/tracking system known as Wide Area Multilateration (WAM) technology (see **Appendix B** in this report). First deployed by the FAA in Alaska, Colorado DOT and FAA recently installed WAM along the Western slope of the Rocky

Mountains in an effort to overcome the inherent line-of-sight limitations of traditional radar and high frequency communications, particularly for aircraft arriving and departing from:

- Garfield County-Rifle (RIL)
- Gunnison (GUC)
- Aspen (ASE)
- Montrose (MTJ)
- Telluride (TEX)
- Durango-LaPlata (DRO)
- Steamboat Springs (SBS)
- Craig (CAG)
- Hayden (HDN)

The WAM technology receives signals from transponders on individual aircraft, and by analyzing those signals is able to accurately identify the location and trajectory of each aircraft, thereby allowing air traffic controllers to provide similar services as if the aircraft were in radar contact. As a result, airspace capacity (i.e. the rate of arrivals and departures) at each of the airports, including RIL, has been increased with the WAM technology.

Instrument Approach Procedures

The FAA has published a number sand variety of instrument approaches to both Runway 8 and 26 (**Table 1-1**). Both runway ends have vertically guided and lateral-only approach procedures. There is no approach light system to Runway 8, so the lowest visibility minimums allowed is one mile. There is an ODALS on 26, but no visibility credits are applied.

The lowest approach minimums were developed for the RNAV (area navigation) RNP (required navigation performance) 0.10 Approach to Runway 8 (250' decision altitude and 1 mile visibility). However, special authorization for both the aircraft and flight crew is required from FAA in order to fly RNP approaches, and most air carriers and small GA aircraft are not certified to fly those particular approaches. Although a number of corporate and air taxi aircraft and flight crews are certified to fly RNP approaches, it is not known how many aircraft and flight crews have been certified, or what percent of total aircraft that fly into RIL have the authorization to use RNP procedures.

TABLE 1-1 RIL INSTRUMENT APPROACHES AND MINIMUMS

Runway 8 - Approach	Lowest Minimums	Decision Height (feet-A TDZE)
RNAV (GPS) Y - LNAV	7420′ – 1 ¼ mile	1922′
RNAV (RNP) Z* RNP 0.10 RNP 0.30	 5748′ – 1 mile 6391′ – 3 miles	 250′ 893′
Runway 26 - Approach	**Lowest Minimums**	**Decision Height (feet-A TDZE)**
ILS **	6800′ – 4 miles	1,263′
RNAV (GPS) W - LNAV	7180′ – 1 ¼ mile	1,643′
RNAV (GPS) X - LPV	6,300′ – 2 ¼ mile	763′
RNAV (RNP) Y* RNP 0.30	 6,387′ – 2 ½ mile	850′
RNAV (RNP) Z* RNP 0.10 RNP 0.30	 5,955′ – 1 mile 6,387′ - 2 ½ mile	 418′ 850′
Circle To Land	**Lowest Minimums**	**Decision Height (feet-AGL)**
LOC/DME-A	7780′ – 1 ¾ mile	2,243′
VOR/DME-C	7360′ – 1 ¼ mile	1,823′

** Requires FAA authorization and aircraft certification*
*** FAA Note on Approach Chart: "Missed approach requires a minimum climb of 355 feet per NM to 10,400'; if unable to meet climb gradient, see LOC/DME-A"*
Source: FAA Aeronautical Information Services, http://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dtpp/search/results/?cycle=1503&ident=ril

In addition to the instrument approaches, FAA has also published instrument departure procedures for aircraft departing under instrument flight rules (IFR) from RIL. See **Appendix A** for the instrument approach charts as well as departure procedures. Separate departure procedures were developed for Runway 8 and 26.

When FAA Flight Procedures Division (AJW) creates instrument approach procedures, they use the criteria specified in FAA Order 8260.3, *United States Standard for Terminal Instrument Procedures (TERPS)*. They also utilize 14 CFR Part 97, *Standard instrument Procedures*. Subpart C of Part 97 states in part: "Standard instrument approach procedures and associated supporting data adopted by the FAA are documented on FAA Forms 8260-3, 8260-4, 8260-5 (**Appendix C**). Takeoff minimums and obstacle departure procedures (ODPs) are documented on FAA Form 8260-15A."

FAA Flight Procedures also utilizes 14 CFR Part 25, *Airworthiness Standards: Transport Category Airplanes*, in order to determine certain vertical obstacle clearance requirements based on climb performance required of transport category aircraft, including one-engine inoperative (OEI) performance standards. Based on that criteria FAA has developed obstacle evaluation (OE) standards for instrument departures (see **Appendix D** for some of the OE surfaces considered by FAA). Penetrations to the departure surfaces impact instrument approach minimums as do penetrations to the TERPS approach surfaces. In fact at some airports penetrations to departure surfaces may impact approach minimums more than penetrations to the approach surfaces.

For example, FAA inserted a note on the ILS 26 approach chart stating that if aircraft are unable to meet the minimum climb gradient of 355' per NM up to 10,400' MSL on the missed approach, then aircraft must use the LOC/DME-A approach procedure, with significantly higher approach minimums.

AGIS Mapping

FAA requires that airports participate in their Airport Geographic Information System (AGIS) program, particularly when they are preparing airport master plans. AGIS is a mapping program described in various advisory circulars that result in a detailed survey of specific areas around airports. The survey data is uploaded onto FAA's web site, and it is reviewed and approved by the FAA and the National Geodetic Survey (NGS). After the AGIS mapping has been approved by FAA and NGS, it is used by FAA Flight Procedures Division to review the existing instrument approach procedures, as well as used as the data base for developing future instrument approaches. RIL completed AGIS mapping in 2010 after the runway was reconstructed. The AGIS mapping was prepared by Woolpert, Inc., and it was uploaded onto FAA's website, reviewed and approved by FAA and NGS.

Assumed Adverse Obstacles (AAO)

However, AGIS mapping standards do not require surveying the missed approach surfaces as defined in TERPS. As a result, even with approved AGIS mapping there are areas underlying the imaginary surfaces defined in TERPS that are not surveyed. In those un-surveyed areas FAA *assumes* that there are obstacles of various elevations, up to 199' above ground level (AGL). Those objects are known as 'Assumed Adverse Objects (AAO)'. AAOs are applied as safety margins by the FAA to ensure adequate clearances for the OE surfaces. As a result, when FAA identifies penetrations to the imaginary surfaces by either surveyed objects or AAOs, they apply penalties to the approach minimums to ensure adequate clearances for arriving and departing aircraft. As noted below, the FAA has applied a number of AAOs in the vicinity of RIL, and that have a direct impact on the approach minimums, including the ILS 26 approach.

1.6 PREVIOUS RECOMMENDATIONS FOR IAP IMPPROVEMENTS

The instrument approach procedures at RIL have been studied at different periods previously. Runway 8/26 was reconstructed in 2010, and one of the specific goals was to avoid some of the objects that had been identified by FAA as penetrations to the TERPS surfaces, thereby lowering the instrument approach minimums. However, the approach minimums were not lowered by FAA, in part because of AAOs applied under the TERPS approach and departure surfaces. Two subsequent studies examined the instrument approach procedures and the minimums, and recommended (see **Appendix E** for a memorandum prepared in May 2012):

1. Installation of a Localizer Type Directional Aid (LDA) transmitter in the missed approach area for approaches to Runway 26. An LDA transmitter would provide more precise guidance than the existing VOR used for missed approach procedures, and thereby allow FAA to apply smaller departure surfaces and reduce the number of penetrations to OE surfaces. FAA has indicated that an LDA *may* result in lower approach minimums for procedures to Runway 26, including

the ILS, but FAA has not stated what the lower minimums would be, nor where the LDA antenna should be sited to obtain maximum benefit in the missed approach area. It was also determined that the FAA would not pay for the LDA antenna and would not maintain it, both of which would be the Airport's responsibility. It was also noted that development of a new departure procedures after the LDA antenna was installed and lower minimums published could take as long as 12 months.

2. Remove the assumed obstacles in the vicinity of the Airport. It was noted previously that the AGIS mapping prepared in 2010 would result in the removal of some of the AAOs in the vicinity of RIL and result in lower approach minimums. However, the AGIS survey did not include the TERPS missed approach surfaces. As a result FAA continues to use AAOs in those areas to apply adequate safety margins in unmapped areas, and the approach minimums were not lowered.

3. Increase the climb gradient on the missed approach to the GPS RNP 0.30 approach to Runway 26. It was noted that applying the 398'/NM climb gradient to the RNP 0.30 approach could result in minima similar to a RNP 0.10 procedure. FAA Subsequently published an RNAV RNP 0.10 procedure to Runway 26, with approach minimums lower than were anticipated (published RNP 0.10 minimums = 418' DA & 1 mile, vs. anticipated 500' DA and 1 mile).

4. Develop a "special" instrument approach procedure similar to those used at Eagle and Aspen Airports. It was noted that development of a "special" procedure requires significant coordination with users and the FAA, and RIL Airport would have to assume the cost for the development and maintenance of any "special" procedure. In addition, not all aircraft or flight crews would be qualified to fly the "special" procedure.

1.7 FAA FLIGHT PROCEDURES CURRENT ASSESSMENT OF RIL

Discussions were held with Fred Mitchell, FAA Flight Procedures Division, in March 2015 to review the current instrument approach procedures and minimums at RIL. Involved in those discussions with Fred were Brian Condie, RIL Airport Manager, David Kuxhausen, Woolpert, and Stephen Berardo, Jviation. Notes from the conference call with Fred are attached in **Appendix F**.

- Fred noted that there are a number of AAOs in both the approach and departure surfaces to the ILS 26 approach, although there are many more AAOs in the 40:1 missed approach surface (see **Appendix F**). Based on a question from the airport manager, Fred said that if the County had an ordinance restricting development in the missed approach area that FAA would not apply AAOs.

- FAA has inserted AAOs in a variety of locations in order to provide adequate safety margins because it cannot tell whether there are any objects on top of the hills or not. Some of those AAOs do impact the approach minimums on the ILS Runway 26.

- Brian said that his goal is to reduce the minimums on the ILS 26 because that is the most widely used approach. He said it was the County's understanding when the runway was reconstructed in 2010 that FAA would re-examine the approaches and lower the minimums, but that did not happen.
- Woolpert said that they did not map the missed approach areas as part of their AGIS in 2010 because it was not required by FAA.
- Fred said that his records show an obstacle (ID# KRILTO29, elev. 5,553', shown below) near the Runway 26 threshold that is affecting the minimums. Dave Kuxhausen examined Woolpert's AGIS mapping and determined that object is 28.65' lower than FAA's records indicate, and wrote a letter to Fred Mitchell, FAA, showing their survey data (see **Appendix G** for Woolpert letter). Fred Mitchell responded that he lowered the elevation of that object to the elevation shown on AGIS, and based on FAA's new analysis felt that FAA could lower the HAT on the ILS 26 to 200', just based on the objects in the final approach course. He is still looking at objects in the missed approach area which affect the approach minimums.

STANDARD INSTRUMENT APPROACH PROCEDURE DATA RECORD

PART - A OBSTRUCTION DATA

1. APP SEGMENT	FROM	TO	OBSTRUCTION	COORDINATES	ELEV. MSL	ROC	ALT. ADJUSTMENTS	MIN. ALT.
FINAL: ILS	YODUB/I-RIL	RW26	13. GRD (KRILT029)	393133.30N/1074247.28W	5553 (2C)	28.3	MA963 AC20	6800/1263

- Brian Condie noted a tower shown on the ILS 26 approach chart with an elevation of 5,969' is not there. Dave Kuxhausen said that tower is not shown on the AGIS mapping. Fred said that tower was identified by FAA National Flight Data Center (NFDC), but it is not shown in his records. Fred will look at that further and determine if it can be removed from the approach chart.
- A discussion was held about whether Woolpert could survey the AAOs in the missed approach and document that the objects are either not there or much lower than FAA records indicate. Fred said he would provide a map delineating an area that would need surveying. Dave said it would be much more cost effective to survey specific points (assuming he had the latitude/longitude coordinates for each point), rather doing an area survey.
- Dave Kuxhausen talked with Chuck Youngblood, FAA Flight Procedures, Oklahoma City, to confirm that FAA would accept Woolpert's survey data in the 40:1 missed approach area and re-examine the instrument approach minimums based on the new survey. Youngblood confirmed that FAA would do that.
- Dave Kuxhausen said Woolpert will provide a cost estimate and schedule to do the survey for the AAOs after they have received the spreadsheet from Fred Mitchell.

DRAFT AIRSPACE & INSTRUMENT PROCEDURES REPORT

AIRPORT MASTER PLAN

Rifle Garfield County Airport

Appendix A

Instrument Approach and Departure Procedures

Source: FAA Aeronautical Information Services

http://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dtpp/search/results/?cycle=1503&ident=ril

ILS RWY 26

GARFIELD COUNTY RGNL (RIL)

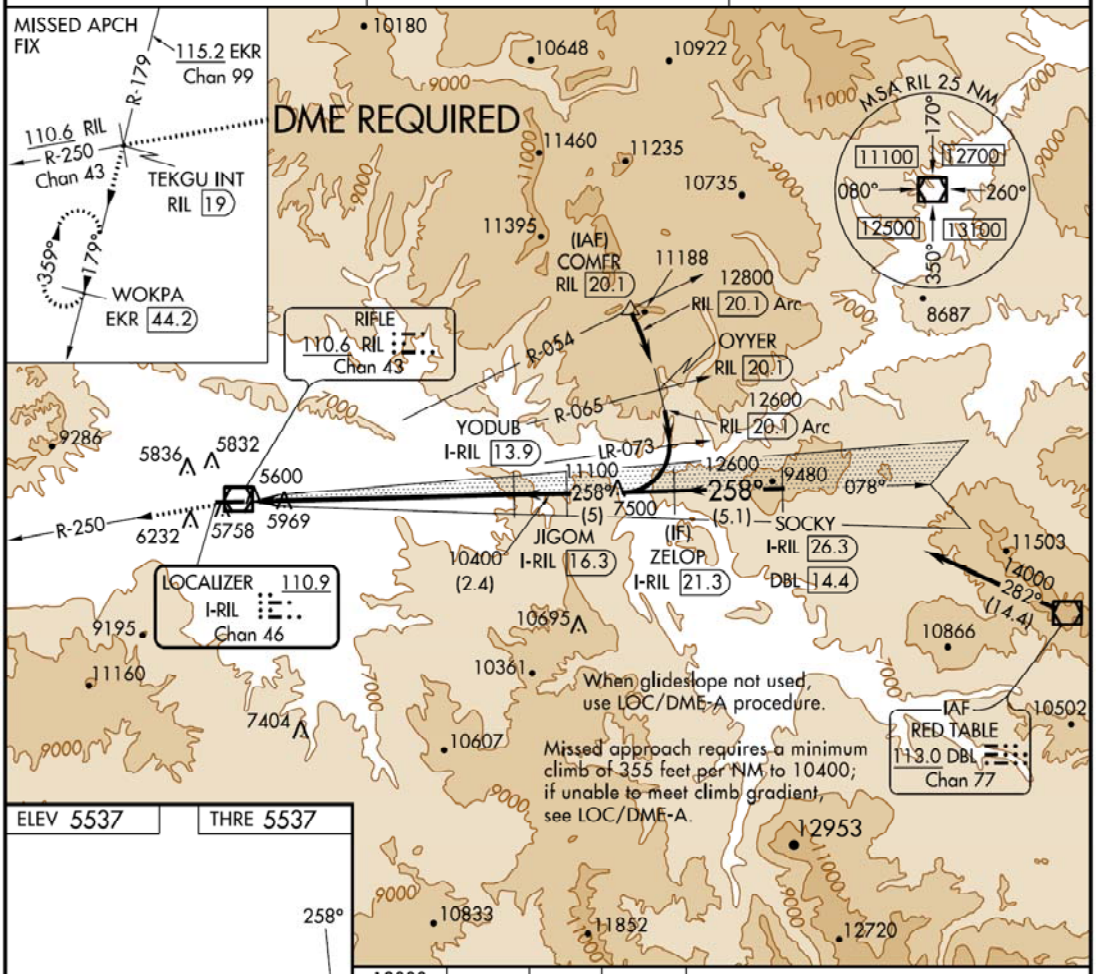
LOC/DME I-RIL	APP CRS	Rwy Idg	7000
110.9	258°	THRE	5537
Chan 46		Apt Elev	5537

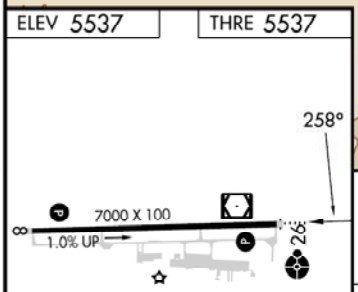
Visibility reduction by helicopters NA.
Use I-RIL DME when on localizer course.
DME required. Circling not authorized.

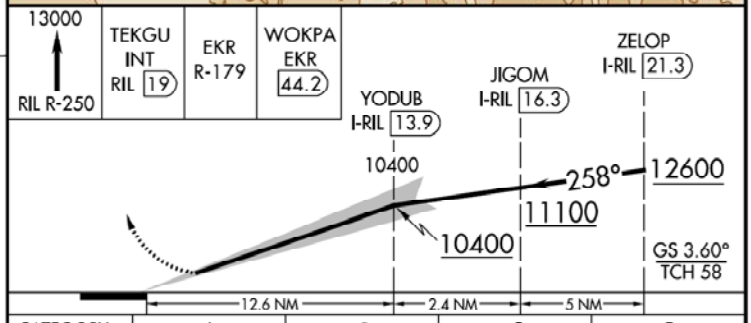
ODALS

MISSED APPROACH: Climb to 13000 on RIL VOR/DME R-250 to TEKGU INT/RIL 19 DME and on EKR VOR/DME R-179 to WOKPA/EKR 44.2 DME and hold.

ASOS	DENVER CENTER	UNICOM
135.275	134.5 327.8	122.8 (CTAF)







CATEGORY	A	B	C	D
S-ILS 26	6800-4	1263 (1300-4)		NA

HIRL Rwy 8-26
REIL Rwy 8

APP CRS		
259°	Rwy Idg	7000
	TDZE	5537
	Apt Elev	5537

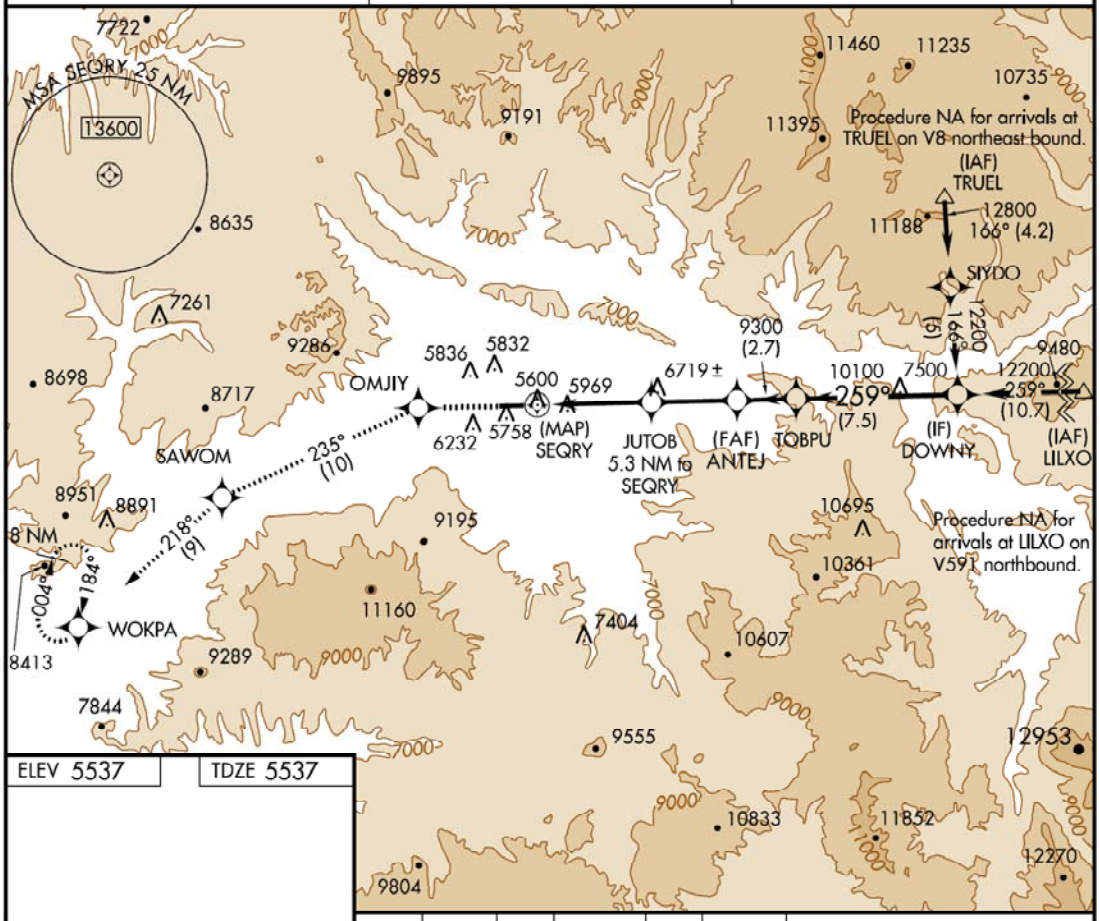
RNAV (GPS) W RWY 26
GARFIELD COUNTY RGNL (RIL)

DME/DME RNP-0.3 NA. Visibility reduction by helicopters NA. Circling not authorized at night south of Rwy 8-26. Inoperative table does not apply.

ODALS

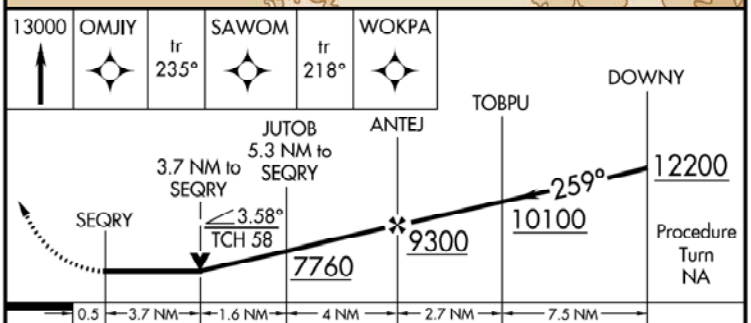
MISSED APPROACH: Climb to 13000 direct OMJIY and on track 235° to SAWOM and on track 218° to WOKPA and hold, continue climb-in-hold to 13000.

ASOS	DENVER CENTER	UNICOM
135.275	134.5 327.8	122.8 (CTAF) L



ELEV 5537 TDZE 5537

HIRL Rwy 8-26 L
REIL Rwy 8 L



CATEGORY	A	B	C	D
LNAV MDA	7180-1¼ 1643 (1700-1¼)	7180-1½ 1643 (1700-1½)	7180-3 1643 (1700-3)	NA
CIRCLING	7180-1¼ 1643 (1700-1¼)	7180-1½ 1643 (1700-1½)	7180-3 1643 (1700-3)	NA

RNAV (GPS) X RWY 26

GARFIELD COUNTY RGNL (RIL)

WAAS	APP CRS	Rwy Idg	7000
CH 93708	259°	TDZE	5537
W26A		Apt Elev	5537

NA DME/DME RNP-0.3 NA.

ODALS

MISSED APPROACH: Climb to 13000 direct OMJIY and on track 235° to SAWOM and on track 218° to WOKPA and hold, continue climb-in-hold to 13000.

ASOS	DENVER CENTER	UNICOM
135.275	134.5 327.8	122.8 (CTAF) L

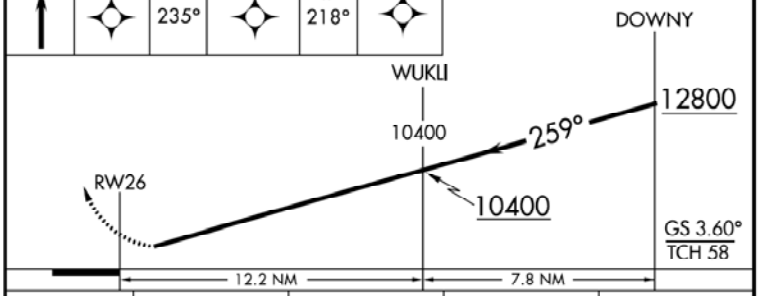
MSA RW 26 25 NM
13100
7722
9895
9191
11460
11235
10735
11395
Procedure NA for arrivals at TRUEL on V8 northeast bound.
(IAF) TRUEL
11188
166° (9.2)
12800
8635
7261
9286
8698
8717
5836
5832
5600
5969
OMJIY
6232
5758
RW26
WUKLI
10400
7500
259° (7.8)
(IF) DOWNY
9480
12800
259° (10.7)
(IAF) LILXO
SAWOM
235° (10)
8951
8891
8 NM
218° (9)
184°
004°
WOKPA
8413
9289
9195
11160
7404
10695
10361
10607
Procedure NA for arrivals at LILXO on V591 northbound.
9555
12953
11852
10833
12270
9804
Missed approach obstructions require a minimum climb gradient of 290 ft/NM to 9600 feet; if unable to meet climb gradient, see RNAV (GPS) W RWY 26.

ELEV 5537 TDZE 5537

259° to RW26

7000 X 100
1.0% UP
26

13000	OMJIY	tr 235°	SAWOM	tr 218°	WOKPA



CATEGORY	A	B	C	D
LPV DA	6300-2¼	763 (800-2¼)		NA

HIRL Rwy 8-26 L
REIL Rwy 8 L

APP CRS	Rwy Idg	7000
259°	TDZE	5537
	Apt Elev	5537

RNAV (RNP) Y RWY 26

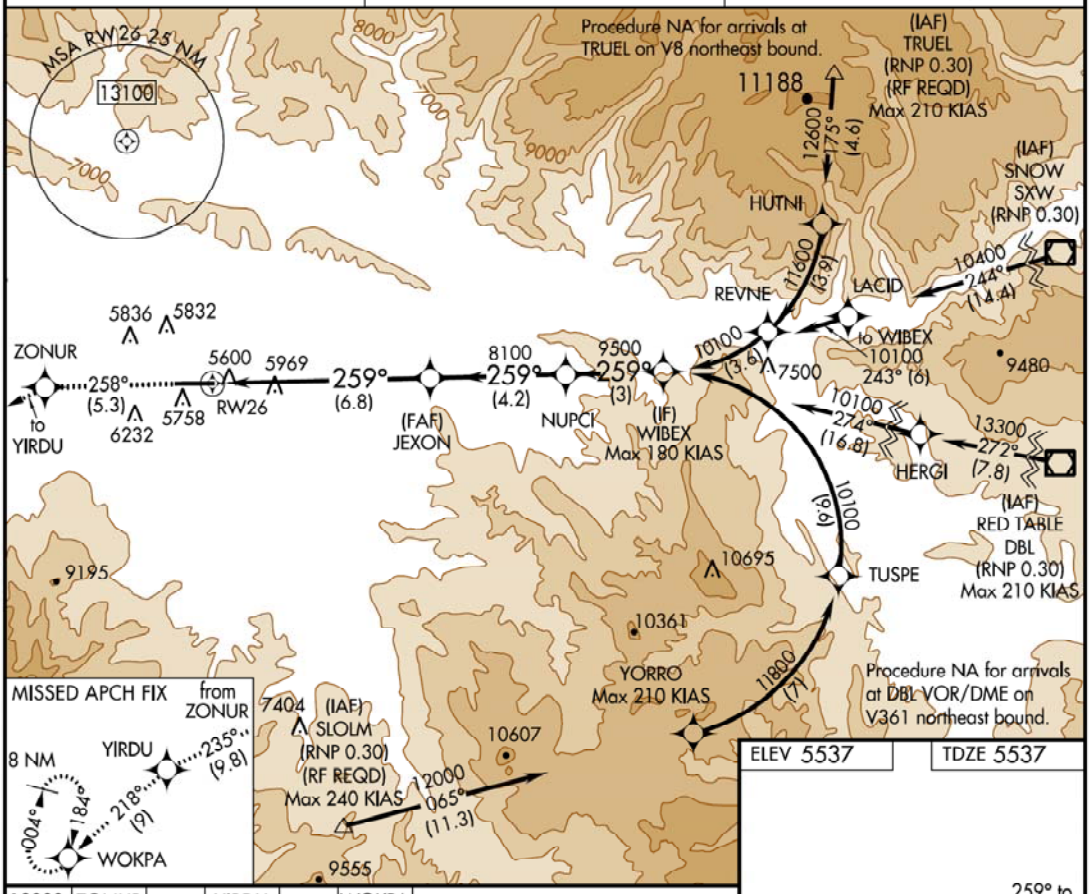
GARFIELD COUNTY RGNL (RIL)

When VGSI inoperative, procedure NA at night.
For uncompensated Baro-VNAV systems, procedure NA below -24°C (-11°F) or above 38°C (100°F).
GPS required.

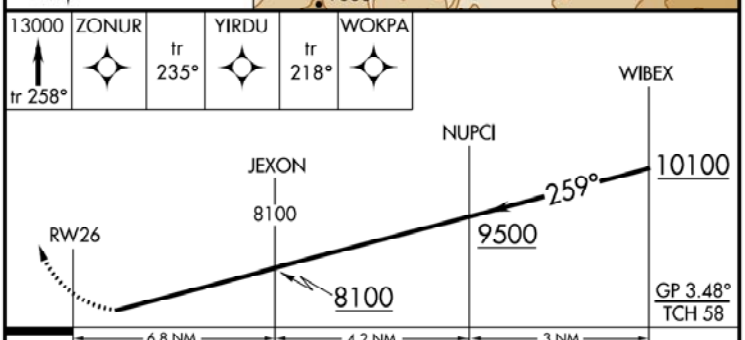
ODALS

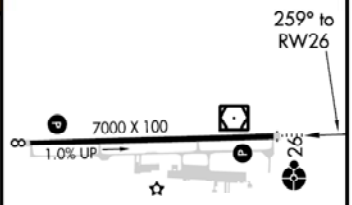
MISSED APPROACH: Climb to 13000 on track 258° to ZONUR and track 235° to YIRDU and track 218° to WOKPA and hold, continue climb-in-hold to 13000.

ASOS	DENVER CENTER	UNICOM
135.275	134.5 327.8	122.8 (CTAF) L



ELEV 5537 TDZE 5537





CATEGORY	A	B	C	D
RNP 0.30 DA	6387-2½ 850 (900-2½)			NA

AUTHORIZATION REQUIRED

HIRL Rwy 8-26 L
REIL Rwy 8 L

APP CRS	Rwy Idg	7000
259°	THRE	5537
	Apt Elev	5537

RNAV (RNP) Z RWY 26

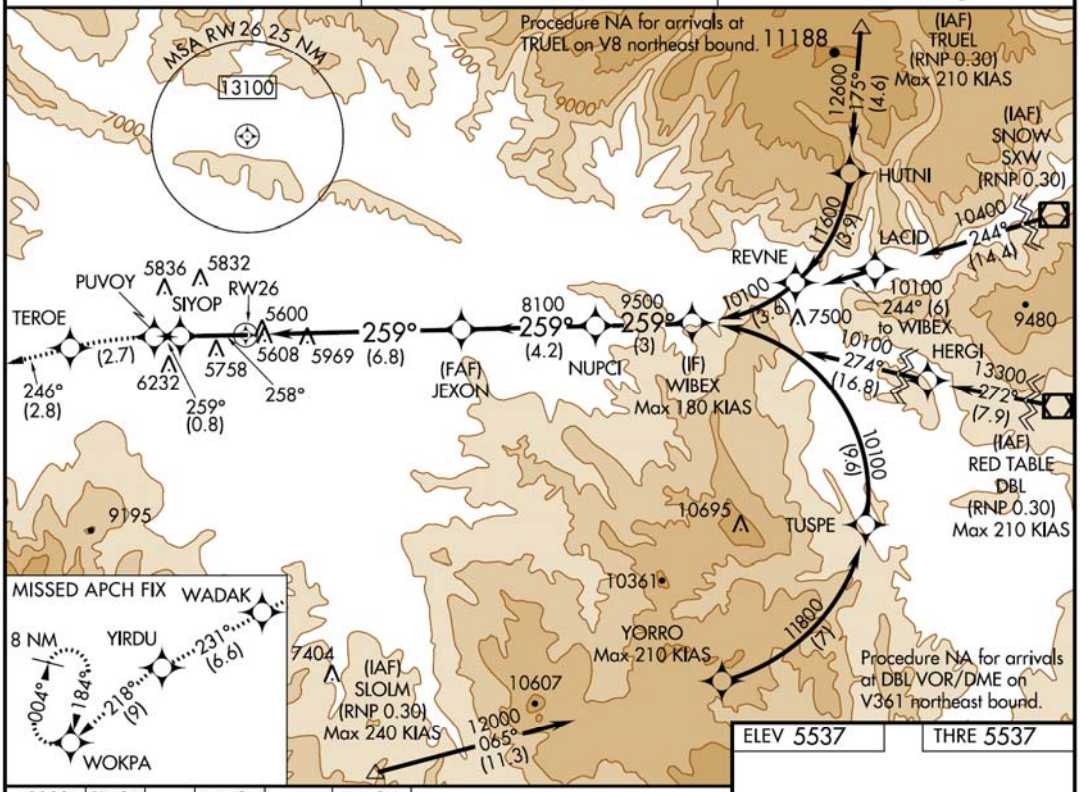
GARFIELD COUNTY RGNL (RIL)

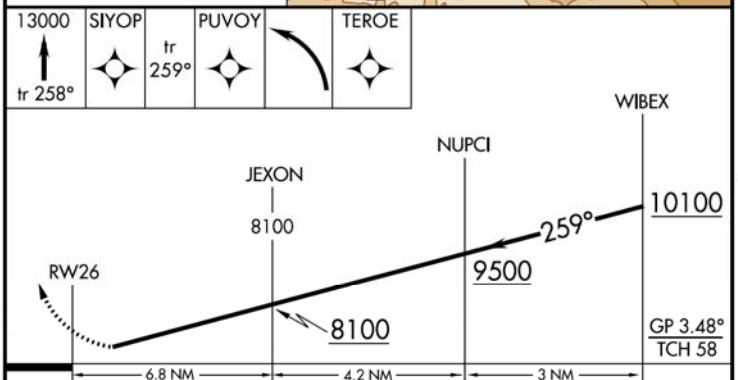
*Missed approach requires minimum climb of 398 feet per NM to 9100. When VGSI inoperative, procedure NA at night. RF required. GPS required. Missed approach requires RNP less than 1.0. For uncompensated Baro-VNAV systems, procedure NA below -24°C (-11°F) or above 38°C (100°F).

ODALS

MISSED APPROACH: Climb to 13000 on track 258° to SIYOP and track 259° to PUVOY left turn to TEROE and track 246° to WADAK and track 231° to YIRDU and track 218° to WOKPA and hold, continue climb-in-hold to 13000.

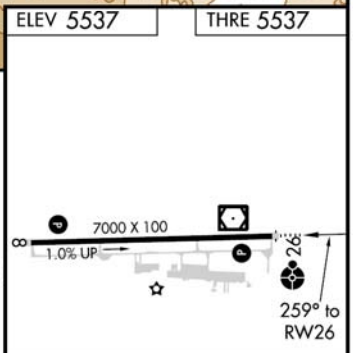
ASOS	DENVER CENTER	UNICOM
135.275	134.5 327.8	122.8 (CTAF) L





CATEGORY	A	B	C	D
RNP 0.10 DA*	5955-1	418 (500-1)		NA
RNP 0.30 DA	6387-2½	850 (900-2½)		NA

AUTHORIZATION REQUIRED



HIRL Rwy 8-26 L
REIL Rwy 8 L

APP CRS	Rwy Idg	7000
068°	TDZE	5498
	Apt Elev	5537

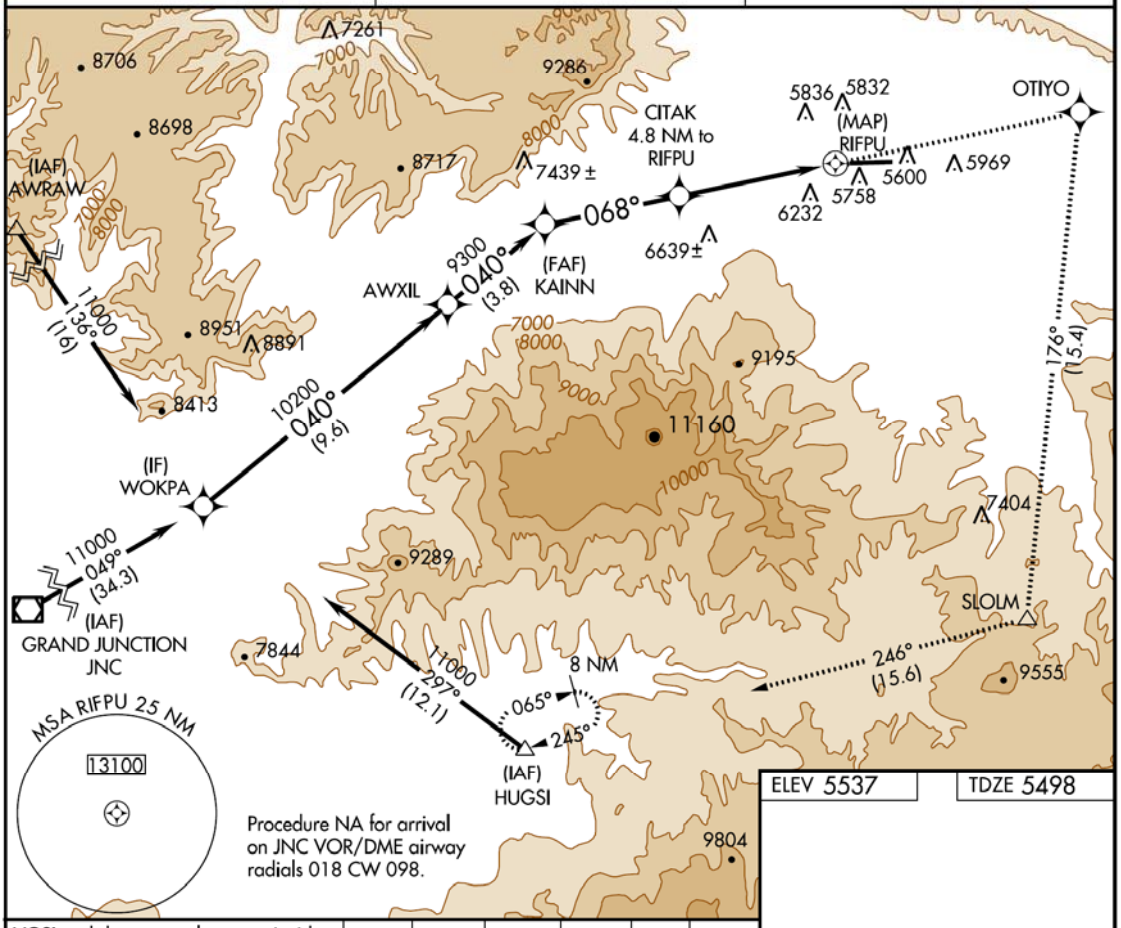
RNAV (GPS) Y RWY 8

GARFIELD COUNTY RGNL (RIL)

DME/DME RNP- 0.3 NA. Visibility reduction by helicopters NA. Circling NA at night south of Rwy 8-26.

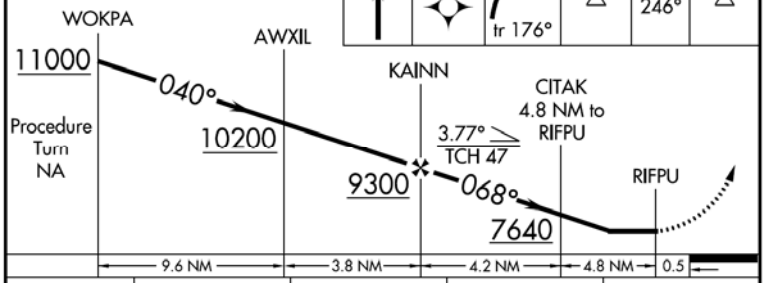
MISSED APPROACH: Climb to 13000 direct OTIYO and right turn on track 176° to SLOLM and on track 246° to HUGSI and hold, continue climb-in-hold to 13000.

ASOS	DENVER CENTER	UNICOM
135.275	134.5 327.8	122.8 (CTAF) L

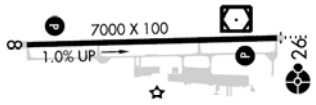


ELEV 5537 TDZE 5498

VGSI and descent angles not coincident (VGSI Angle 3.00/TCH 47).



CATEGORY	A	B	C	D
LNAV MDA	7420-1¼ 1922 (1900-1¼)	7420-1½ 1922 (1900-1½)	7420-3 1922 (1900-3)	NA
CIRCLING	7420-1¼ 1883 (1900-1¼)	7420-1½ 1883 (1900-1½)	7420-3 1883 (1900-3)	NA



HIRL Rwy 8-26 L
REIL Rwy 8 L

RNAV (RNP) Z RWY 8

GARFIELD COUNTY RGNL (RIL)

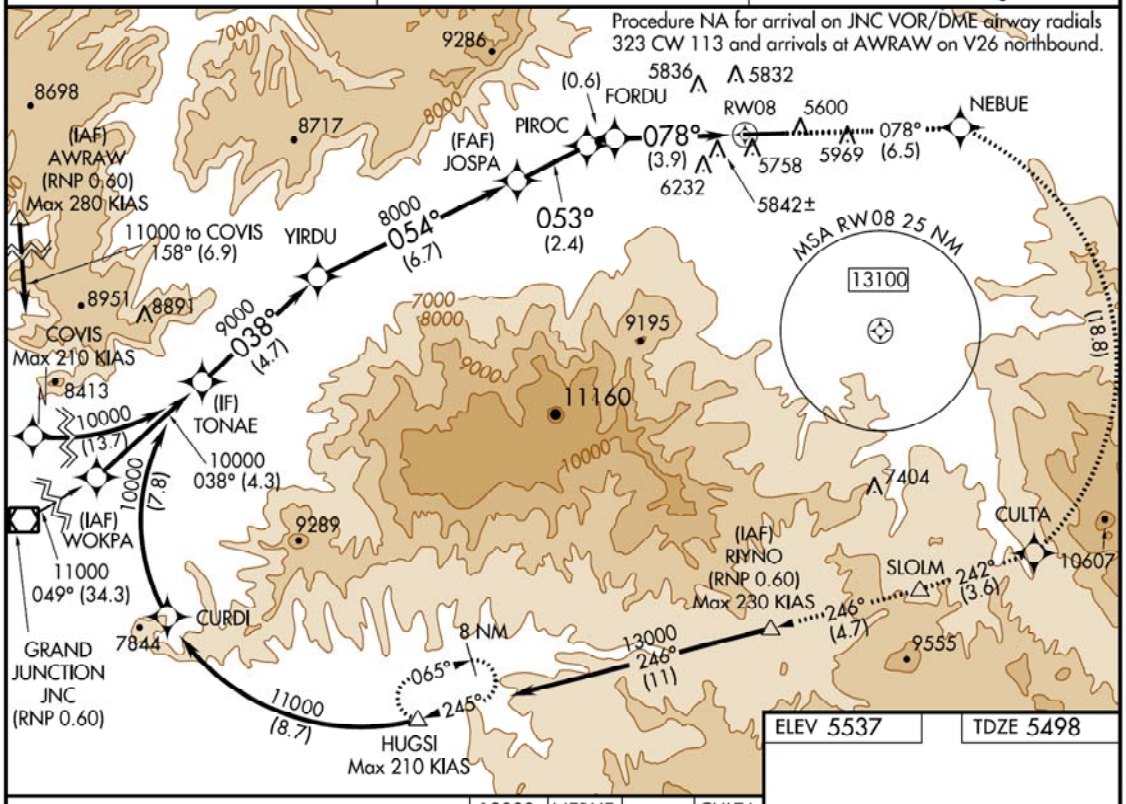
APP CRS	Rwy Idg	7000
078°	TDZE	5498
	Apt Elev	5537

RF and GPS required.
Procedure NA for wingspans greater than 136 feet. For uncompensated Baro-VNAV systems, procedure NA below -24°C (-11°F) or above 54°C (130°F).
* Missed approach requires minimum climb of 425 feet per NM to 11300.
** Missed approach requires minimum climb of 425 feet per NM to 10000; if unable, see RNAV (GPS) Y RWY 8.

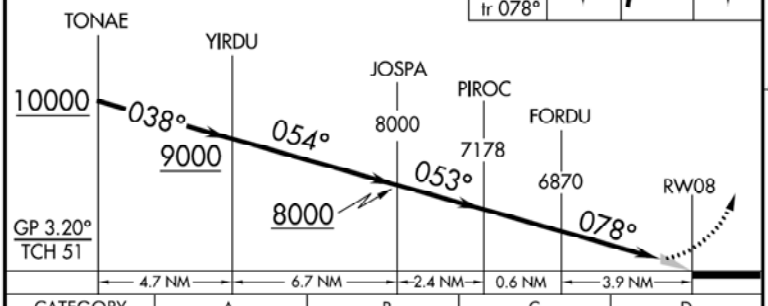
MISSED APPROACH: Climb to 13000 on track 078° to NEBUE, right turn to CULTA, and track 242° to SLOLM and track 246° to RIYNO and track 246° to HUGSI and hold.

ASOS	DENVER CENTER	UNICOM
135.275	134.5 327.8	122.8 (CTAF) L

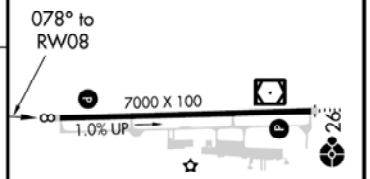
Procedure NA for arrival on JNC VOR/DME airway radials 323 CW 113 and arrivals at AWRAW on V26 northbound.



VGSI and RNAV glidepath not coincident (VGSI Angle 3.00/TCH 47).



13000	NEBUE		CULTA
tr 078°			



ELEV 5537 TDZE 5498

CATEGORY	A	B	C	D
RNP 0.10 DA*	5748-1	250 (300-1)		NA
RNP 0.30 DA**	6391-3	893 (900-3)		NA

AUTHORIZATION REQUIRED

HIRL Rwy 8-26 L
REIL Rwy 8 L

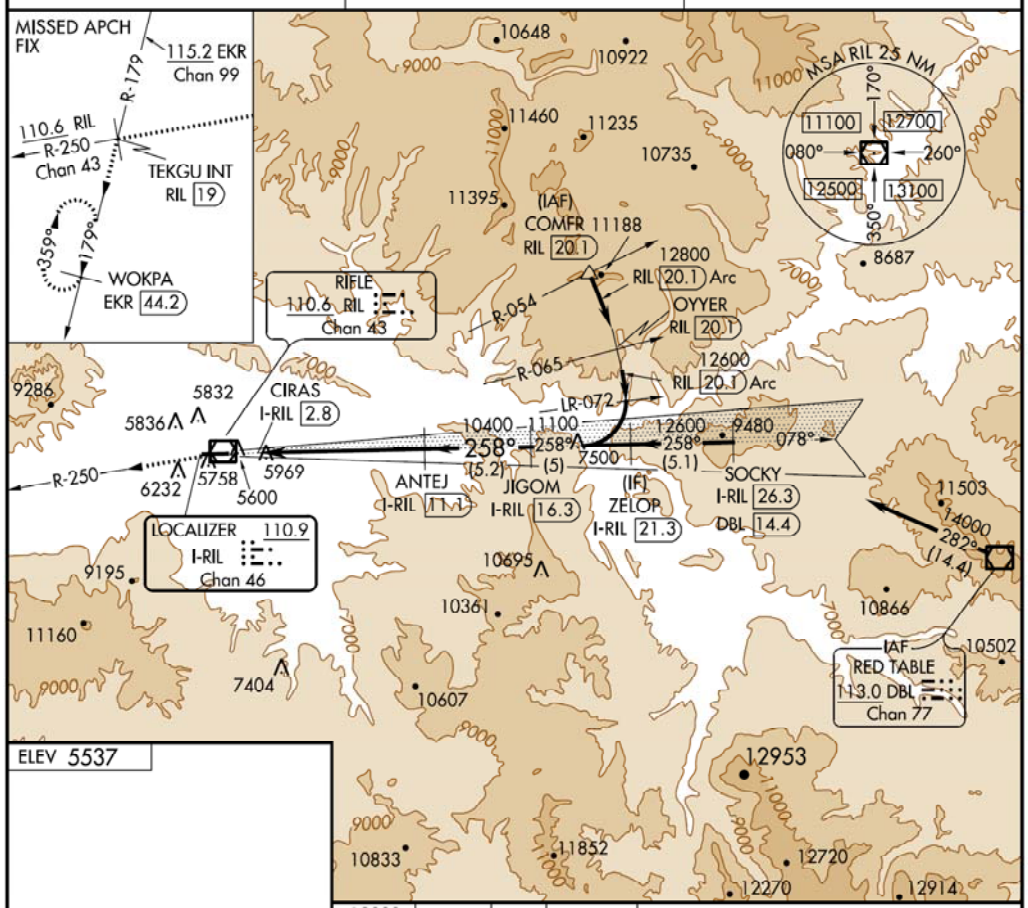
LOC/DME I-RIL	APP CRS	Rwy Idg	N/A
110.9 Chan 46	258°	TDZE	N/A
		Apt Elev	5537

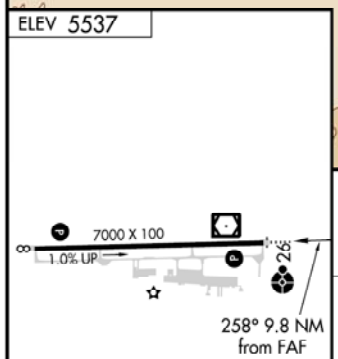
LOC/DME-A
GARFIELD COUNTY RGNL (RIL)

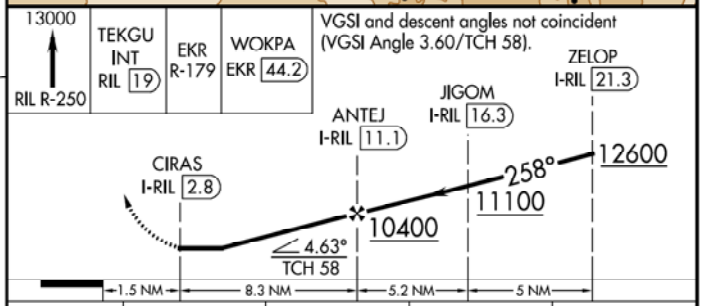
Visibility reduction by helicopters NA.
Use I-RIL DME when on localizer course.
Circling not authorized at night south of Rwy 8-26.

MISSED APPROACH: Climb to 13000 on RIL VOR/DME R-250 to TEKGU INT/RIL 19 DME and on EKR VOR/DME R-179 to WOKPA/EKR 44.2 DME and hold, continue climb-in-hold to 13000.

ASOS	DENVER CENTER	UNICOM
135.275	134.5 327.8	122.8 (CTAF) L







CATEGORY	A	B	C	D
CIRCLING	7780-1¾	2243 (2300-1¾)	7780-3 2243 (2300-3)	NA

HIRL Rwy 8-26 L
REIL Rwy 8 L

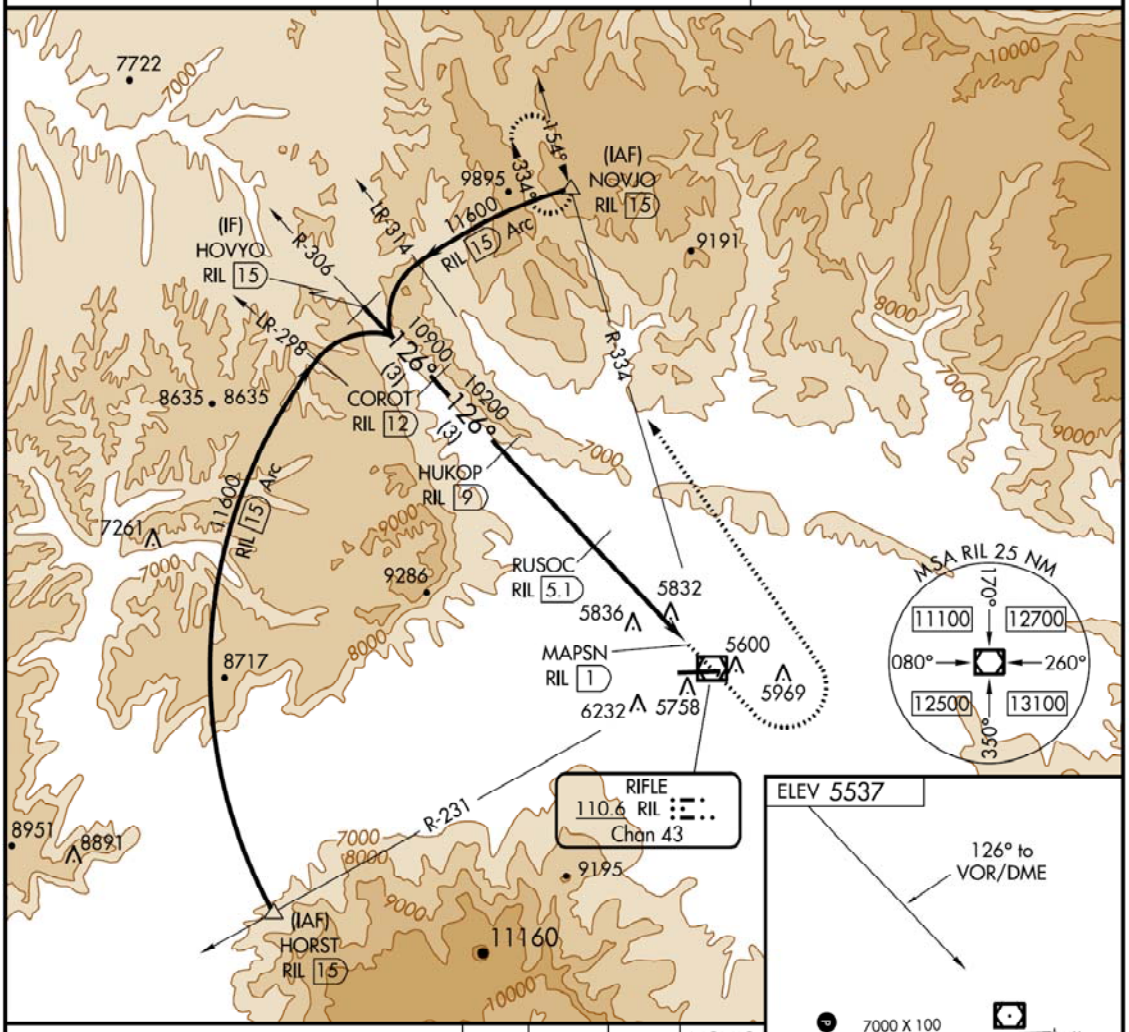
VOR/DME RIL	APP CRS	Rwy Idg	N/A
110.6	126°	TDZE	N/A
Chan 43		Apt Elev	5537

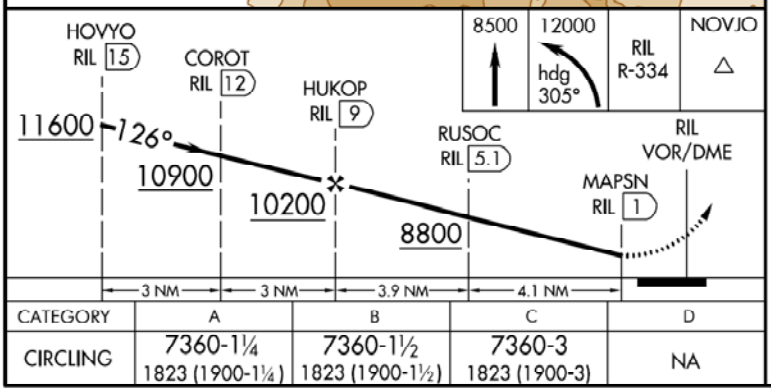
VOR/DME-C
GARFIELD COUNTY RGNL (RIL)

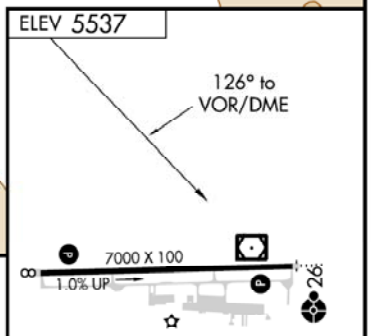
Circling NA south of Rwy 8-26 at night.

MISSED APPROACH: Climb to 8500 then climbing left turn 12000 on heading 305° and RIL VOR/DME R-334 to NOVJO/15 DME and hold, continue climb-in-hold to 12400.

ASOS	DENVER CENTER	UNICOM
135.275	134.5 327.8	122.8 (CTAF) L



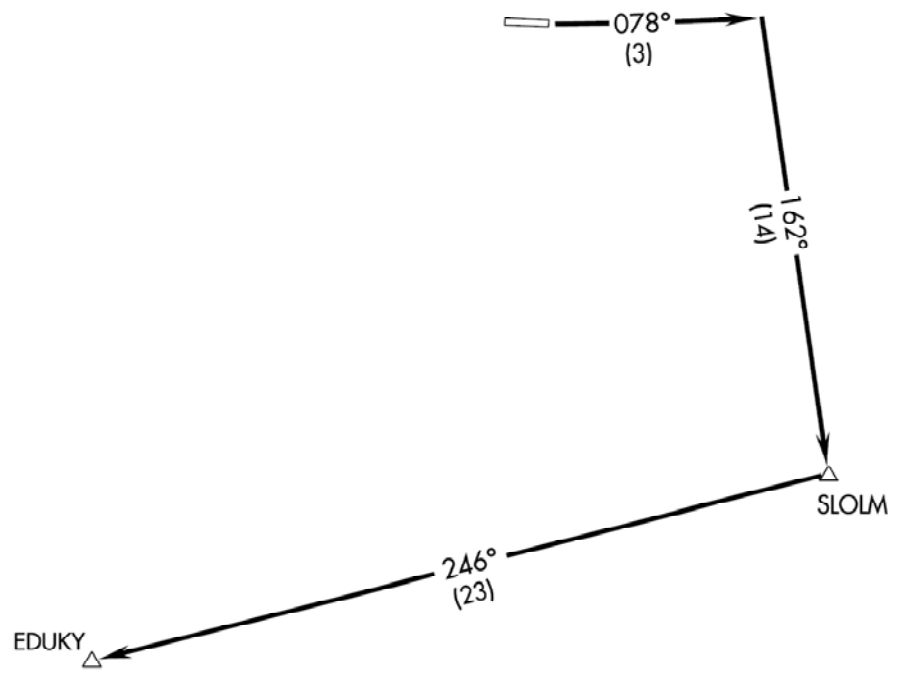




CATEGORY	A	B	C	D
CIRCLING	7360-1¼ 1823 (1900-1¼)	7360-1½ 1823 (1900-1½)	7360-3 1823 (1900-3)	NA

HIRL Rwy 8-26 L
REIL Rwy 8 L

DENVER CENTER
134.5 327.8



TAKEOFF MINIMUMS

Rwy 26: NA- ATC.

Rwy 8: Standard with minimum climb of 396′ per NM to 11100.

NOTE: GPS Required.

NOTE: RNAV 1

TAKEOFF OBSTACLE NOTES

Rwy 8: Terrain beginning 452′ from DER, 464′ right of centerline, up to 5551′ MSL..
Pole 4024′ from DER, 1396′ right of centerline 42′ AGL/5642′ MSL.
Obstruction light on NDB Tower 15′ from DER, 283′ left of centerline, up to 5586′ MSL.
Transmission line towers beginning 1.7 NM from DER, 1852′ right of centerline, up to 150′ AGL/5969′ MSL.

NOTE: Chart not to scale.

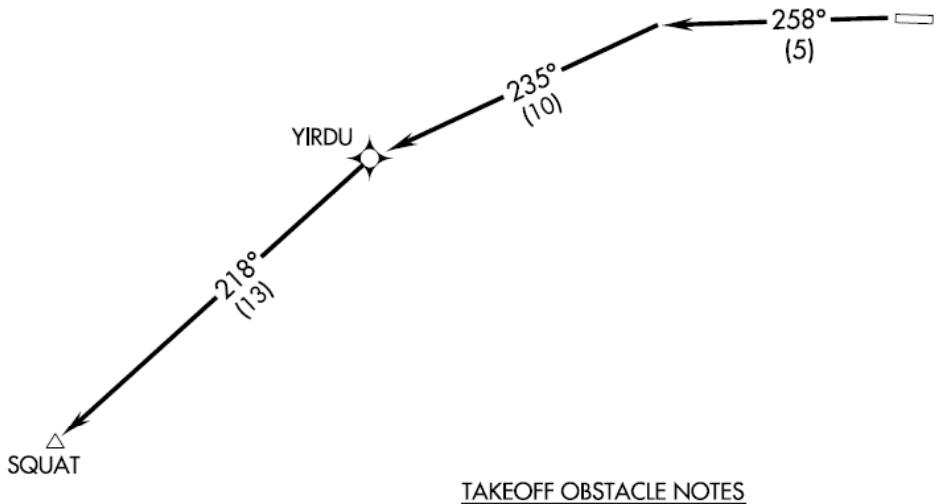
DEPARTURE ROUTE DESCRIPTION

TAKEOFF RUNWAY 8: Climb heading 078° to intercept course 162° to SLOLM, then on track 246° to EDUKY, Thence. . . .

. . . .via assigned route, maintain 14000, expect clearance to assigned altitude 10 minutes after departure.

SQUAT THREE DEPARTURE (RNAV) (OBSTACLE)

DENVER CENTER
134.5 327.8



TAKEOFF OBSTACLE NOTES
Rwy 26: Poles beginning 1446' from DER, 634' left of centerline, up to 58' AGL/5331' MSL.

TAKEOFF MINIMUMS
Rwy 8: NA- ATC.
Rwy 26: Standard with minimum climb of 399' per NM to 9700.

NOTE: GPS Required.
NOTE: RNAV 1

NOTE: Chart not to scale.

DEPARTURE ROUTE DESCRIPTION

TAKEOFF RUNWAY 26: Climb heading 258° to intercept course 235° to YIRDU, and on 218° to SQUAT, maintain 10500 or as assigned.

UYRIG THREE DEPARTURE (RNAV)

NOTE: RNAV 1.
NOTE: GPS Required.

TAKEOFF MINIMUMS
Rwy 26: NA - ATC.
Rwy 8: Standard with minimum climb of 335' per NM to 10000.

TAKEOFF OBSTACLE NOTES
Rwy 8: Terrain beginning 452' from DER, 464' right of centerline, up to 5551' MSL.
Pole 4024' from DER, 1396' right of centerline, 42' AGL/5642' MSL.
Obstruction light on NDB Twr 15' from DER, 283' left of centerline, up to 5586' MSL.
Transmission line towers beginning 1.7 NM from DER, 1852' right of centerline, up to 150' AGL/5969' MSL.

NOTE: Chart not to scale.

DEPARTURE ROUTE DESCRIPTION

TAKEOFF RUNWAY 8: Climb heading 078° to intercept course 064° to TALJE, then on track 090° to UYRIG. Thence. . . .

. . . .via transition or assigned route. Maintain 14000, expect clearance to assigned altitude 10 minutes after departure.

RED TABLE TRANSITION (UYRIG3.DBL)

SNOW TRANSITION (UYRIG3.SXW)

RIFLE, CO

GARFIELD COUNTY RGNL (RIL)

TAKEOFF MINIMUMS AND (OBSTACLE) DEPARTURE PROCEDURES

AMDT 10 12320 (FAA)

TAKEOFF MINIMUMS: **Rwy 8,** std. w/ min. climb of 400' per NM to 11900 or 5400-3 for climb in visual conditions.

DEPARTURE PROCEDURE: **Rwy 8,** DME required. Climb on RIL VOR/DME R-083 to ZOBAK/7.4 DME, then climbing left turn direct RIL VOR/DME. Climb In RIL VOR/DME holding pattern (hold East, right turns, 263° inbound) to cross RIL VOR/DME at or above MEA/MCA before proceeding enroute, or for climb in visual conditions cross Garfield County RGNL airport at or above 10800 before proceeding on course. When executing VCOA, notify ATC prior to departure. **Rwy 26,** use SQUAT (RNAV) DEPARTURE.

NOTE: **Rwy 8,** terrain beginning 155' from DER, 380' right of centerline, up to 5551' MSL. Pole 4049' from DER, 1379' right of centerline, 42' AGL/5642' MSL. Obstruction light on NDB tower 41’ from DER, 300' left of centerline, 46' AGL/5586' MSL.

APPENDIX B

WIDE AREA MULTILATERATION (WAM)

SURVEILLANCE SYSTEM

Sources: CDOT and FAA

The Colorado Surveillance Project

What is the "Colorado Surveillance Project":

- "The cooperative Effort between the State of Colorado and the FAA to advance NextGen by deploying the emerging technologies of ADS-B and WAM to bring radar like service to the mountain airports of serving Ski Country."

Why a State of Colorado Project:

- Business Case - Colorado Ski Country Airports did not support the business case necessary to justify a 100% FAA funded project.
- The Division of Aeronautics realized that it would have to be part of the of the solution and not rely solely on the FAA.

Need for Improved Surveillance:

- Capacity - Increase airport capacity by eliminating the need for one-in one-out operations and improving operational efficiencies.
- Access – Enhanced surveillance improves access to airports by reducing delays, diversions and denied access.
- Economics - When aircraft are delayed or diverted due to the inability to safely and efficiently separate aircraft, there is a significant negative impact to the state and economies.

The Colorado Surveillance Project Overview

Phase I – **Complete certified in the NAS**

Utilized Wide Area Multilateration (WAM) as the surveillance source and provides "radar like" services to the following Colorado Ski Country Airports:

1. **Craig**
2. **Hayden**
3. **Steamboat Springs**
4. **Rifle**

- ✓ Project Start 2006
- ✓ Site Acceptance Test (SAT) 2009
- ✓ Initial Operating Capability (IOC) 2010

Phase II – Will add ADS-B to WAM to provide "radar like" coverage to the Following Colorado Ski Country airports:

1. **Durango**
2. **Gunnison**
3. **Montrose – Key Site**
4. **Telluride**

- ✓ Design Underway - Radios, Target Processor and Virtual Radar
- ✓ Siting for Key Site Montrose In process
- ✓ IOC **Montrose** scheduled June 2012
- ✓ IOC **Durango, Gunnison** and **Telluride** scheduled March 2013

Challenges to Colorado Mountain Airports

Colorado's Mountain Airports experience the three "D's": Delays, Diversions and Denied Service.

Factors that contribute to the three D's are:

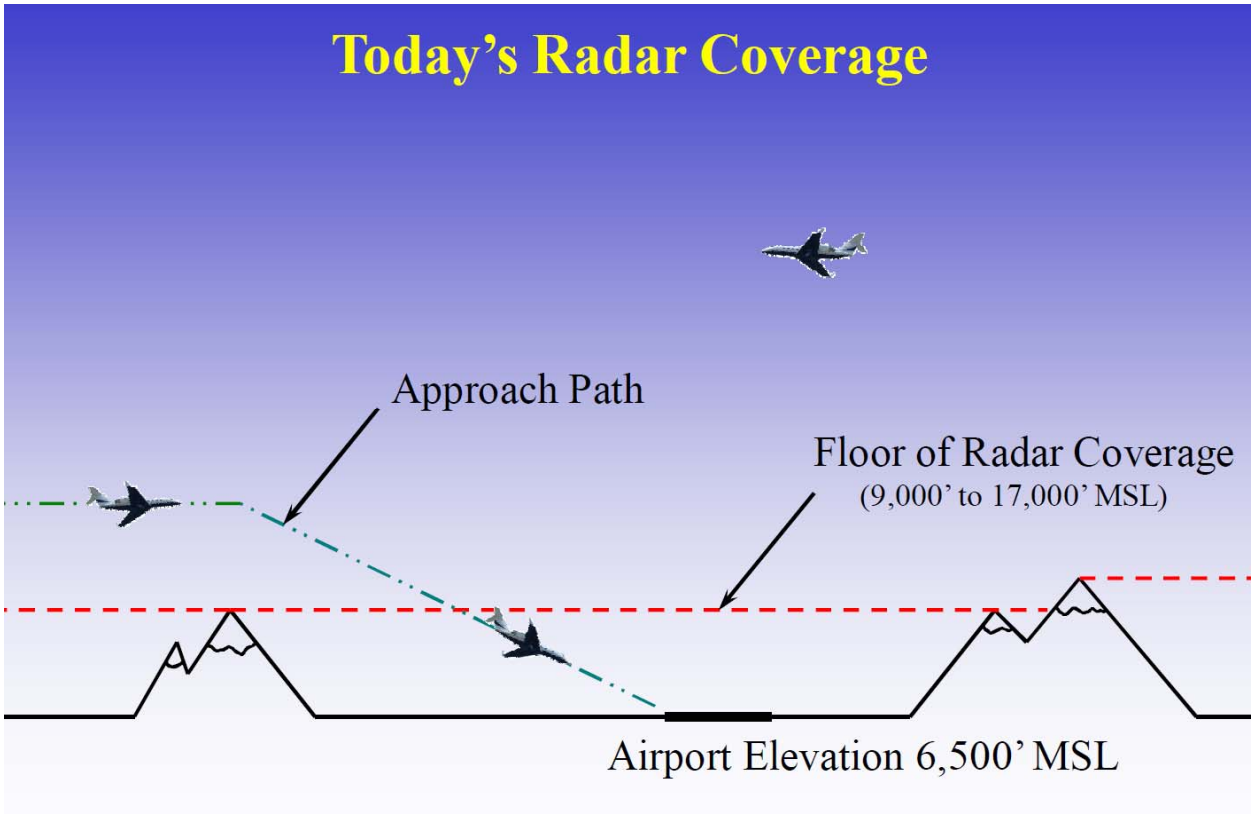
a. Weather

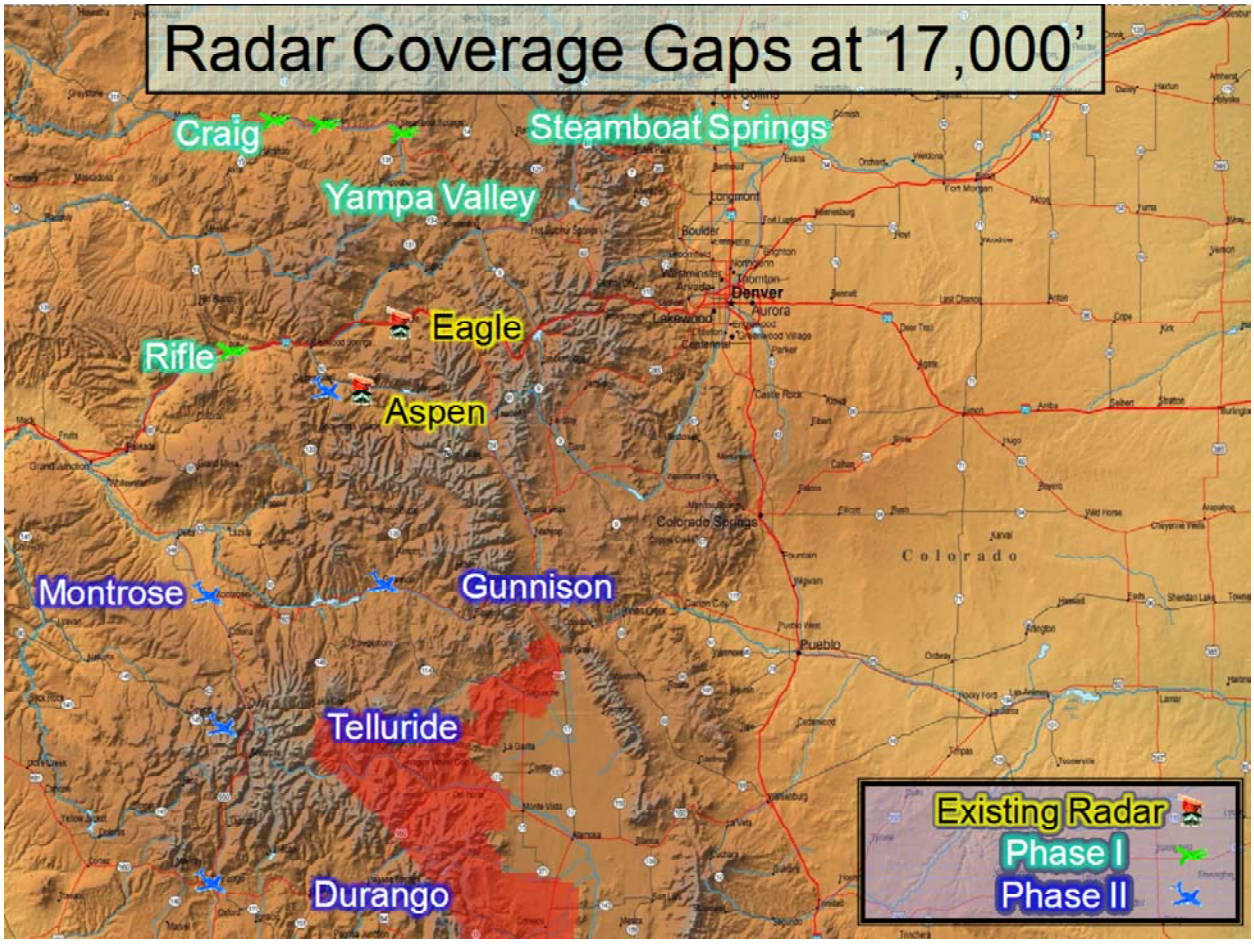
b. Traffic Volume (Denied Service)

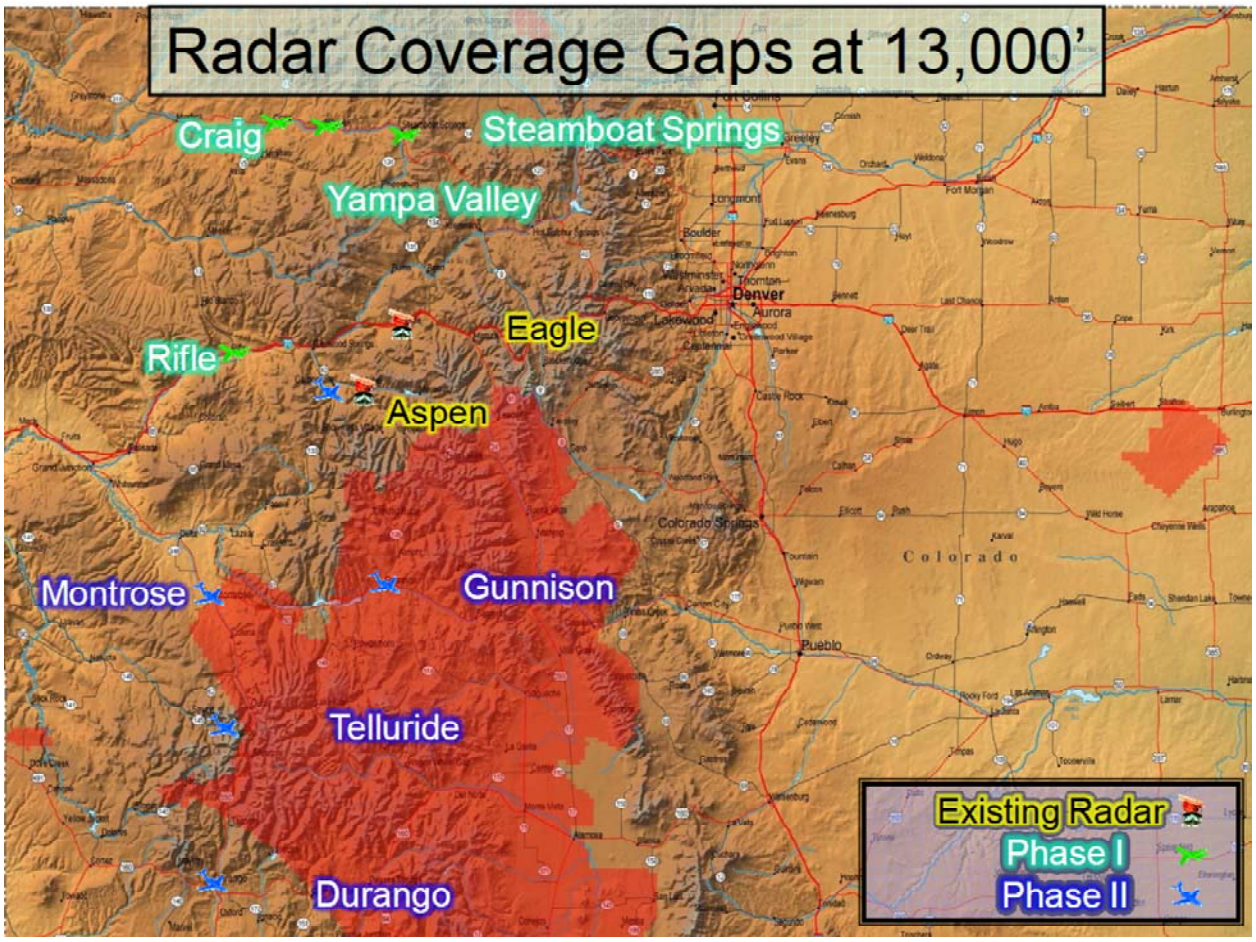
c. Physical Limitations of the Airport
   - Surrounding Mountainous Terrain
   - Runway Configuration - Most mountain airports have only one instrument runway, which limits the number of instrument approaches.
   - Limited Ramp Space - Aircraft must depart the airport, adding to the volume problem.

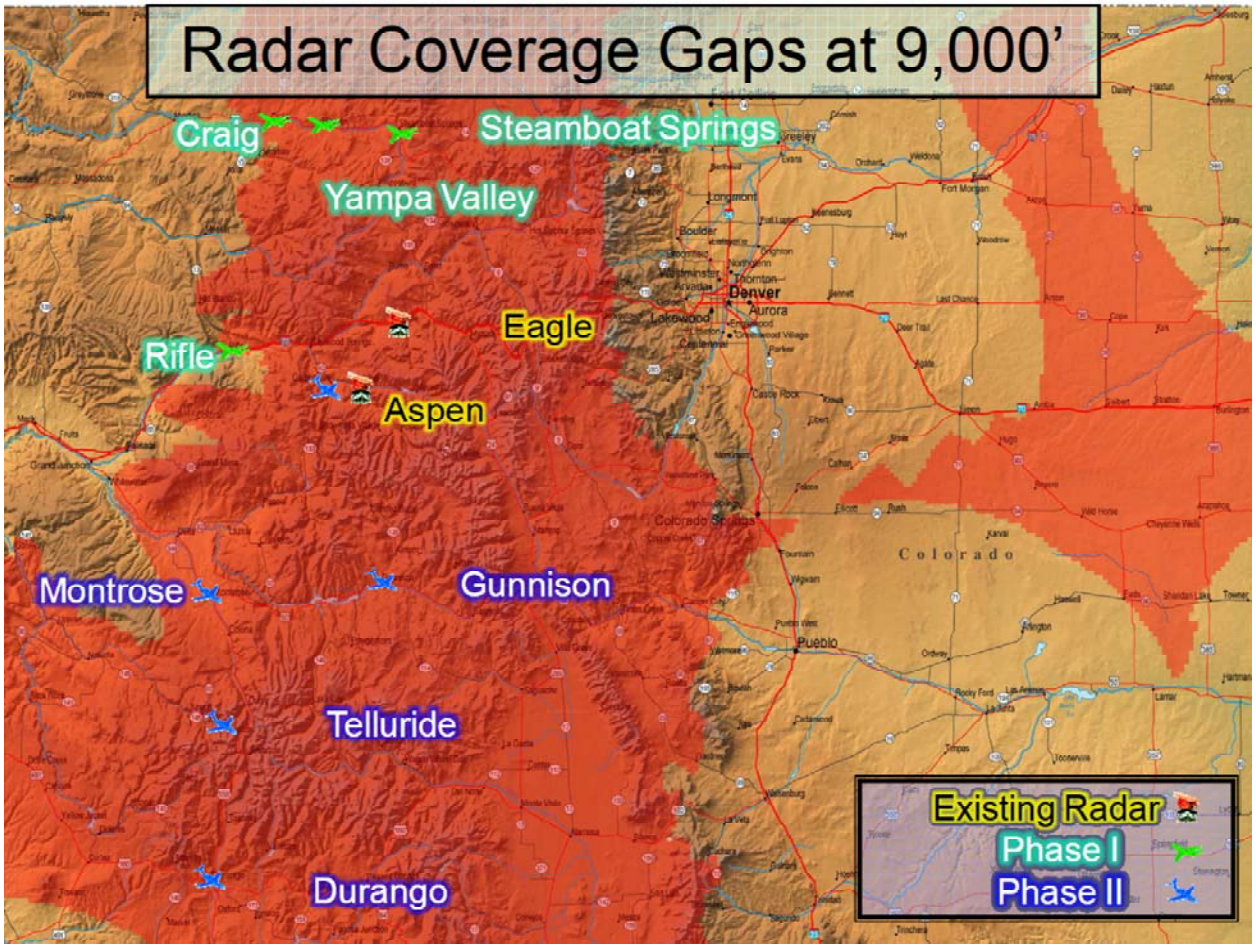
d. Instrument Approaches - Terrain causes approach minimums to be high resulting in more missed approaches (Delays and Diversions).

e. Lack of Surveillance - Inadequate surveillance during the approach and departure phase of flight results in greater separation requirements and reduced airport capacity.


Today's Radar Coverage
Approach Path
Floor of Radar Coverage
(9,000' to 17,000' MSL)
Airport Elevation 6,500' MSL


Radar Coverage Gaps at 17,000'
Craig
Steamboat Springs
Yampa Valley
Eagle
Rifle
Aspen
Montrose
Gunnison
Telluride
Durango
Denver
Aurora
Colorado Springs
Pueblo
Colorado
Existing Radar
Phase I
Phase II

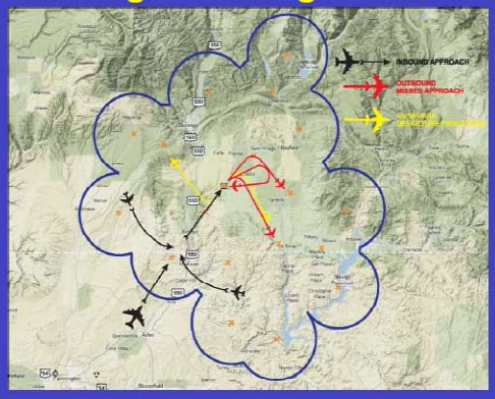

Radar Coverage Gaps at 13,000'
Craig
Steamboat Springs
Yampa Valley
Eagle
Rifle
Aspen
Montrose
Gunnison
Telluride
Durango
Denver
Aurora
Lakewood
Colorado Springs
Pueblo
Colorado
Existing Radar
Phase I
Phase II


Radar Coverage Gaps at 9,000'
Craig
Steamboat Springs
Yampa Valley
Eagle
Rifle
Aspen
Montrose
Gunnison
Telluride
Durango
Existing Radar
Phase I
Phase II

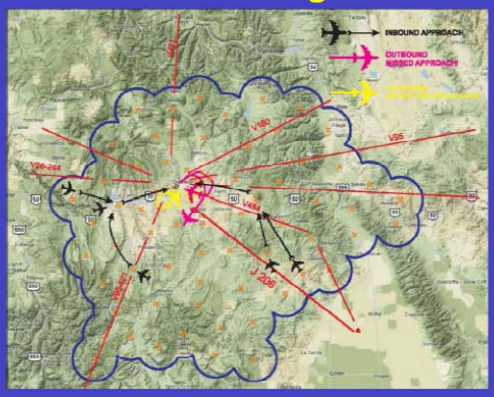
DEPARTMENT OF TRANSPORTATION

Phase II Coverage Volumes

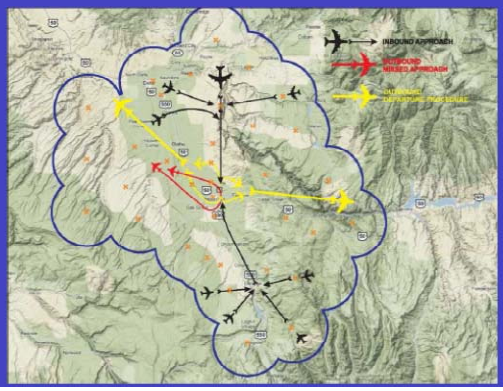
Durango Coverage Volume



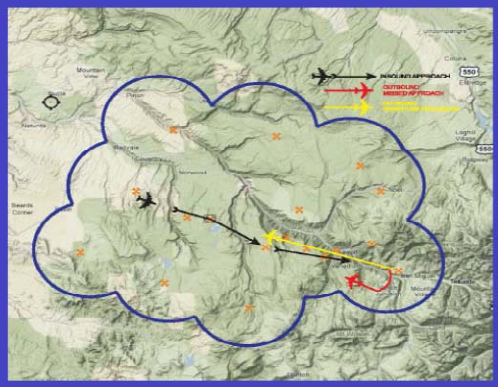
Gunnison Coverage Volume



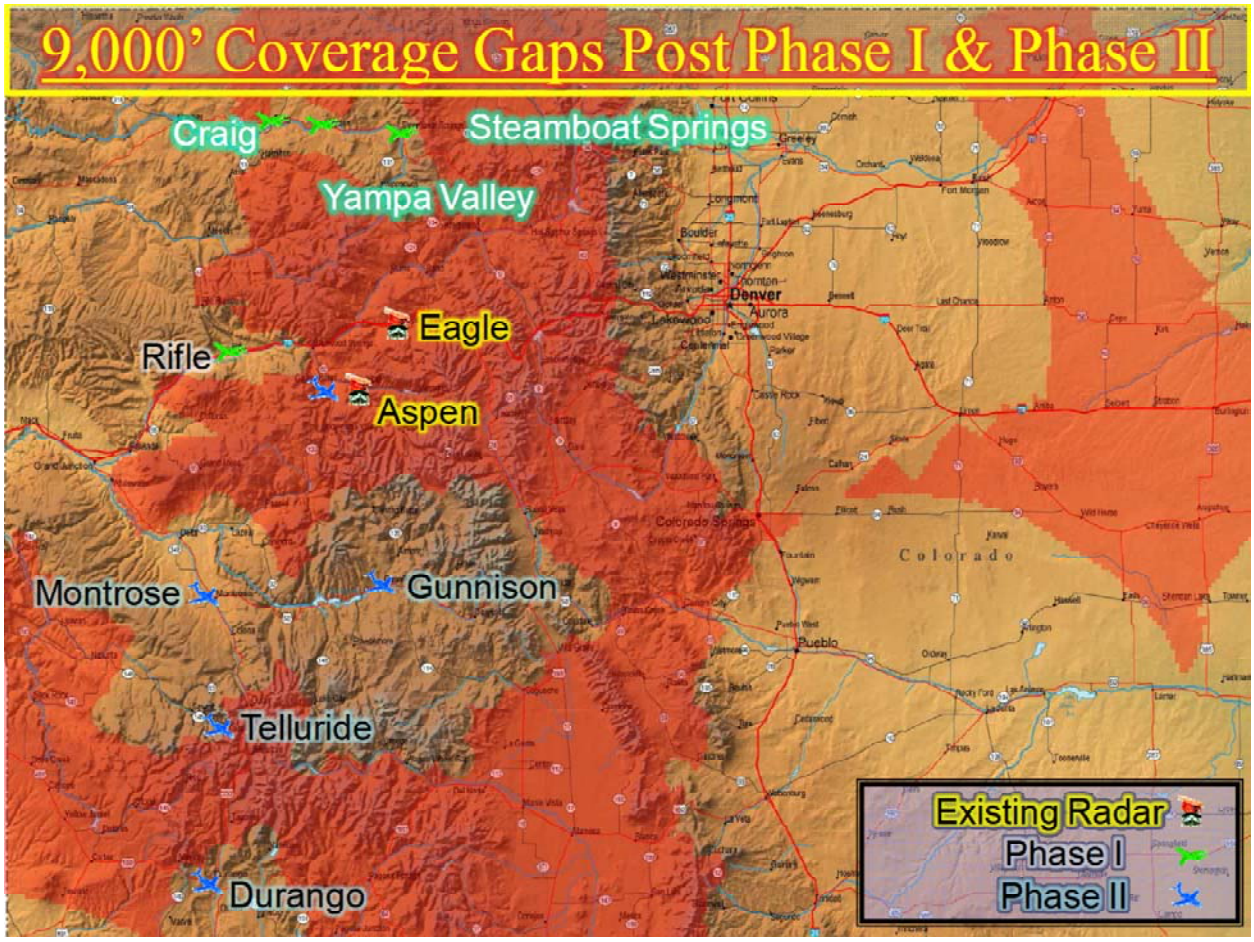
Montrose Coverage Volume



Telluride Coverage Volume



DEPARTMENT OF TRANSPORTATION



Air Traffic Control System Complete, Operational at Western Colorado Airports

August 9, 2013 - Statewide Transportation Plan - DENVER, COLORADO - The Colorado Department of Transportation (CDOT) Aeronautics Division announced that a Federal Aviation Administration (FAA) Next Generation Air Transportation (NextGen) ground and satellite-based air traffic control system that expands radar coverage of the airspace serving major western Colorado airports at Gunnison, Telluride, and Durango became operational on July 31.

The new system, utilizing Wide Area Multilateration (WAM) technology, allows air traffic controllers based in Longmont, CO, to track and separate flights at the three airports which receive heavy visitor traffic throughout the year and especially during ski season due to their proximity to major winter resorts.

The three airports now join a system previously activated for Montrose (2012) and Rifle/Garfield County, Craig, Steamboat Springs, and Hayden (2010).

"This is great news for aviation safety in Colorado," noted CDOT Executive Director **Don Hunt**. "This completed system will help deliver more on-time flights, reduce fuel consumption, and will help boost tourism and economic development. This system is consistent with the goals of Governor Hickenlooper and CDOT to deliver the most efficient and safest transportation system for Colorado."

Prior to implementation of the new WAM technology, tracking of flights at these airports was very limited via traditional radar and was not possible at altitudes below 17,000 feet. As a result there were frequent flight delays and diversions, especially during bad weather.

WAM technology works by utilizing a network of sensors deployed around each of the airports which receive and send aircraft transponder signals. System computers immediately analyze the signals, allowing air traffic controllers to determine precise aircraft location for the purposes of keeping air traffic safely separated and providing vital flight guidance in the event of inclement weather.

The technology also allows pilots to fly search and rescue missions in weather conditions that would previously have kept them grounded and improves their ability to located downed aircraft more quickly. The system helps reduce weather-related flight diversions and delays.

"CDOT's Aeronautics Division has been involved with this system for the past eight years," explained Aeronautics Division Director **David Gordon**. "This has been a great partnership with the FAA. The technology which was first used in western Colorado is now being installed across the United States to help our aviation system stay safe, on-time, and dependable."

CDOT's Aeronautics Division paid for WAM system development, which for the first time is integrated with NextGen technologies, at Montrose, Durango, Telluride, and Gunnison. The (FAA) maintains and operates the system.

What Is Wide Area Multilateration?

A new surveillance system introduced, called multilateration or Wide Area Multilateration (WAM), is now allowing air traffic controllers to track aircraft along the difficult approach to Juneau, Alaska—a mountainous area where radar was not possible.

Multilateration is a surveillance technology that works by employing multiple small remote sensors throughout an area to compensate for terrain obstructions, and is another tool the SBS program uses to enhance air traffic surveillance. The data from multilateration sensors is fused to determine aircraft position and identification. This data is then transmitted to air traffic control for use in providing surveillance separation services.

Currently, Juneau, Alaska; and several airports in the mountainous regions of Colorado have the first multilateration systems.

COLORADO WIDE AREA MULTILATERATION

Background

Increases in air traffic have resulted in growing delays and denied service at the Colorado mountain airports, especially during bad weather. Instrument meteorological conditions can reduce aircraft acceptance rates for these airports from 12 to 17 flights per hour, to only four per hour. From November to April each year, the Colorado Department of Transportation estimates 75 aircraft per airport, per day, are delayed or diverted, resulting in major revenue loss for the state.

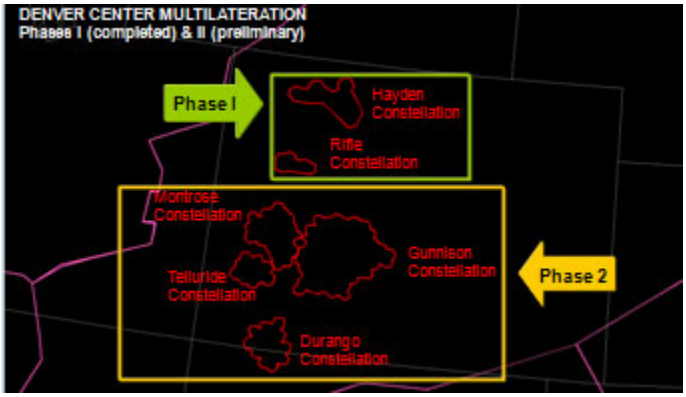
In 2005, the FAA, at the request of the State of Colorado Department of Transportations Division of Aeronautics, conducted an analysis of these delays and cancellations. The FAA study determined that the lack of surveillance contributed to reduced capacity during instrument meteorological conditions, and identified multilateration as the preferred solution for providing surveillance to the Colorado mountain airports.

Wide-Area Multilateration (WAM), began initial operations on September 12, 2009 at Denver Center serving the Yampa Valley-Hayden, Craig-Moffat, Steamboat Springs and Garfield County Regional-Rifle Airports. The WAM capability provide these airports with improved safety, efficiency and capacity by allowing controllers to see aircraft that are outside radar coverage saving time and money that would otherwise be lost due to flight delays and cancellations or diversions to other airports.

On December 8, 2009, the FAA approved the next phase of the Colorado Wide Area Multilateration (WAM). The phase 2 allows for the development and implementation of air traffic separation services, using Multilateration and ADS-B surveillance, for En Route air traffic operations in and out of the following airports:

- Gunnison-Crested Butte Regional (GUC)
- Montrose Regional (MTJ)
- Telluride Regional (TEX)
- Durango-La Plata County (DRO)

The system will be an ADS-B 1090 Extended Squittter (ES) and Universal Access Transceiver (UAT) surveillance system with integrated Multilateration surveillance capabilities. The system will also provide additional ADS-B services, including Flight Information Services-Broadcast (FIS-B) and Traffic Information Services-Broadcast (TIS-B) services. The Initial Operating Capability (IOC) of the ADS-B and Multilateration services is expected in Montrose by June 2012 with other sites operational in March 2013.



APPENDIX C

FAA FORM 8260

ILS RUNWAY 26, RIL

Flight Procedure Tracking Form	Action: FLIGHT CHECK	Task Type: IAP	Date Open: 03/07/2011	Task #: 20110307296437003	Request #: 20110307296437
Procedure: ILS RWY 26 AMDT 3		Airport ID: KRIL	Airport: GARFIELD COUNTY RGNL		Reimbursable #:
City: RIFLE	ST: CO	GPS #:		Estimated Chart Date: 11/15/2012	FICO #: 1091924
Fac ID: RIL	Fac. Type: ILS	Proc - A	Specialist: VICTOR NASO		

Procedure Review

	Rec'd	Rel'd	Full Name	Comments
Lead:	03/28/2012	08/22/2012	LONNIE EVERHART	
QA:	08/22/2012	08/22/2012	ERIC HILL	
Liaison:	08/22/2012		K Sparin	HARD DATE - WAIVER - REPLACEMENT WHL PKG 8/22/12

P1

Procedure Comments:

Remark Type: INFORMATION

Pkg 3 of 4

RIFLE, CO GARFIELD COUNTY RGNL (KRIL) ILS RWY 26, AMDT 3 ENROUTE NO HARD DATE: 11-15-2012
ATTACHED FORMS: 8260-3; 8260-10; 8260-9; 8260-2(S): COMFR-INT, REV 2; OYYER-INT, REV 1; SOCKY-INT, REV 3; TEKGU-INT, REV 2; WOKPA-INT, REV 3; YODUB-INT, ORIG; ZELOP-INT, ORIG; (INFO ONLY) JIGOM-INT, ORIG; RED TABLE (DBL) VDME, REV 11.
8260-1 (CANX).
CONTACT: ADOLFO URRUTIA/LONNIE EVERHART-AVN-130 LEADS, 405.954.2079/405.954.4576.

FIG

ILS RWY 26

RIFLE/GARFIELD COUNTY RGNL (RIL)

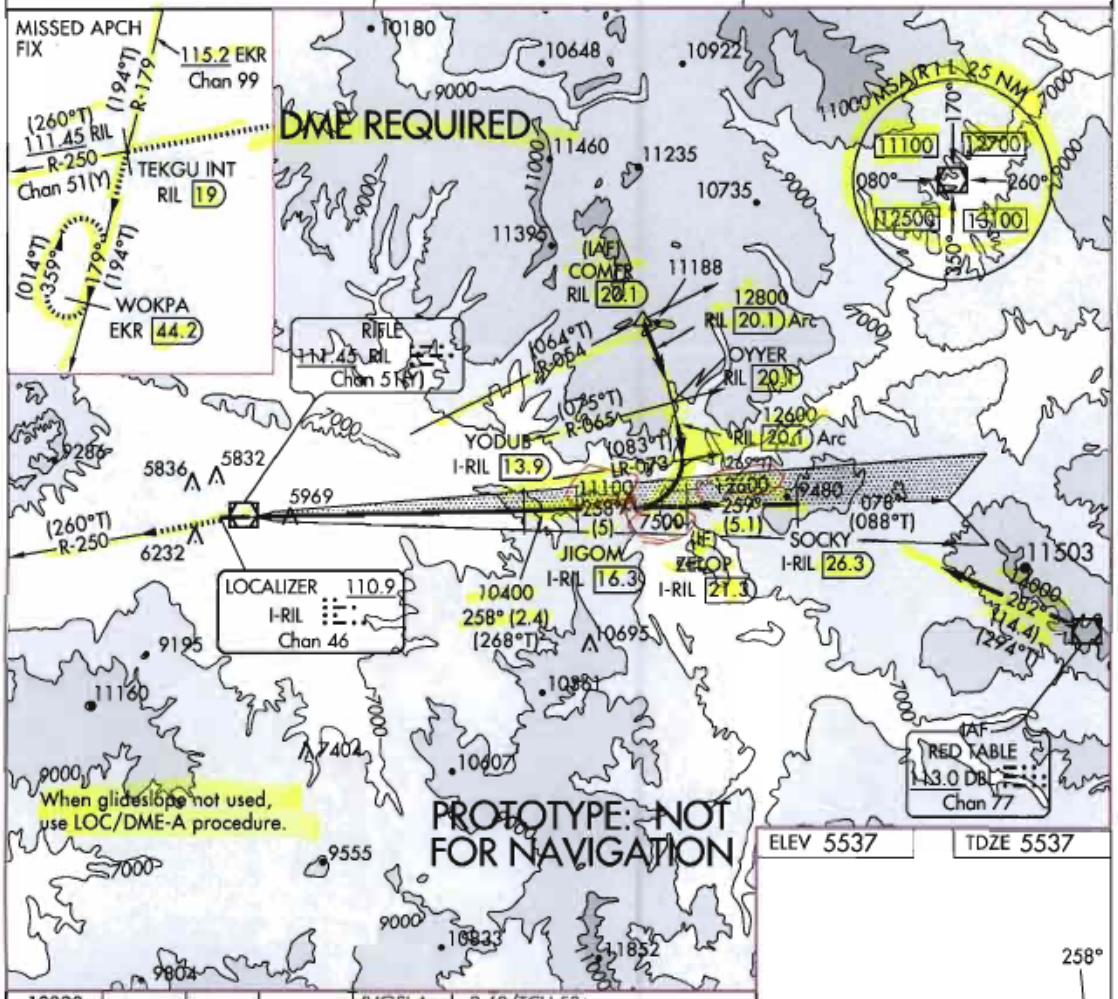
LOC/DME I-RIL	APP CRS	Rwy Idg	7000
110.9	258°	TDZE	5537
Chan 46		Apt Elev	5537

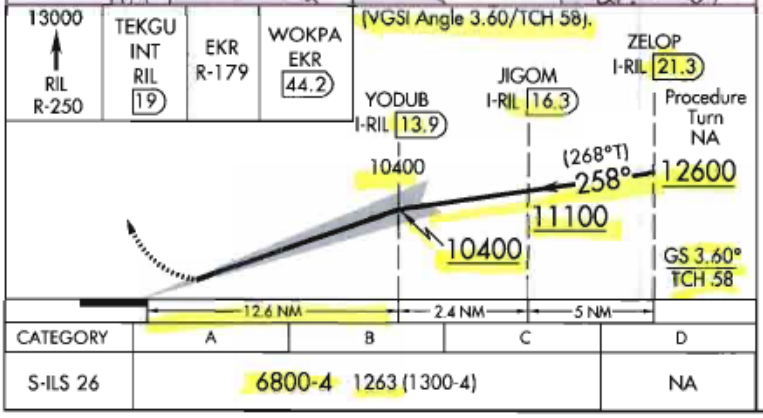
VISIBILITY REDUCTION BY HELICOPTERS NA. USE I-RIL DME WHEN ON LOCALIZER COURSE. CIRCLING NOT AUTHORIZED. DME REQUIRED.
MISSED APPROACH REQUIRES A MINIMUM CLIMB OF 355 FT PER NM TO 10400. IF UNABLE TO MEET CLIMB GRADIENT, SEE LOC/DME-A.

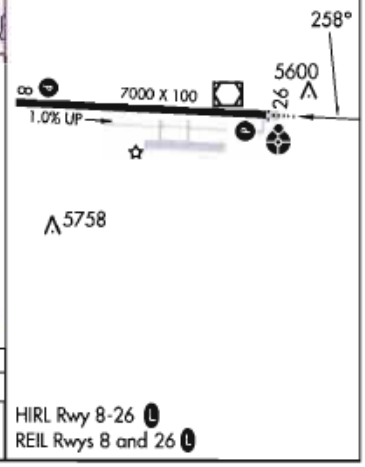
ODALS

MISSED APPROACH: Climb to 13000 on RIL VOR/DME R-250 to TEKGU INT/RIL 19 DME and on EKR VOR/DME R-179 to WOKPA/EKR 44.2 DME and hold.

ASOS	DENVER CENTER	UNICOM
135.275	134.5 327.8	122.8 (CTAF) L





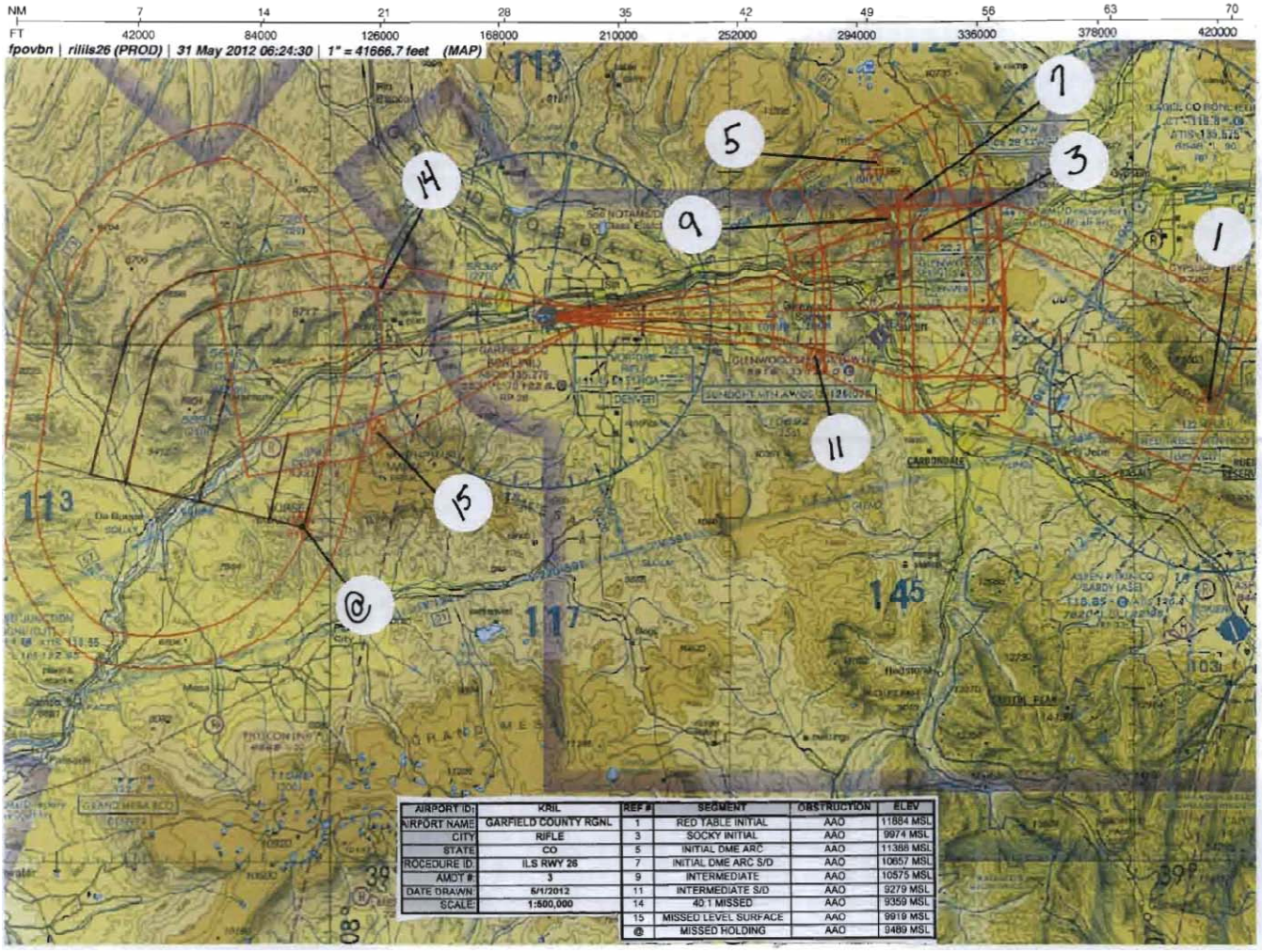


CATEGORY	A	B	C	D
S-ILS 26	6800-4 1263 (1300-4)			NA

HIRL Rwy 8-26 L
REIL Rwys 8 and 26 L

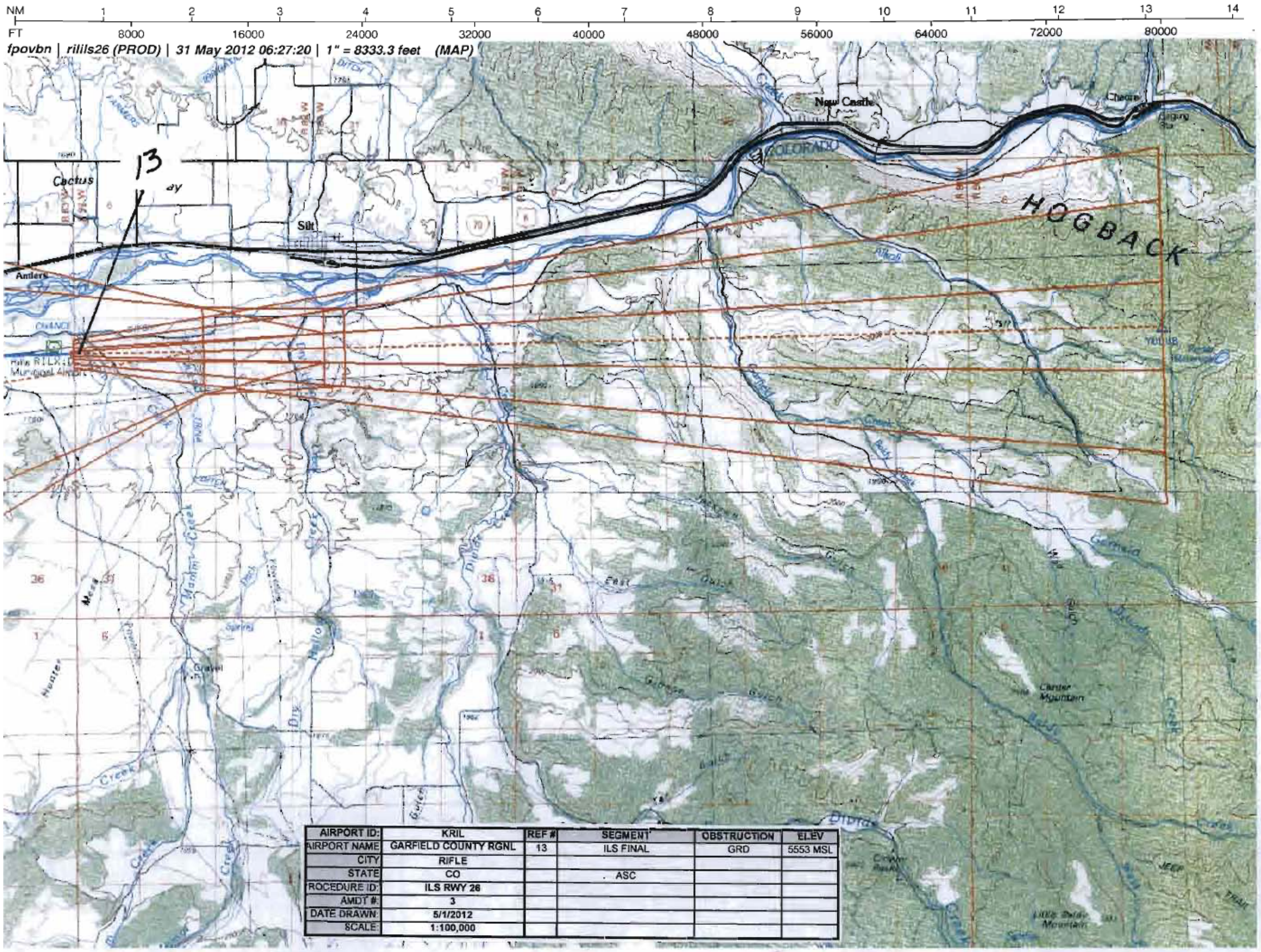
39°32'N-107°44'W

RIFLE/GARFIELD COUNTY RGNL (RIL)
ILS RWY 26



AIRPORT ID:	KRIL
AIRPORT NAME:	GARFIELD COUNTY RGNL
CITY:	RIFLE
STATE:	CO
PROCEDURE ID:	ILS RWY 26
AMDT #:	3
DATE DRAWN:	5/1/2012
SCALE:	1:500,000

REF #	SEGMENT	OBSTRUCTION	ELEV
1	RED TABLE INITIAL	AAO	11884 MSL
3	SOCKY INITIAL	AAO	9974 MSL
5	INITIAL DME ARC	AAO	11388 MSL
7	INITIAL DME ARC S/D	AAO	10657 MSL
9	INTERMEDIATE	AAO	10575 MSL
11	INTERMEDIATE S/D	AAO	9279 MSL
14	40:1 MISSED	AAO	9359 MSL
15	MISSED LEVEL SURFACE	AAO	9919 MSL
@	MISSED HOLDING	AAO	9489 MSL



AIRPORT ID:	KRIL	REF #	SEGMENT	OBSTRUCTION	ELEV
AIRPORT NAME	GARFIELD COUNTY RGNL	13	ILS FINAL	GRD	5553 MSL
CITY	RIFLE				
STATE	CO		. ASC		
PROCEDURE ID:	ILS RWY 26				
AMDT #:	3				
DATE DRAWN:	5/1/2012				
SCALE:	1:100,000				

US DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

ILS - STANDARD INSTRUMENT APPROACH PROCEDURE TITLE 14 CFR PART 97.29

Bearings, headings, courses, and radials are magnetic. Elevations and altitudes are in feet, MSL, except HAT, HAA, TCH, and RA. Altitudes are minimum altitudes unless otherwise indicated. Ceilings are in feet above airport elevation. Distances are in nautical miles unless otherwise indicated, except visibilites which are in statute miles or in feet RVR.

TERMINAL ROUTES

FROM	TO	COURSE AND DISTANCE	ALTITUDE
DBL VOR/DME (IAF)	SOCKY/I-RIL 26.32 DME	282.09 / 14.37	14000
SOCKY/I-RIL 26.32 DME	ZELOP/I-RIL 21.27 DME	258.46 / 5.05 (I-RIL)	12600
COMFR/RIL VOR/DME 20.14 DME CW (IAF)	OYYER/RIL VOR/DME 20.14 DME	20.14 DME ARC	12800
OYYER/RIL 20.14 DME CW	ZELOP/I-RIL 21.27 DME	20.14 DME ARC (RIL LR-073)	12600
ZELOP/I-RIL 21.27 DME (IF)	JIGOM/I-RIL 16.32 DME	258.46 / 4.95 (I-RIL)	11100
JIGOM/I-RIL 16.32 DME	YODUB/I-RIL 13.89 DME	258.46 / 2.43 (I-RIL)	10400

MISSED APPROACH

ILS: DA

CLIMB TO 13000 ON RIL VOR/DME R-250 TO TEKGU INT/RIL 19.00 DME AND ON EKR VOR/DME R-179 TO WOKPA/EKR 44.18 DME AND HOLD.

ADDITIONAL FLIGHT DATA:
HOLD N, RT, 179.40 INBOUND.
CHART DBL VOR/DME 14.37 DME AT SOCKY
CHART RIL R-065 AT OYYER.
CHART RIL R-054 AT COMFR.

1. PT ____ SIDE OF COURSE ____ OUTBOUND ____ FT WITHIN ____ MILES OF ____ (IAF)
2. PROFILE STARTS AT ZELOP/I-RIL 21.27 DME
3. FAC: 258.46 FAF: ____ DIST FAF TO MAP: ____ THLD: ____
4. MIN. ALT: ZELOP 12600, JIGOM 11100, YODUB 10400
5. DIST TO THLD FROM OM: 12.57 MM: - IM: - 150 HAT: - 100 HAT: - GS ANT: 1053
6. MIN GS INCPT: 10400 GS ALT AT: YODUB 10400 OM: - MM: - IM: -
7. GS ANGLE: 3.60 TCH: 58.0
8. MSA FROM: RIL VOR/DME 350-080 12700, 080-170 13100, 170-260 12500, 260-350 11100

MAG VAR: 10E EPOCH YEAR: 2015

MINIMUMS

TAKEOFF: SEE FAA FORM 8260-15A FOR THIS AIRPORT ALTERNATE: N A ILS: #

CATEGORY =====>	A			B			C			D			E		
	DH/MDA	VIS	HAT/HAA	DH/MDA	VIS	HAT/HAA	DH/MDA	VIS	HAT/HAA	DH/MDA	VIS	HAT/HAA	DH/MDA	VIS	HAT/HAA
S-ILS 26	6800	4	1263	6800	4	1263	6800	4	1263		NA				

NOTES:
CHART NOTE: VISIBILITY REDUCTION BY HELICOPTERS NA.
CHART PLANVIEW NOTE: DME REQUIRED.
CHART PLANVIEW NOTE: WHEN GS NOT USED, USE LOC/DME-A PROCEDURE.
CHART NOTE: USE I-RIL DME WHEN ON LOCALIZER COURSE.
(SEE FORM 8260-10)

CAT A, B, C 1300-4

CITY AND STATE	ELEVATION: 5537 THRE: 5537 AIRPORT NAME:	FACILITY IDENTIFIER:	PROCEDURE NO./AMDT NO./EFFECTIVE DATE:	SUP:
RIFLE, CO	GARFIELD COUNTY RGNL	I-RIL	ILS RWY 26, AMDT 3 NOV 15 2012	AMDT: 2 DATED 11/18/2010

ALL AFFECTED PROCEDURES REVIEWED?	COORDINATES OF FACILITIES	REQUIRED EFFECTIVE DATE
[ ] YES [X] NO	SEE CHANGES	NOV 15 2012

COORDINATED WITH:

ATA	AAT	ALPA	APA	AOPA	NBAA	OTHER (specify)
[X]	[ ]	[X]	[X]	[X]	[X]	[X] ZDV, CO AERO, AMGR

FLIGHT CHECKED BY

NAME:	FIFO	DATE:
PENDING		

DEVELOPED BY

NAME:	FIFO	DATE:
VICTOR B. NASO	AJV-354	05/02/2012

APPROVED BY

NAME:		FIFO	DATE:
DEZ SILAGYI	MANAGER	AJV-354	

CHANGES:

1. NAVAID USE CHANGED FROM RGA VOR/DME TO RIL VOR/DME. ALSO MAGVAR UPDATED (DATE, REMAINS 10E) CHANGING ALL REFERENCE TO RGA TO RIL.
2. FIX MOVED DUE TO NEW NAVAID USE: COMFR - FROM 394034.03N/1071946.76W TO 394031.82N/1071945.37W, OYYER - FROM 393648.50N/1071759.05W TO 393648.56N/1071759.08W.
3. IF CHANGED FROM DOWNY TO ZELOP.
4. PFAF CHANGED FROM WUKLI TO YODUB.
5. LENGTH OF FINAL CHANGED FROM 12.22 NM TO 12.57 NM.
6. RAISED MISSED CLIMB GRADIENT TERMINATION ALTITUDE FROM 10000 TO 10400.
7. REMOVED NOTE: VGSI AND ILS GLIDEPATH NOT COINCIDENT.
8. REWORDED MISSED APPROACH CLIMB GRADINET TO: MISSED APPROACH REQUIRES A MINIMUM CLIMB OF 355 FT PER NM TO 10400; IF UNABLE TO MEET CLIMB GRADIENT, SEE LOC/DME-A.

DME: 393131.99N / 1074438.39W, GS: 393140.49N / 1074309.68W, LOC: 393134.58N / 1074438.25W, 3RD PARTY SURVEY

REASONS:

1. DECOMMISSIONING OF RGA AND COMMISSIONING OF RIL.
2. DUE TO NEW NAVAID LOCATION AND CENTERING FIXES ON AIRWAY.
3. DUE TO MIRRORED ILS AND RNAV PROCEDURES AND NEW PFAF LOCATION REQUIRED NEW FIX ACTION AS REQUESTED BY FPT TO NOT AMEND RNAV PROCEDURES AT THIS TIME.
4., 5. NEW PFAF LOCATION CALC. AND SURVEY DATA AT AIRPORT.
6. NEW CONTROLLING OBSTRUCTION AND CALCULATION.
7. THEY ARE NOW COOINCIDENT.
8. IAW 8260.19E

08/07/2012: THIS IS A CORRECTED COPY OF THE FORM APPROVED ON 06252012.

1. ALL EFFECTIVE DATES CHANGED FROM 09/20/2012 TO 11/15/2012.

US DEPARTMENT OF TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION **ILS - STANDARD** **INSTRUMENT APPROACH PROCEDURE - TITLE 14 CFR PART 97.29**	Bearings, headings, courses, and radials are magnetic. Elevations and altitudes are in feet, MSL, except HAT, HAA, TCH, and RA. Altitudes are minimum altitudes unless otherwise indicated. Ceilings are in feet above aiport elevation. Distances are in nautical miles unless otherwise indicated, except visibilities which are in statute miles or in feet RVR.

NOTES, (CONT.):
CHART PLANVIEW NOTE: MISSED APPROACH REQUIRES A MINIMUM CLIMB OF 355 FT PER NM TO 10400; IF UNABLE TO MEET CLIMB GRADIENT, SEE LOC/DME-A.
CHART NOTE: DME REQUIRED
CHART NOTE: CIRCLING NOT AUTHORIZED.

CITY AND STATE	ELEVATION: 5537 THRE: 5537 AIRPORT NAME:	FACILITY IDENTIFIER:	PROCEDURE NO./ AMDT NO./EFFECTIVE DATE:	SUP:
RIFLE, CO	**GARFIELD COUNTY RGNL**	**I-RIL**	**ILS RWY 26, AMDT 3** **NOV 15 2012**	AMDT: **2** DATED: **11/18/2010**

ALL AFFECTED PROCEDURES REVIEWED? ☐ YES ☐ NO	COORDINATES OF FACILITIES	REQUIRED EFFECTIVE DATE

COORDINATED WITH:

ATA ☐ AAT ☐ ALPA ☐ APA ☐ AOPA ☐ NBAA ☐ OTHER (specify) ☐ _____

FLIGHT CHECKED BY		
NAME:	FIFO	DATE:
DEVELOPED BY		
NAME:	FIFO	DATE:
APPROVED BY		
NAME:	FIFO	DATE:

CHANGES:

REASONS:

U.S. DEPARTMENT OF TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

ILS STANDARD INSTRUMENT APPROACH PROCEDURE

FLIGHT STANDARDS SERVICES - **FAR PART 97.29**

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ARINC PACKET - 424-18 - ILS

```
                 1         2         3         4         5         6         7         8         9         0         1         2         3
NAVAID  12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901
        -------------------------------------------------------------------------------------------------------------------------------
        SUSAD        DBL   K2011300VDHW N39262164W106534085     N39262164W106534085E0120118002      NARRED TABLE
        SUSAD        EKR   K2011520VDHW N40040275W107552977     N40040275W107552977E0150076312      NARMEEKER
        SUSAD        RIL   K2011060VDLW N39314196W107431063     N39314196W107431063E0100055331      NARRIFLE
        SUSAD KRILK2 IRIL  K2011090 IT                     IRILN39313199W107443839      054700      NARGARFIELD COUNTY RGNL

                 1         2         3         4         5         6         7         8         9         0         1         2         3
WP      12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901
        -------------------------------------------------------------------------------------------------------------------------------
        SUSAEAENRT   COMFR K20    R   L N39403182W107194537                         E0099    NAR           COMFR
        SUSAEAENRT   JIGOM K20    R     N39315931W107233327                         E0100    NAR           JIGOM
        SUSAEAENRT   OYYER K20    R     N39364856W107175908                         E0099    NAR           OYYER
        SUSAEAENRT   SOCKY K20    R     N39321258W107103794                         E0099    NAR           SOCKY
        SUSAEAENRT   TEKGU K20    R     N39281937W108071986                         E0103    NAR           TEKGU
        SUSAEAENRT   WOKPA K20    C     N39211247W108093936                         E0103    NAR           WOKPA
        SUSAEAENRT   YODUB K20    R     N39315586W107264205                         E0100    NAR           YODUB
        SUSAEAENRT   ZELOP K20    R     N39320606W107170922                         E0099    NAR           ZELOP

                 1         2         3         4         5         6         7         8         9         0         1         2         3
AIRPORT 12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901
        -------------------------------------------------------------------------------------------------------------------------------
        SUSAP KRILK2ARIL     0      070YHN39313580W107434080E010005537          1800018000C    MNAR    GARFIELD COUNTY RGNL

                 1         2         3         4         5         6         7         8         9         0         1         2         3
SEGMENT 12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901
        -------------------------------------------------------------------------------------------------------------------------------
        SUSAP KRILK2FI26   ACOMFR 010COMFRK2EA0E  A    IF RIL K2      05390201          D               18000                 0 DS
        SUSAP KRILK2FI26   ACOMFR 020OYYERK2EA0E   R   AF RIL K2      065202010539      D   + 12800                           0 DS
        SUSAP KRILK2FI26   ACOMFR 030ZELOPK2EA0E  BR   AF RIL K2      078702010652      D   + 12600                           0 DS
        SUSAP KRILK2FI26   ACOMFR 040JIGOMK2EA0EE      CF IRILK2      078401632585005OPI  + 11100                           0 DS
        SUSAP KRILK2FI26   ADBL   010DBL  K2D 0V  A    IF                                                18000                 0 DS
        SUSAP KRILK2FI26   ADBL   020SOCKYK2EA0E       TF                                   + 14000                           0 DS
        SUSAP KRILK2FI26   ADBL   030ZELOPK2EA0E  B    TF                                   + 12600                           0 DS
        SUSAP KRILK2FI26   ADBL   040JIGOMK2EA0EE      CF IRILK2      078401632585005OPI  + 11100                           0 DS
        SUSAP KRILK2FI26   I      010JIGOMK2EA0E  I    IF IRILK2      07840163          PI  J 111001040018000                 0 DS
        SUSAP KRILK2FI26   I      020YODUBK2EA0E  F    CF IRILK2      078401392580002 4PI  H 1040010400        -360RIL   K2D 0 DS
        SUSAP KRILK2FI26   I      030RW26 K2PG0GY M    CF IRILK2      0784001325800126PI    05595           -360              0 DS
        SUSAP KRILK2FI26   I      040TEKGUK2EA0E M     CF RIL K2      2499019024990200D                                       0 DS
        SUSAP KRILK2FI26   I      050WOKPAK2EA0EY      CF EKR K2      1794044217940080D   + 13000                           0 DS
        SUSAP KRILK2FI26   I      060WOKPAK2EA0EE  R   HM                      1794T010   + 13000                           0 DS

                 1         2         3         4         5         6         7         8         9         0         1         2         3
```

CITY AND STATE	ELEVATION: **5537** THRE: **5537**	FACILITY IDENTIFIER:	PROCEDURE NO. / AMDT NO. / EFFECTIVE DATE:	SUP:
RIFLE, CO	AIRPORT NAME: **GARFIELD COUNTY RGNL**	**I-RIL**	**ILS RWY 26, AMDT 3** NOV 15 2012	AMDT: **2** DATED: **11/18/2010**

U.S. DEPARTMENT OF TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

ILS STANDARD INSTRUMENT APPROACH PROCEDURE

FLIGHT STANDARDS SERVICES - **FAR PART 97.29**

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```
RUNWAY  12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012
        --------------------------------------------------------------------------------------------------------------------------------
        SUSAP KRILK2GRW26     0070002585 N39313672W107425611-1000     +16718055370000581001IRIL1

                 1         2         3         4         5         6         7         8         9         0         1         2         3
ILS     12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012
        --------------------------------------------------------------------------------------------------------------------------------
        SUSAP KRILK2IIRIL1    011090RW26 N39313458W10744382525 85N39314049W1074309681006 10530527360E01005805522

                 1         2         3         4         5         6         7         8         9         0         1         2         3
MSA     12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012
        --------------------------------------------------------------------------------------------------------------------------------
        SUSAP KRILK2SRIL  K2D               0   08017011125170260127252603501312535008012525                                     M
```

CITY AND STATE	ELEVATION: **5537** **THRE: 5537**	FACILITY IDENTIFIER:	PROCEDURE NO. / AMDT NO. / EFFECTIVE DATE:	SUP:
RIFLE, CO	AIRPORT NAME: **GARFIELD COUNTY RGNL**	**I-RIL**	**ILS RWY 26, AMDT 3** NOV 1 5 2012	AMDT: **2** DATED: **11/18/2010**

U.S. DEPARTMENT OF TRANSPORTATION - FEDERAL AVIATION ADMINISTRATION

ILS STANDARD INSTRUMENT APPROACH PROCEDURE

FLIGHT STANDARDS SERVICES - **FAR PART 97.29**

Bearings, headings, courses, and radials are magnetic. Elevations and altitudes are in feet, MSL, except HAT, HAA, TCH, and RA. Altitudes are minimum altitudes unless otherwise indicated. Ceilings are in feet above airport elevation. Distances are in nautical miles unless otherwise indicated, except visibilities which are in statute miles or in feet RVR.

ARINC SUMMARY - 424-18 - ILS

ROUTES	TRANSITION	FIX	SEQ	USE	PATH	TURN	FO/FB	RNP	MAG(TRUE)	DISTANCE	ALTITUDE	SPEED
	COMFR	COMFR	010	IAF	IF		FB					
	COMFR	OYYER	020		AF	R	FB		053.9()		AA 12800	
	COMFR	ZELOP	030		AF	R	FB		065.2()		AA 12600	
	COMFR	JIGOM	040		CF		FB		258.5()	005.0	AA 11100	
	DBL	DBL	010	IAF	IF		FB					
	DBL	SOCKY	020		TF		FB				AA 14000	
	DBL	ZELOP	030		TF		FB				AA 12600	
	DBL	JIGOM	040		CF		FB		258.5()	005.0	AA 11100	
		JIGOM	010	FACF	IF		FB				AA 11100 GI 10400	
		YODUB	020	FAF	CF		FB		258.0()	002.4	GI 10400 GS 10400	
		RW26	030	MAP	CF		FO		258.0()	012.6	AT 05595	

MISSED APPROACH	FIX	SEQ	USE	PATH	TURN	FO/FB	RNP	MAG(TRUE)	DISTANCE	ALTITUDE	SPEED
	TEKGU	040		CF		FB		249.9()	020.0		
	WOKPA	050		CF		FO		179.4()	008.0	AA 13000	
	WOKPA	060		HM	R	FO		179.4()	T01.0	AA 13000	

POINT DATA	WAYPOINT	LAT IN SECS	LONG IN SECS	LAT IN MINS	LONG IN MINS
	DBL	N392621.64	W1065340.85	N3926.361	W10653.681
	EKR	N400402.75	W1075529.77	N4004.046	W10755.496
	RIL	N393141.96	W1074310.63	N3931.699	W10743.177
	IRIL (DME)	N393131.99	W1074438.39	N3931.533	W10744.640
	COMFR	N394031.82	W1071945.37	N3940.530	W10719.756
	JIGOM	N393159.31	W1072333.27	N3931.989	W10723.555
	OYYER	N393648.56	W1071759.08	N3936.809	W10717.985
	SOCKY	N393212.58	W1071037.94	N3932.210	W10710.632
	TEKGU	N392819.37	W1080719.86	N3928.323	W10807.331
	WOKPA	N392112.47	W1080939.36	N3921.208	W10809.656
	YODUB	N393155.86	W1072642.05	N3931.931	W10726.701
	ZELOP	N393206.06	W1071709.22	N3932.101	W10717.154
	RW26	N393136.72	W1074256.11	N3931.612	W10742.935
	IRIL (LOC)	N393134.58	W1074438.25	N3931.576	W10744.638

RUNWAY DATA	RWY	THRESHOLD ELEVATION	TCH
	RW26	05537	58

CITY AND STATE	ELEVATION: 5537 THRE: 5537	FACILITY IDENTIFIER:	PROCEDURE NO. / AMDT NO. / EFFECTIVE DATE:	SUP:
RIFLE, CO	AIRPORT NAME: **GARFIELD COUNTY RGNL**	**I-RIL**	**ILS RWY 26, AMDT 3** NOV 15 2012	AMDT: **2**
				DATED: **11/18/2010**

STANDARD INSTRUMENT APPROACH PROCEDURE DATA RECORD

PART - A OBSTRUCTION DATA

1. APP SEGMENT	FROM	TO	OBSTRUCTION	COORDINATES	ELEV. MSL	ROC	ALT. ADJUSTMENTS	MIN. ALT.
INITIAL	DBL VOR/DME	SOCKY/I-RIL	1. AAO	392639.00N/1065412.00W	11884 (4E)	1000	AT741 PR375	14000
		26.32 DME	2. TERRAIN	392639.00N/1065412.00W	11684		AS1500	13200
					(11700)			
INITIAL	SOCKY/I-RIL	ZELOP/I-RIL	3. AAO	393606.00N/1071515.00W	9974 (4E)	1000	AT1251 PR375	12600
	26.32 DME	21.27 DME	4. TERRAIN	393606.00N/1071515.00W	9774 (9800)		AS1500	11300
INITIAL: ARC	COMFR/RIL	OYYER/RIL	5. AAO	394028.80N/1071859.40W	11388 (6C)	1000	PR375	12800
	VOR/DME 20.14	VOR/DME 20.14	6. TERRAIN	394028.80N/1071859.40W	11188		AS1500	12700
	DME CW	DME			(11200)			
INITIAL: ARC STEPDOWN	OYYER/RIL 20.14	ZELOP/I-RIL	7. AAO	393827.00N/1071645.00W	10657 (4E)	1000	PR375 AT568	12600
	DME CW	21.27 DME	8. TERRAIN	393627.00N/1071527.00W	10128		AS1500	11600
					(10100)			
INTERMEDIATE	ZELOP/I-RIL	JIGOM/I-RIL	9. AAO	393717.89N/1071828.48W	10575 (2A)	500	PR375 SA-416 AT66	11100
	21.27 DME	16.32 DME	10. TERRAIN	393536.00N/1071857.00W	9338 (9300)		AS1500	10800
INTERMEDIATE:	JIGOM/I-RIL	YODUB/I-RIL	11. AAO	392909.00N/1072330.00W	9279 (2C)	500	SA-257 PR375 AT503	10400
STEPDOWN	16.32 DME	13.89 DME	12. TERRAIN	392942.00N/1072330.00W	8291 (8300)		AS1500	9800
2. PROCEDURE TURN	NA							
3. MISSED APPROACH MAP:	DA	WOKPA/EKR 44.18	14. AAO	393316.89N/1075545.92W	9359 (2C)	ASC		13000
		DME	15. AAO	392453.45N/1075613.43W	9919 (2C)	1000	SA-465	10500
ELEV:	6155		16. TERRAIN	393313.78N/1075549.85W	9119 (9100)		AS1500	10600

4. CIRCLING AREA	DISTANCE	HT. ABV. ARPT. REQUIRED	HT. ABV. ARPT. ACTUAL
CATEGORY A	1.3 NM	350	
CATEGORY B	1.5 NM	450	
CATEGORY C	1.7 NM	450	
CATEGORY D	2.3 NM	550	
CATEGORY E	4.5 NM	550	

5. MINIMUM SAFE ALTITUDES — PRIMARY NAVAID: RIL VOR/DME

SECTOR	OBSTRUCTION	BRG/DIST	ELEVATION (MSL)	M S A	SECTOR	OBSTRUCTION	BRG/DIST	ELEVATION (MSL)	M S A
350-080	AAO	031/ 21.2	11683 (4E)	12700	170-260	AAO	182/ 27.5	11436 (6A)	12500
080-170	AAO	131/ 25.8	12052 (6A)	13100	260-350	AAO	327/ 15.5	10095 (6A)	11100

CITY AND STATE		FACILITY	PROCEDURE AND AMENDMENT NO:	REGION
RIFLE, CO	ELEVATION: 5537 AIRPORT NAME: GARFIELD COUNTY RGNL	I-RIL	ILS RWY 26, AMDT 3 NOV 15 2012	ANM

QUALIFIED

CANCELED

FAA Form 8260 - 9 / April 2006 (Computer Generated)

PART B - SUPPLEMENTAL DATA

1. COMMUNICATIONS WITH:

ZDV ARTCC
DEN FSS

SATISFACTORY ON:

X VHF | X UHF | HF

2. WEATHER SERVICE

NWS | FAA | A/C

OTHER: ASOS

LOCATION: KRIL

3. ALTIMETER SETTING

SOURCE: KRIL

DISTANCE:

HOURS REMOTE OPERATION:

ADJUSTMENT: 0

4. MONITOR STATUS

PRIMARY NAVAID: I-RIL

MONITOR POINT: POCC

HRS OPTN: CAT 1: 24 | CAT 3:

5. APPROACH & RUNWAY LIGHTING

	ALS
	(S) SALS
	MALS
	HIRL
X	MIRL 08 (PCL), 26 (PCL)
X	REIL 08 (PCL), 26 (PCL)
	TDZ
	C/LINE
X	OTHER (SPECIFY) ODALS 26 (PCL) PAPI-4L 08, 26

6. RUNWAY MARKINGS

BASIC

ALL WEATHER: PIR-F 26

INSTRUMENT: NPI-F 08

7. RUNWAY VISUAL RANGE

APPROACH

MIDFIELD

ROLL OUT

8. GLIDE PATH

GP ANGLE: 3.60

DISTANCE FROM RWY: 1053

ELEV RWY THRESHOLD: 5536.9

ELEV GP ANTENNA: 5528.5

THRESHOLD CROSSING HEIGHT: 58.0

9. FINAL APPROACH COURSE AIMING

X	RUNWAY THRESHOLD	FT. FROM THRESHOLD
X	ON CENTERLINE	FT. FROM CENTERLINE

10. WAIVERS: 1

ORDER 8260.36A GLIDEPATH ANGLE ABOVE 3.00 DEGREES MUST BE APPROVED BY FLIGHT STANDARDS SERVICE IN WASHINGTON, D.C.. (FAA ORDER 8260.36A, PARA 11, NOTE) GLIDESLOPE ANGLE IS 3.60 DEGREES.

PART D - PREPARED BY: VICTOR B. NASO

DATE: 05/02/2012

TITLE: AERONAUTICAL INFORMATION SPECIALIST

OFFICE: AJV-354

PART C - REMARKS:

PARA 251, 34:1 PENETRATION.

PRECIPITOUS TERRAIN EVALUATION COMPLETED.

BLOCK 3: BACK-UP ALTIMETER SETTING NOT REQUIRED DUE TO REDUNDANT ALTIMETER SETTINGS FROM ASOS AND 24 HOUR FBO.

BLOCK 4: ILS MONITORED AT CORPORATE AIR SERVICES MAIN HANGAR, CAT 1 1300-0200Z, CAT 3 0200-1300Z.

BLOCK 10: AFS-400 APPROVAL FOR 3.60 DEGREE GLIDE SLOPE ANGLE RECEIVED ON 6/17/1999.

PER FLIGHT CHECK ADDED NOTE - CIRCLING NOT AUTHORIZED.

WAIVER: FAAO 8260.36A GLIDEPATH ANGLE ABOVE 3.00 DEGREES MUST BE APPROVED BY FLIGHT STANDARDS SERVICE IN WASHINGTON, D.C.. (FAA ORDER 8260.36A, PARA 11, NOTE) GLIDESLOPE ANGLE IS 3.60 DEGREES.

SEE ATTACHED AIRSPACE LETTER.

TERPS, VOLUME 1, "VISUAL PORTION OF THE FINAL"
34:1 RWY 26
5553 GRD (KRILT029) 393133.30N/1074247.28W (2.69)
5969 T-L TWR (08-000693) 393123.00N/1074025.00W (91.83)

ILS DA 6800 ACHIEVED THROUGH A COMBINATION OF ADJUSTED HAT OF 1263 AND A MISSED CLIMB GRADIENT OF 355 FT/NM. 8260.52 FORMULAS USED FOR CLIMB GRADIENT CALCULATIONS:

9246 (8838.88 PRIMARY EQUIVALENT) SPOT ELEV/AAO LOCATED IN THE 12:1 AREA CONTROLS CLIMB GRADIENT.
8000(8839.88-6450)/59024.48=351 FT/NM CLIMB GRADIENT.
DISTANCE MEASURED ALONG MISSED APPROACH COURSE.

CTA CALCULATION:
(6800-50)+(284*(67334.38/6076.12)=10364.14

OBSTACLE #9 5040 FEET INTO SECONDARY
OBSTACLE #11 3120 FEET INTO SECONDARY

STANDARD INSTRUMENT APPROACH PROCEDURE DATA RECORD

PART - A OBSTRUCTION DATA

1. APP SEGMENT	FROM	TO	OBSTRUCTION	COORDINATES	ELEV. MSL	ROC	ALT. ADJUSTMENTS	MIN. ALT.
FINAL: ILS	YODUB/I-RIL	RW26	13. GRD (KRILT029)	393133.30N/1074247.28W	5553 (2C)	28.3	MA963 AC20	6800/1263
	13.89 DME							

3. MISSED APPROACH								
	MAP:							
	ELEV:							

4. CIRCLING AREA	DISTANCE	REQUIRED	ACTUAL	HT. ABV. ARPT.
CATEGORY A	1.3 NM	350		
CATEGORY B	1.5 NM	450		
CATEGORY C	1.7 NM	450		
CATEGORY D	2.3 NM	550		
CATEGORY E	4.5 NM	550		

5. MINIMUM SAFE ALTITUDES — PRIMARY NAVAID:

SECTOR	OBSTRUCTION	BRG/DIST	ELEVATION (MSL)	M S A	SECTOR	OBSTRUCTION	BRG/DIST	ELEVATION (MSL)	M S A

QUALITY CHECKED

CITY AND STATE		FACILITY	PROCEDURE AND AMENDMENT NO:	REGION
RIFLE, CO	ELEVATION: 5537 AIRPORT NAME: GARFIELD COUNTY RGNL	I-RIL	ILS RWY 26, AMDT 3 NOV 15 2012	ANM

RADIO FIX AND HOLDING DATA RECORD

NAME: COMFR **STATE:** CO **COUNTRY:** US

LATITUDE/LONGITUDE: 394031.82N/1071945.37W **TYPE:** DME

AIRSPACE DOCKET: **FIX TYPE OF ACTION:** MODIFY

FIX MAKE-UP FACILITIES:

FAC	NAME	IDENT	TYPE	CLASS	MAG BRG	TRUE BRG	DME	DIST FROM NM	FAC FEET	MRA	MAA
1	RIFLE	RIL	VOR/DME	L	053.89	063.89	20.14	20.14		13400	17500

HOLDING: **HOLDING TYPE OF ACTION:** MODIFY

CONTROLLING OBSTRUCTIONS:

PAT	AIRSPEED	OBSTRUCTION	COORDINATES	ELEVATION	ACCURACY CODE
UPN	230	AAO	395526.40N/1070817.00W	12441	6A

PRECIPITOUS TERRAIN ADDITIONS:

PAT	SPEED	ADDITION
UPN	230	375

HOLDING RESTRICTIONS:
UNPLANNED HOLDING AUTHORIZED AT OR ABOVE 13900

REMARKS:
PRECIPITOUS TERRAIN EVALUTAION COMPLETED

FIX USE:

USE TYPE	USE TITLE	FAC	PAT	AIRPORT IDENT	CITY	STATE
EN ROUTE	V8	1				(US)
IAP	ILS RWY 26	1		KRIL	RIFLE	CO (US)
IAP	LOC/DME-A	1		KRIL	RIFLE	CO (US)

REQUIRED CHARTING: IAP, CONTROLLER, EN ROUTE LOW

COMPULSORY REPORTING POINT: NO

RECORD REVISION NUMBER: 2 **DATE OF REVISION:** 09/20/2012

REASON FOR REVISION:
UPDATED FIX MAKE UP FACILITY, NEW FACILITY, REMOVED RGA AND ADDED RIL.
FIXED MOVED 248.64 FT NE.
UPDATED CONTROLLING OBSTRUCTIONS
RAISED HOLDING RESTRICTIONS FOR UNPLANNIED HOLDING FROM 13500 TO 13900.
RAISED FACILITY 1 MRA FROM 13200 TO 13400 TO MATCH AIRWAY MEA.

DEVELOPED BY: **DATE:** 04/30/2012 **OFFICE:** AJV-354 **NAME:** VICTOR NASO

APPROVED BY: **DATE:** **OFFICE:** AJV-354 **NAME:** DEZ SILAGYI

SIGNATURE:

DISTRIBUTION:
NFDC
FPO: WST
ARTCC: ZDV
ATC FACILITY:
OTHER:

RADIO FIX AND HOLDING DATA RECORD

NAME: SOCKY **STATE:** CO **COUNTRY:** US

LATITUDE/LONGITUDE: 393212.58N/1071037.94W **TYPE:** DME

AIRSPACE DOCKET: **FIX TYPE OF ACTION:** NO CHANGE

FIX MAKE-UP FACILITIES:

FAC	NAME	IDENT	TYPE	CLASS	MAG BRG	TRUE BRG	DME	DIST FROM FAC NM	DIST FROM FAC FEET	MRA	MAA
1	RIFLE	I-RIL	LOC		078.46	088.46	26.32	26.32		13400	17500

EXPANDED SERVICE VOLUME (ESV):

FAC IDENT	FAC TYPE	RADIAL/BEARING	DISTANCE	MIN ALTITUDE	MAX ALTITUDE
I-RIL	LOC	R-078	27	13400	17500

HOLDING: **HOLDING TYPE OF ACTION:** MODIFY

PATTERNS:

PAT	DIR	IDENT	TYPE	RAD/CRS/BRG	CRS INBOUND	TURN (L OR R)	LEG LENGTH TIME	LEG LENGTH DME	HOLDING ALTITUDES MIN	HOLDING ALTITUDES MAX	TEMPLATES MIN	TEMPLATES MAX
1	E	I-RIL	LOC/DME	078.46	258.46	L	1-1 1/2		13400	17500	11	17

CONTROLLING OBSTRUCTIONS:

PAT	AIRSPEED	OBSTRUCTION	COORDINATES	ELEVATION	ACCURACY CODE
1	230	AAO	392536.00N/1065057.00W	11890	4E

PRECIPITOUS TERRAIN ADDITIONS:

PAT	SPEED	ADDITION
1	230	375

REASON FOR NONSTANDARD HOLDING:
PAT 1 TERRAIN/AIRSPACE

HOLDING RESTRICTIONS:
HOLDING LIMITED TO ESTABLISHED PATTERN

REMARKS:
PRECIPITOUS TERRAIN EVALUATION COMPLETED
PAT 1 ATC REQUEST

FIX USE:

USE TYPE	USE TITLE	FAC	PAT	AIRPORT IDENT	CITY	STATE
IAP	ILS RWY 26	1		KRIL	RIFLE	CO (US)
IAP	LOC/DME-A	1		KRIL	RIFLE	CO (US)

REQUIRED CHARTING: IAP

COMPULSORY REPORTING POINT: NO

RECORD REVISION NUMBER: 3 **DATE OF REVISION:** 09/20/2012

REASON FOR REVISION:
UPDATED HOLDING PATTERN RAD/CRS/BRG AND CRS INBOUND FROM 078.47 AND 258.47 TO 078.46 AND 258.46.

DEVELOPED BY: **DATE:** 05/23/2012 **OFFICE:** AJV-354 **NAME:** VICTOR NASO

APPROVED BY: **DATE:** **OFFICE:** AJV-354 **NAME:** DEZ SILAGYI

SIGNATURE:

DISTRIBUTION:
NFDC
FPO: WST
ARTCC: ZDV
ATC FACILITY:
OTHER:

RADIO FIX AND HOLDING DATA RECORD

NAME: TEKGU **STATE:** CO **COUNTRY:** US

LATITUDE/LONGITUDE: 392819.37N/1080719.86W **TYPE:** INT, DME

AIRSPACE DOCKET: **FIX TYPE OF ACTION:** MODIFY

FIX MAKE-UP FACILITIES:

FAC	NAME	IDENT	TYPE	CLASS	MAG BRG	TRUE BRG	DME	DIST FROM FAC NM	DIST FROM FAC FEET	MRA	MAA
1	RIFLE	RIL	VOR/DME	L	249.90	259.90	19.00	19.00		11400	17500
2	MEEKER	EKR	VOR/DME	H	179.41	194.41	36.85	36.85		11400	17500

HOLDING: **HOLDING TYPE OF ACTION:** NO CHANGE

REMARKS:
RIFLE (FAC1) AND MEEKER (FAC2) USED TO ESTABLISH FIX COORDINATES.

FIX USE:

USE TYPE	USE TITLE	FAC	PAT	AIRPORT IDENT	CITY	STATE
IAP	ILS RWY 26	1		KRIL	RIFLE	CO (US)
IAP	LOC/DME-A	1		KRIL	RIFLE	CO (US)

REQUIRED CHARTING: IAP

COMPULSORY REPORTING POINT: NO

RECORD REVISION NUMBER: 2 **DATE OF REVISION:** 09/20/2012

REASON FOR REVISION:
RIL RELOCATION AND MAGVAR CHAGED
- UPDATED FACILITY 1 FIX MAKE UP TO REMOVE RGA AND ADD RIL,MAG BRG AND TRUE BRG FROM 250.26 AND 260.26 TO 249.90 AND 259.90, DME AND DISTANCE FROM FAC FROM 18.37 TO 19.00.

DEVELOPED BY: **DATE:** 04/30/2012 **OFFICE:** AJV-354 **NAME:** VICTOR NASO

APPROVED BY: **DATE:** **OFFICE:** AJV-354 **NAME:** DEZ SILAGYI

SIGNATURE:

DISTRIBUTION:
NFDC
FPO: WST
ARTCC: ZDV
ATC FACILITY:
OTHER:

RADIO FIX AND HOLDING DATA RECORD

NAME: WOKPA **STATE:** CO **COUNTRY:** US

LATITUDE/LONGITUDE: 392112.47N/1080939.36W **TYPE:** WP, DME

AIRSPACE DOCKET: **FIX TYPE OF ACTION:** MODIFY

FIX MAKE-UP FACILITIES:

FAC	NAME	IDENT	TYPE	CLASS	MAG BRG	TRUE BRG	DME	DIST FROM FAC NM	DIST FROM FAC FEET	MRA	MAA
1	MEEKER	EKR	VOR/DME	H	179.40	194.40	44.18	44.18		13000	17500

EXPANDED SERVICE VOLUME (ESV):

FAC IDENT	FAC TYPE	RADIAL/BEARING	DISTANCE	MIN ALTITUDE	MAX ALTITUDE
EKR	VOR/DME	R-179	45	13000	17500

HOLDING: **HOLDING TYPE OF ACTION:** NO CHANGE

PATTERNS:

PAT	DIR	IDENT	TYPE	RAD/CRS/BRG	CRS INBOUND	TURN (L OR R)	LEG LENGTH TIME	LEG LENGTH DME	HOLDING ALTITUDES MIN	HOLDING ALTITUDES MAX	TEMPLATES MIN	TEMPLATES MAX
1	N	EKR	VOR/DME	179.40	179.40	R	1-1 1/2		13000	17500	12	18
2	N		WP	004.40	184.40	R		8	13000	17500	11	17

CONTROLLING OBSTRUCTIONS:

PAT	AIRSPEED	OBSTRUCTION	COORDINATES	ELEVATION	ACCURACY CODE
1	230	AAO	391928.90N/1080207.10W	9489	6C
1	310	AAO	392142.00N/1075615.00W	10922	4E
2	230	AAO	391928.90N/1080207.10W	9489	6C
2	310	AAO	392151.00N/1075627.00W	10903	4E

PRECIPITOUS TERRAIN ADDITIONS:

PAT	SPEED	ADDITION
1	230	359
2	230	359

HOLDING RESTRICTIONS:
HOLDING LIMITED TO ESTABLISHED PATTERN.

PROCEDURES REQUIRING CLIMB-IN-HOLD:

PAT	PROCEDURE TITLE	AIRPORT IDENT	CITY	STATE
1	ILS RWY 26	KRIL	RIFLE	CO (US)
1	LOC/DME-A	KRIL	RIFLE	CO (US)
2	RNAV (GPS) X RWY 26	KRIL	RIFLE	CO (US)
2	RNAV (RNP) Z RWY 26	KRIL	RIFLE	CO (US)
2	RNAV (RNP) Y RWY 26	KRIL	RIFLE	CO (US)
2	RNAV (GPS) W RWY 26	KRIL	RIFLE	CO (US)

REMARKS:
MEEKER (FAC 1) USED TO ESTABLISH FIX COORDINATES
PRECIPITOUS TERRAIN EVALUATION COMPLETED.

FIX USE:

USE TYPE	USE TITLE	FAC	PAT	AIRPORT IDENT	CITY	STATE
IAP	ILS RWY 26	1	1	KRIL	RIFLE	CO (US)
IAP	LOC/DME-A	1	1	KRIL	RIFLE	CO (US)
IAP	RNAV (GPS) W RWY 26		2	KRIL	RIFLE	CO (US)
IAP	RNAV (GPS) X RWY 26		2	KRIL	RIFLE	CO (US)
IAP	RNAV (GPS) Y RWY 8			KRIL	RIFLE	CO (US)
IAP	RNAV (RNP) Y RWY 26		2	KRIL	RIFLE	CO (US)
IAP	RNAV (RNP) Z RWY 26		2	KRIL	RIFLE	CO (US)
IAP	RNAV (RNP) Z RWY 8			KRIL	RIFLE	CO (US)

REQUIRED CHARTING: IAP

COMPULSORY REPORTING POINT: NO

RECORD REVISION NUMBER: 3 **DATE OF REVISION:** 09/20/2012

REASON FOR REVISION:
UPDATED FACILITY ONE (1) TO ACTIVE FACILITY FROM HISTORY.

DEVELOPED BY: **DATE:** 05/24/2012 **OFFICE:** AJV-354 **NAME:** VICTOR NASO

APPROVED BY: **DATE:** **OFFICE:** AJV-354 **NAME:** DEZ SILAGYI

RADIO FIX AND HOLDING DATA RECORD

NAME: ZELOP **STATE:** CO **COUNTRY:** US

LATITUDE/LONGITUDE: 393206.06N/1071709.22W **TYPE:** DME

AIRSPACE DOCKET: **FIX TYPE OF ACTION:** ESTABLISH

FIX MAKE-UP FACILITIES:

FAC	NAME	IDENT	TYPE	CLASS	MAG BRG	TRUE BRG	DME	DIST FROM FAC NM	DIST FROM FAC FEET	MRA	MAA
1	RIFLE	I-RIL	LOC/DME		078.46	088.46	21.27	21.27		12600	17500

EXPANDED SERVICE VOLUME (ESV):

FAC IDENT	FAC TYPE	RADIAL/BEARING	DISTANCE	MIN ALTITUDE	MAX ALTITUDE
I-RIL	LOC/DME	R-078	22	12600	17500

FIX USE:

USE TYPE	USE TITLE	FAC	PAT	AIRPORT IDENT	CITY	STATE
IAP	ILS RWY 26	1		KRIL	RIFLE	CO (US)
IAP	LOC/DME-A	1		KRIL	RIFLE	CO (US)

REQUIRED CHARTING: IAP

COMPULSORY REPORTING POINT: NO

RECORD REVISION NUMBER: ORIG **DATE OF REVISION:** 09/20/2012

DEVELOPED BY: **DATE:** 05/02/2012 **OFFICE:** AJV-354 **NAME:** VICTOR NASO

APPROVED BY: **DATE:** **OFFICE:** AJV-354 **NAME:** DEZ SILAGYI

SIGNATURE:

DISTRIBUTION:
NFDC
FPO: WST
ARTCC: ZDV
ATC FACILITY:
OTHER:

RADIO FIX AND HOLDING DATA RECORD

NAME: JIGOM **STATE:** CO **COUNTRY:** US

LATITUDE/LONGITUDE: 393159.31N/1072333.27W **TYPE:** DME

AIRSPACE DOCKET: **FIX TYPE OF ACTION:** ESTABLISH

FIX MAKE-UP FACILITIES:

FAC	NAME	IDENT	TYPE	CLASS	MAG BRG	TRUE BRG	DME	DIST FROM FAC NM	DIST FROM FAC FEET	MRA	MAA
1	RIFLE	I-RIL	LOC		078.46	088.46	16.32	16.32		11100	12800

EXPANDED SERVICE VOLUME (ESV):

FAC IDENT	FAC TYPE	RADIAL/BEARING	DISTANCE	MIN ALTITUDE	MAX ALTITUDE
I-RIL	LOC	R-078	17	11100	12800

HOLDING: **HOLDING TYPE OF ACTION:** NO CHANGE

FIX USE:

USE TYPE	USE TITLE	FAC	PAT	AIRPORT IDENT	CITY	STATE
IAP	ILS RWY 26	1		KRIL	RIFLE	CO (US)
IAP	LOC/DME-A	1		KRIL	RIFLE	CO (US)

REQUIRED CHARTING: IAP

COMPULSORY REPORTING POINT: NO

RECORD REVISION NUMBER: ORIG **DATE OF REVISION:** 11/18/2010

REASON FOR REVISION:
THIS IS A CORRECTED COPY OF THE FORM DEVELOPED ON 06/14/2010.
FIX MOVED 37.12 FT E DUE TO NEW RUNWAY COORDINATES, FIX COORDINATES UPDATED. TRUE AND MAG BRG CHANGED FROM 78.47 AND 88.47 TO 78.46 AND 88.46

DEVELOPED BY: **DATE:** 10/22/2010 **OFFICE:** AVN-130 **NAME:** CHARLES SCHNEIDER

APPROVED BY: **DATE:** **OFFICE:** AVN-130 **NAME:** DEZ SILAGYI

SIGNATURE:

DISTRIBUTION: **NFDC**
FPO: WST
ARTCC: ZDV
ATC FACILITY:
OTHER:

RADIO FIX AND HOLDING DATA RECORD

NAME: RED TABLE VOR/DME **STATE:** CO **COUNTRY:** US

LATITUDE/LONGITUDE: 392621.64N/1065340.85W **TYPE:**

AIRSPACE DOCKET: **FIX TYPE OF ACTION:** NO CHANGE

FIX MAKE-UP FACILITIES:

FAC	NAME	IDENT	TYPE	CLASS	MAG BRG	TRUE BRG	DME	DIST FROM FAC NM	FAC FEET	MRA	MAA
1	RED TABLE	DBL	VOR/DME	H							45000

FIX RESTRICTIONS:
SPECIAL GLENO-ONE (RNP), KASE, ASPEN, CO
SPECIAL RNAV (GPS) Z RWY 15, KASE, ASPEN, CO
SPECIAL LOC/DME RWY 15, KASE, ASPEN, CO

HOLDING: **HOLDING TYPE OF ACTION:** MODIFY

PATTERNS:

PAT	DIR	IDENT	TYPE	RAD/CRS/BRG	CRS INBOUND	TURN (L OR R)	LEG LENGTH TIME	LEG LENGTH DME	HOLDING ALTITUDES MIN	HOLDING ALTITUDES MAX	TEMPLATES MIN	TEMPLATES MAX
1	N	DBL	VOR/DME	344.00	164.00	R	1-1 1/2		14000	29000	10	22
2	N	DBL	VOR/DME	343.38	163.38	R	1-1 1/2		13700	17500	10	16
3	N		WP	343.38	163.38	R		8	13700	17500	11	17

CONTROLLING OBSTRUCTIONS:

PAT	AIRSPEED	OBSTRUCTION	COORDINATES	ELEVATION	ACCURACY CODE
1	230	AAO	392506.00N/1064648.00W	11979	4E
2	230	AAO	392506.00N/1064648.00W	11979	4E
3	230	AAO	392512.60N/1064616.80W	12238	6C

PRECIPITOUS TERRAIN ADDITIONS:

PAT	SPEED	ADDITION
1	230	375
2	230	375
3	230	375

HOLDING RESTRICTIONS:
HOLDING LIMITED TO ESTABLISHED PATTERN

REMARKS:
PRECIPITOUS TERRAIN EVALUATION COMPLETED

FIX USE:

USE TYPE	USE TITLE	FAC	PAT	AIRPORT IDENT	CITY	STATE
DP	ASPEN			KASE	ASPEN	CO (US)
DP	GLENO-ONE (RNP)			KASE	ASPEN	CO (US)
DP	LINDZ			KASE	ASPEN	CO (US)
DP	SARDD (OBSTACLE)			KASE	ASPEN	CO (US)
DP	ROCKIES		1	KBKF	AURORA	CO (US)
DP	SPRINGS			KCOS	COLORADO SPRINGS	CO (US)
DP	ROCKIES		1	KAPA	DENVER	CO (US)
DP	ROCKIES		1	KBJC	DENVER	CO (US)
DP	ROCKIES		1	KDEN	DENVER	CO (US)
DP	ROCKIES		1	KFTG	DENVER	CO (US)
DP	GYPSUM			KEGE	EAGLE	CO (US)
DP	MEEKER			KEGE	EAGLE	CO (US)
DP	ROCKIES		1	KFNL	FORT COLLINS/LOVELAND	CO (US)
DP	GRAND JUNCTION			KGJT	GRAND JUNCTION	CO (US)
DP	GRAND MESA			KGJT	GRAND JUNCTION	CO (US)
DP	ROCKIES		1	KGXY	GREELEY	CO (US)
DP	CANYON			KPUB	PUEBLO	CO (US)
DP	UYRIG (RNAV) DP			KRIL	RIFLE	CO (US)
EN ROUTE	J206					(US)
EN ROUTE	J60					(US)
EN ROUTE	J80					(US)
EN ROUTE	V108					(US)
EN ROUTE	V134					(US)
EN ROUTE	V356					(US)
EN ROUTE	V361					(US)
EN ROUTE	V421					(US)
IAP	LOC/DME RWY 15			KASE	ASPEN	CO (US)
IAP	LOC/DME-E			KASE	ASPEN	CO (US)
IAP	RNAV (GPS) Z RWY 15			KASE	ASPEN	CO (US)
IAP	RNAV (GPS)-F		3	KASE	ASPEN	CO (US)
IAP	ROARING FORK VISUAL RWY 15			KASE	ASPEN	CO (US)
IAP	VOR/DME-C		2	KASE	ASPEN	CO (US)
IAP	ILS RWY 26			KRIL	RIFLE	CO (US)
IAP	LOC/DME-A			KRIL	RIFLE	CO (US)
IAP	RNAV (GPS) Z RWY 26			KRIL	RIFLE	CO (US)

IAP	RNAV (RNP) Y RWY 26	KRIL	RIFLE	CO (US)
STAR	LARKS	KDEN	DENVER	CO (US)
STAR	POWDR	KDEN	DENVER	CO (US)

REQUIRED CHARTING: DP, STAR, IAP, CONTROLLER, EN ROUTE LOW, EN ROUTE HIGH

COMPULSORY REPORTING POINT: NO

RECORD REVISION NUMBER: 11 **DATE OF REVISION:** 09/20/2012

REASON FOR REVISION:
ADDED PATTERN 1 AND 2.
UPDATED FIX USE.

DEVELOPED BY: **DATE:** 02/24/2012 **OFFICE:** AJV-354 **NAME:** JACOB POWERS

APPROVED BY: **DATE:** **OFFICE:** AJV-354 **NAME:** DEZ SILAGYI

SIGNATURE:

DISTRIBUTION:
NFDC
FPO: WST
ARTCC: ZDV
ATC FACILITY: ASE ATCT, DEN APP CON
OTHER:

TERMINAL AIRSPACE DATA REQUIREMENTS

CITY: **RIFLE** STATE: **COLORADO**

AIRPORT NAME: **GARFIELD COUNTY RGNL** ID: **KRIL**

PROCEDURE: **ILS RWY 26** AMDT: **3**

DOCKET#: **NOT REQUIRED**
(96-AXX-X/Required/Not Required)

ALL DIST TO 1/100 NM; ELEV TO NEAREST FT; COORD TO 1/100 SEC; DEG TO 1/100 DG.

1. Distance from (Enter THLD, FAF, ARP, FACILITY, as appropriate)	**FACILITY**	to 1000' point	**8.65**
2. Width of (Enter appropriate segment, final, intermediate, etc.)	**FINAL**	segment at 1000' point	**2.08**
3. True Course of	**FINAL**	segment containing 1000' point	**268.46**
4. High Terrain in	**FINAL**	segment containing 1000' point	**7914**
5. Distance from (If 1500' point in PT maneuvering area or holding pattern note in remarks)	**FACILITY**	to 1500' point	**9.95**
6. Width of	**FINAL**	segment at 1500' point	**2.36**
7. True Course of	**FINAL**	segment containing 1500' point	**268.46**
8. High Terrain in	**FINAL**	segment containing 1500' point	**7914**

9. Threshold Coordinates (if straight-in) ... **393136.72N** / **1074256.11W**

10. ARP Coordinates ..... **393135.80N** / **1074340.80W**

11. Runway Approach End and distance furthest from ARP ..... RWY **26**

Distance **0.58** NM

12. FAF Coordinates ..... **393155.86N** / **1072642.05W**

REMARKS: Approach/Drawing attached.

US Department of Transportation
Federal Aviation Administration

FLIGHT PROCEDURES STANDARDS WAIVER

AUG 1 8 RECD

FLIGHT STANDARDS USE ONLY

CONTROL NO:

1. Flight Procedure Identification
RIFLE, CO
GARFIELD COUNTY REGIONAL
ILS RWY 26, AMDT 1

2. Waiver Required and Applicable Standard
WAIVE TERPS 8260.3B VOLUME 4 PARA 1.4.1, CALCULATING CLIMB GRADIENTS TO CLEAR OBSTACLES (STANDARD FORMULA)

3. Reason for Waiver: (Justification for non-standard requests)
REQUEST TO USE TERPS 8260.3B VOLUME 4 PARA 1.4.1, CALCULATING CLIMB GRADIENTS TO CLEAR OBSTACLES, (DOD OPTION). ILS DA 6800 ACHIEVED THROUGH A COMBINATION OF ADJUSTED HAT OF 1252 AND A MISSED CLIMB GRADIENT OF 266 FT/NM. 9486 SPOT EL/AAO LOCATED IN THE 12:1 AREA CONTROLS THE CLIMB GRADIENT. 9486-387 = 9099 MSL EQUIVALENT HEIGHT IN PRIMARY AT 10.50 NM FROM END OF SECTION 1B. 9099-6084/7.98 NM = 266 FT/NM CG. ATTEMPTS WERE MADE TO ADOPT A DA HIGH ENOUGH TO NOT REQUIRE A CLIMB GRADIENT BUT, BECAUSE RIFLE IS IN A VALLEY THE MORE THE DA INCREASED, THE CLIMB GRADIENT ALSO INCREASED DUE TO NEW PENETRATIONS

4. Equivalent Level of Safety Provided
1. THE CLIMB GRADIENT WILL BE PUBLISHED ON AN INSTRUMENT APPROACH PROCEDURE.
2. THE CLIMB GRADIENT WILL BE PUBLISHED IN FEET PER NAUTICAL MILE, WHICH WILL PERMIT USERS TO CALCULATE THEIR CLIMB REQUIREMENTS BASED ON INDIVIDUAL REQUIREMENTS.

5. How Relocation or Additional Facilities Will Affect Waiver Requirement:
REROUTING THE MISSED APPROACH WILL NOT ALLEVIATE OBSTRUCTIONS.

Coordination With User Organizations (Specify)
AVN-130
AVN-101

COMMENTS:

DATE: AUG 18 2008

AVN-100

MANAGER, NATIONAL FLIGHT PROCEDURES OFFICE

SIGNATURE: DANNY E. HAMILTON

FAA FORM 8260 - 1 / July 2003 (computer generated)

US Department of Transportation
Federal Aviation Administration

FLIGHT PROCEDURES STANDARDS WAIVER

FLIGHT STANDARDS USE ONLY

CONTROL NO:

1. Flight Procedure Identification:
RIFLE, CO
GARFIELD COUNTY REGIONAL
ILS RWY 25, AMDT 1

2. Waiver Required and Applicable Standard:
TERPS 8260.3B VOLUME 3, PARA 3.9.2, MISSED APPROACH CLIMB GRADIENT.

3. Reason for Waiver *(Justification for nonstandard treatment)*:
ILS DA 6800 ACHIEVED THROUGH A COMBINATION OF ADJUSTED HAT OF 1252 AND A MISSED CLIMB GRADIENT OF 266 FT/NM. 9486 SPOT EL/AAO LOCATED IN THE 12:1 AREA CONTROLS THE CLIMB GRADIENT. 9486-387 = 9099 MSL EQUIVALENT HEIGHT IN PRIMARY AT 10.50 NM FROM END OF SECTION 1B. 9099-6984/7.98 NM = 266 FT/NM CG. ATTEMPTS WERE MADE TO ADOPT A DA HIGH ENOUGH TO NOT REQUIRE A CLIMB GRADIENT BUT, BECAUSE RIFLE IS IN A VALLEY THE MORE THE DA INCREASED, THE CLIMB GRADIENT ALSO INCREASED DUE TO NEW PENETRATIONS.

4. Equivalent Level of Safety Provided:
1. THE CLIMB GRADIENT WILL BE PUBLISHED ON AN INSTRUMENT APPROACH PROCEDURE.
2. THE CLIMB GRADIENT WILL BE PUBLISHED IN FEET PER NAUTICAL MILE, WHICH WILL PERMIT USERS TO CALCULATE THEIR CLIMB REQUIREMENTS BASED ON INDIVIDUAL REQUIREMENTS.

5. How Relocation or Additional Facilities Will Affect Waiver Requirement:
REROUTING THE MISSED APPROACH WILL NOT ALLEVIATE OBSTRUCTIONS

6. Coordination With User Organizations *(Specify)*:
AVN-130 _____
AVN-101 _____

7. SUBMITTED BY

DATE:	Office Identification:	Title:	Signature:
JUL 21 2008	AVN-100	MANAGER, NATIONAL FLIGHT PROCEDURES OFFICE	DANNY E. HAMILTON

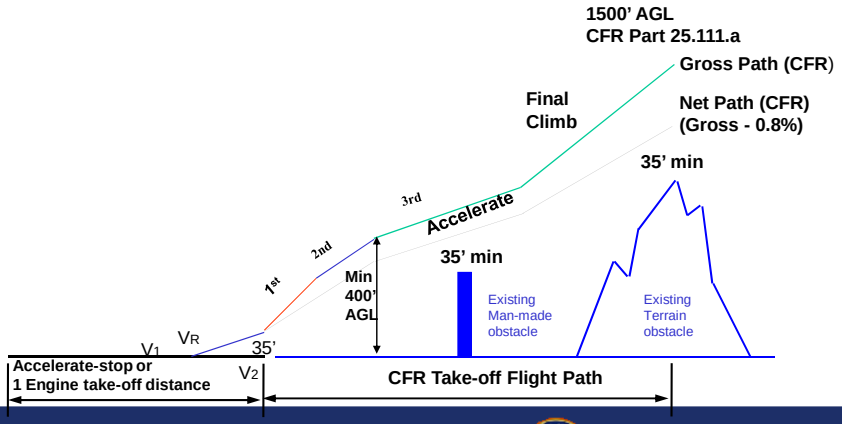
FAA FORM 8260 - 1 / July 2003 (computer generated)

APPENDIX D

FAA OBSTACLE EVALUATION REQUIREMENTS

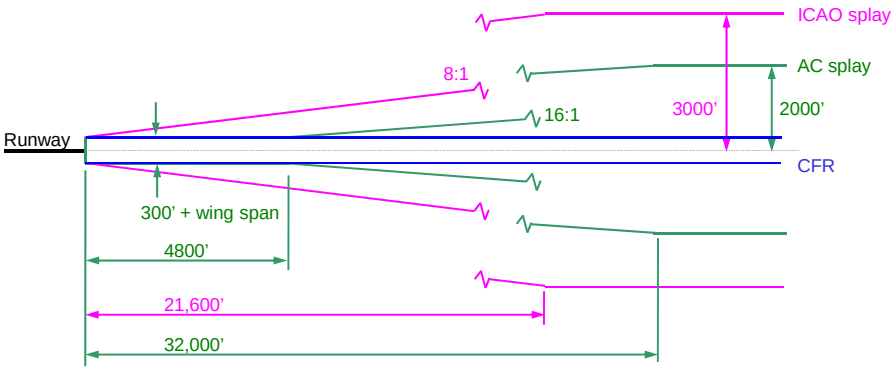
FAA OBSTACLE EVALUATION (OE) CRITERIA

One-Engine Inoperative, Vertical (CFR)



FAA OE CRITERIA

One-Engine Inoperative, Horizontal (FAR / AC / ICAO)



OBSTRUCTION EVALUATION CRITERIA

All-Engines Operating (OE Criteria)

- FAA Order 8260.3b (TERPS)
  - Various Horizontal And Vertical Protection Surfaces
  - Vertical Surface: 200 Ft/Nm
    - >Obstacle Identification Surface (OIS, Net Surface) Of 40:1
  - Horizontal Surface Typically 'Splays' At A 15 Deg Angle, Typical Maximum +/- 2 Nm

OAA: TURNING DEPARTURES

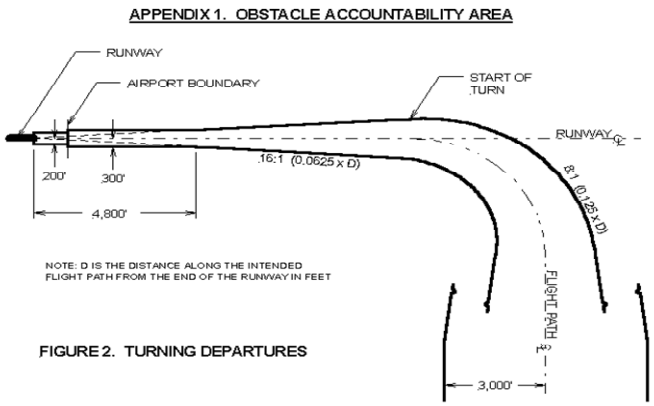
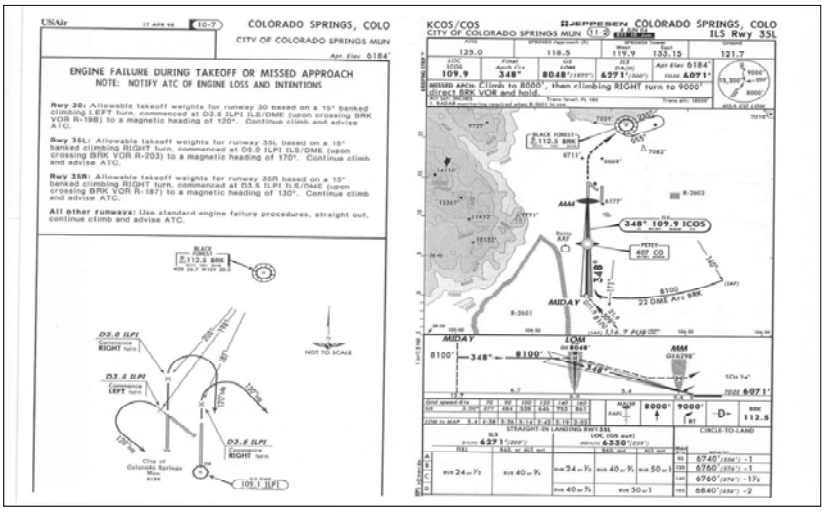


FIGURE 2. TURNING DEPARTURES

AREA ANALYSIS METHOD



APPENDIX E

MEMORANDUM – RIL INSTURMENT APPROACH INFORMATION

MAY 7, 2012

JVIATION®
900 S. Broadway, Suite 350, Denver, CO 80209
Main 303.524.3030 Fax 303.524.3031
JVIATION.COM

MEMO

Date: May 7, 2012

From: Chris Pomeroy

To: Brian Condie

Cc: Travis Vallin, Bill Payne

RE: RIL Instrument Approach Information

Brian,

As you know, the primary challenge preventing improved instrument approach procedures (IAP) at Garfield County Regional Airport (RIL) is the missed approach (MAP). An aircraft that can get "in" to the runway on approach must also get "out". It is the "getting out" that is the cause of your higher minimums due to surrounding terrain. With this mind, below is a summary of findings and information of interest regarding potential approach improvements at RIL. Sources include our meeting with FAA Western Services Area Flight Procedures Office (FPO) on April 17, 2012, in Renton, individual discussions with Bill Pahler with FPO and discussions with Bill Payne with William E. Payne and Associates.

- **Why won't the dopplerized VOR provide improved approach minimums?**

  According to Bill Pahler at FPO, by nature, VORs are susceptible to distortion causing accuracy issues. What dopplerization does is reduce distortion and improve accuracy of the facility.

  A VOR is an omni-directional facility. Regardless if the VOR is dopplerized or not, the size of the VOR "trapezoid" that needs to be protected for the MAP remains the same. Based on the size of the trapezoid and existing approach development criteria, there are too many obstacles in the trapezoid on the MAP. So, the dopplerized VOR can and will support Airway navigation and continue to be used for your existing approach but it will not help with your MAP, thus your minimums cannot be improved as result of the dopplerization.

- **Localizer Type Directional Aid (LDA)**

  Use of an LDA may be a realistic option to help with the MAP. Located offsite, the LDA would provide a new navigational corridor down the valley which would be used for MAP purposes.

Several questions/issues remain regarding this option:

- LDA Location - Where does the LDA need to be located to provide the highest coverage down valley? Bill Pahler has identified a potential preliminary site and your research has determined the current owner of the land where this site is located.

  It is our understanding siting of the LDA would have to undergo a formal site selection study. There may be some risk that the preliminary site may need to move based on the findings of a formal site selection study.

- LDA Equipment – The LDA would need to be procured, installed and maintained. There are basically two options. Procurement, installation and maintenance by the FAA, or procurement, installation and maintenance by the County.

  Based on our experience, it is unlikely FAA Air Traffic Organization (ATO) will invest in the LDA. ATO has publically stated its position not to invest in new conventional NAVAIDS with the transition to NEXTGEN and satellite based navigation technology. The LDA is considered a conventional NAVAID.

- LDA Costs – It is expected that moving forward with the LDA would generally result in the following costs to the County associated with:

  - Site selection Study
  - Land - it is generally understood the County would bear the cost of the land to place the LDA regardless of if the equipment is procured by the FAA or County
  - Site preparation and utilities - dependent on proximity to adjacent utilities
  - Localizer array
  - Installation of localizer array
  - Initial testing and certification of equipment
  - Long term maintenance and certification of equipment

- LDA Minimums – FPO has mentioned minimums with a Decision Height ranging from 500-700 ft. and visibility minimums of around ¾ mile with a Medium Intensity Approach Lighting System with REIL (MALSR). **This is preliminary only.**

- LDA Procedure Development Timeline – FAA has stated that development of a new LDA procedure could take up to 12 mos.

Bill Pahler stated that he is moving forward on trying to get an LDA procedure in the FAA FPO Production Cycle for October, 2013. He is going to the Regional Airspace and Procedures Team (RAPT) in mid-May to request the procedure be put in the cycle. There is no guarantee the RAPT will approve this request. **Further, publication of the new procedures would be dependent on the installation, testing and certification of the equipment.**

According to FPO, the following action would have to occur to meet the deadline:

- April 26, 2013 - Procedure developed and submitted to Oklahoma City
- July 10, 2013 – Equipment installed, tested and certified
- July 10, 2013 – Flight check performed and passed by FAA
- October 17, 2013 – Procedure Published

It is important to note that Bill Pahler is working to get the procedure into the cycle with the understanding the equipment is not installed. If the RAPT accepts the request, this should give us some time to provide you more answers as part of the master plan process.

It is also important to note that there is risk associated with this process. It can and has happened where FPO has developed a procedure, submitted it for QA/QC through other FAA lines of business only to have the procedure denied by FAA HQ. According to FPO and Bill Payne, there is simply no way to get assurance from the FAA that this won't happen.

- **"Special"**

  Perhaps another opportunity is available and that is the development of a "Special" procedure for RIL. This concept has been recently utilized with success in Eagle and Aspen. Development of a Special requires significant coordination with users and the FAA. There will be a cost associated with the coordination and development of the Special. Associated costs would also be the responsibility of the County.

- **Increased climb gradient for RNP .3**

  There is currently a published RNAV RNP approach to Runway 26. While this approach requires authorization to fly, it was noted that the RNP .1 line of minima uses a climb gradient of 398 ft/NM while the RNP .3 minima does not. FPO has advised that RNP .1 is not currently being used by many aircraft operators but RNP .3 is. Applying the 398 ft./NM climb gradient to the RNP .3 may result in similar minima as the RNP .1 of 500-1.

- **Assumed Obstacle**

  As discussed, there is an assumed obstruction (-/+ 400 ft.) on the approach plates. A previous obstruction survey you completed verifies no obstruction exists. The obstruction information needs to be submitted to FPO immediately for them to verify and perhaps revise your approaches to Runway 26.

- **Recommendations**

  - At this point, the LDA seems like a good, primary course of action to pursue for a long term solution based on initial information. That said, we do not feel comfortable with the information that has been provided to say for certain whether or not the LDA will result in minima that are substantially better than what you have versus potential costs considering it's likely the County will have to make the investment to secure, install and maintain the LDA equipment. And, we won't have that answer until the procedure has been developed and substantially more coordination with the FAA has taken place as part of this master plan process.

  - Of immediate concern to the County is; should the County move forward with the purchase of land that has been identified as a preliminary LDA site? It is recommended that, at a minimum, a long term lease be explored until we are certain the LDA is feasible, affordable and this is the correct location. We believe any effort to be proactive with the land will show the FAA that the County is committed to doing their part.

  - If the LDA does not come to fruition, the development of a Special is recommended as the secondary course of action.

  - Regardless of the LDA or Special, it is recommended that FPO review the existing RNAV RNP .3 approach to Runway 26 to consider a revision using the 398 ft./NM climb gradient.

  - Lastly, it is recommended the County submit the obstruction survey to FPO as soon as possible verifying no obstruction exists on the approach to Runway 26.

APPENDIX F

FAA FLIGHT PROCEDURES ASSESSMENT

RIL INSTURMENT APPROACH INFORMATION

MARCH, 2015

From: frederick.mitchell@faa.gov [mailto:frederick.mitchell@faa.gov]
Sent: Thursday, March 12, 2015 8:36 AM
To: Steve Berardo
Subject: RE: (RIL) Garfield County Regional Airport Obstacle KRILT029

Started looking at the approach yesterday afternoon and this morning. On the first run, terrain plus a 200' AAO increases the HAT based on final to 1824. Run 1 (attached) gives the information. On the Google earth snapshot, "HOMER" is the end of the AAO Exempt area, and the obstacles are shown.

For Run 2 (attached), I took the 200' of the original DAAO obstacles and lowered KRILT029 to 5524.35', and rerunning final, I get a 200' hat based on final. The Run 2 graphic shows the AAO Exempt area (dotted blue line), where the obstacles are located (circled in red) and I have included a possible obstacle restriction area for final (solid blue). The coordinates for the area are:

AAAAA 393241.74N/1073858.54W
BBBBB 393041.68N/1073854.32W
CCCCC 393425.94N/1072646.69W
DDDDD 392925.77N/1072637.42W

Again, this is only for final. Will start trying to figure out the missed today. I am also waiting on phone calls from the obstacle team (KRILT029) and criteria folks (use of LDA on missed approach) to be sure that I am evaluating everything correctly.

Regards,
Fred

Fred Mitchell
Senior Specialist
FAA, ATO Western Service Center
Flight Procedures Team, AJV-W24
Email: Frederick.mitchell@faa.gov
Phone: (425) 917-6722
FAX: (425) 917-6643

PFINAL99: ril

APT ID	RWY ID	FAC ID	TYPE	SIAP ID	GPI	TCH	GPA	Aligned	GS INT Dist	Surf Delay
KRIL	R26	RIL;ID	ILS		921.10	58.00	3.60	YES	12.57	32.90

DA distance to threshold:
Primary Altimeter, Lowest Category: 2257.65

PFINAL Penetrations
Sort by: PENETRATION (Descending Sort)
SURFACE
INC HAT TO (Descending Sort)

OBS ID	DESC	Lat/Long	Waive Bypass Adjust	MSL	Pent	Surf	RAISE GS TO	CHG TCH TO	INC HAT TO	HORZ /VERT	Thld Dist	C/L Dist	W Width	X Width	Y Width	EC Factor
DAA000007	TERRAIN+AAO	393133.00N-1073348.00W	A	7056.96	14.00	W	3.64	58.60	1820	164/98	42907.45	1493.35	1937.47	5291.85	7470.91	
DAA000001	TERRAIN+AAO	393151.00N-1073400.00W	A	7020.87	9.45	W	3.63	58.50	1784	164/98	42013.74	350.32	1905.30	5195.88	7335.76	
DAA000009	TERRAIN+AAO	393130.00N-1073345.00W	A	7060.24	9.26	W	3.63	58.50	1824	164/98	43134.73	1802.60	1945.65	5316.29	7505.35	
DAA000003	TERRAIN+AAO	393145.00N-1073357.00W	A	7024.15	4.98	W	3.62	58.30	1788	164/98	42233.33	262.27	1913.19	5219.35	7368.74	
DAA000002	TERRAIN+AAO	393148.00N-1073357.00W	A	7024.15	4.71	W	3.62	58.30	1788	164/98	42240.97	41.06	1913.48	5220.32	7370.20	
DAA000004	TERRAIN+AAO	393142.00N-1073354.00W	A	7030.71	3.52	W	3.61	58.20	1794	164/98	42460.58	571.52	1921.37	5243.79	7403.18	
DAA000006	TERRAIN+AAO	393139.00N-1073351.00W	A	7037.27	2.06	W	3.61	58.20	1801	164/98	42687.84	880.77	1929.56	5268.23	7437.62	
DAA000008	TERRAIN+AAO	393130.00N-1073348.00W	A	7043.84	1.15	W	3.61	58.20	1807	164/98	42899.83	1796.68	1937.19	5291.03	7469.76	
DAA000005	TERRAIN+AAO	393142.00N-1073348.00W	A	7043.84	0.07	W	3.61	58.20	1807	164/98	42930.38	583.36	1938.29	5294.30	7474.36	

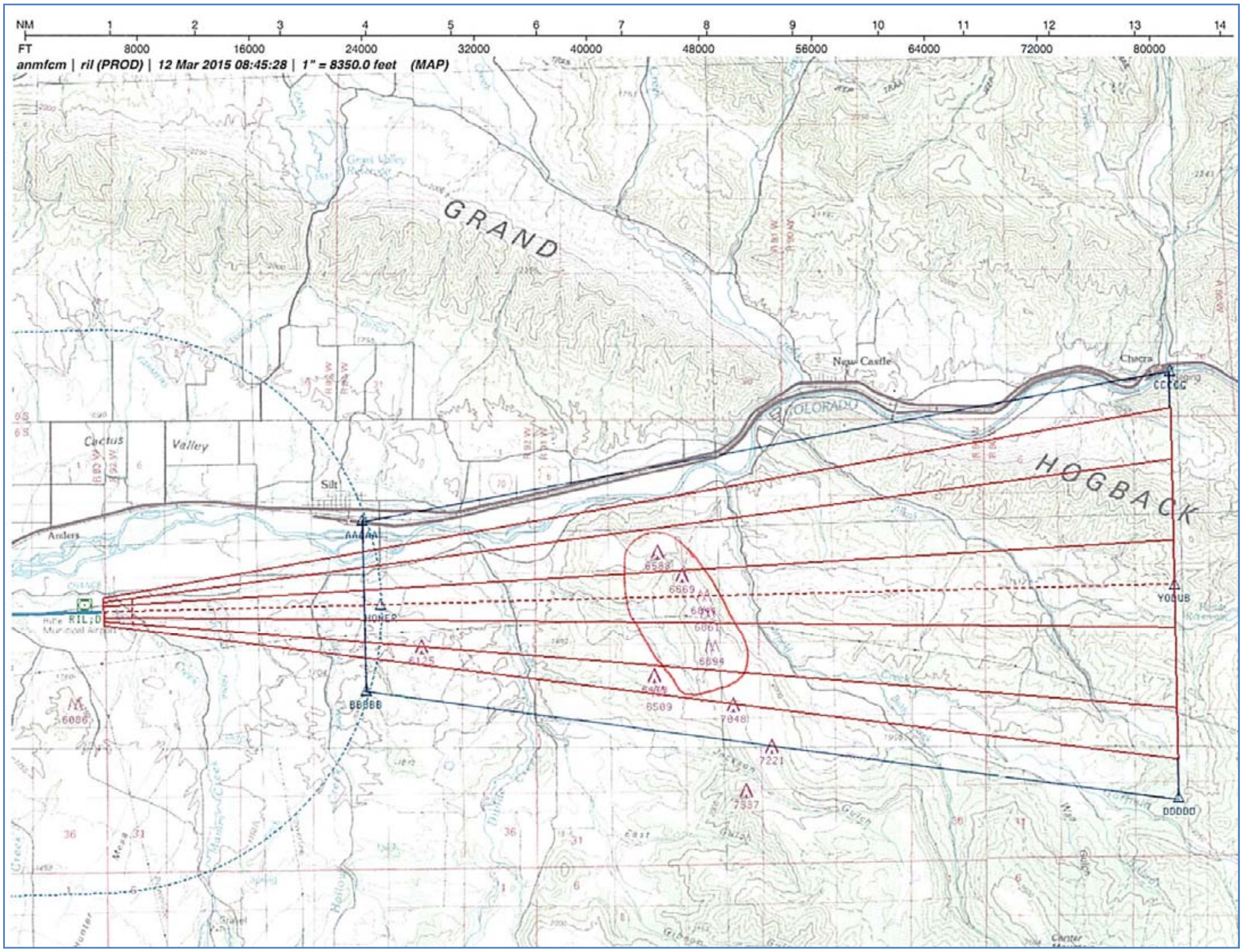
PFINAL99: ril

APT ID	RWY ID	FAC ID	TYPE	SIAP ID	GPI	TCH	GPA	Aligned	GS INT Dist	Surf Delay
KRIL	R26	RIL;ID	ILS		921.10	58.00	3.60	YES	12.57	32.90

DA distance to threshold:
Primary Altimeter, Lowest Category: 2257.65

PFINAL Penetrations
Sort by: PENETRATION (Descending Sort)
SURFACE
INC HAT TO (Descending Sort)

OBS ID	DESC	Lat/Long	Waive Bypass Adjust	MSL	Pent	Surf	RAISE GS TO	CHG TCH TO	INC HAT TO	HORZ /VERT	Thld Dist	C/L Dist	W Width	X Width	Y Width	EC Factor
KRILT030	GRD	393132.43N-1074249.85W	A	5551.00	-3.69	X	2.07	58.00	200	50/20	478.50	446.91	410.03	729.94	1042.19	
KRIL0007	GROUND	393132.81N-1074247.29W	A	5548.00	-4.58	W	2.56	58.00	200	20/2	679.97	413.88	417.28	751.60	1072.71	
KRILT029	GRD	393133.30N-1074247.28W	A	5524.35	-28.30	W	0.00	58.00	200	50/20	682.09	364.35	417.35	751.83	1073.03	
08-000688	POLE	393138.00N-1074215.00W	A	5604.00	-38.31	W	2.30	58.00	200	50/3	3222.30	43.10	508.81	1024.97	1457.97	
KRILT031	WSK	393130.39N-1074251.59W	A	5563.00	-38.61	X	0.00	58.00	200	50/20	336.71	649.51	404.92	714.70	1020.71	
KRILT0001	TREE	393134.65N-1074211.63W	A	5598.00	-53.30	W	1.93	58.00	200	50/20	3477.11	302.66	517.97	1052.34	1496.52	
KRIL0026	TREE	393134.55N-1074211.49W	A	5593.00	-58.68	W	1.77	58.00	200	20/2	3487.80	313.06	518.36	1053.49	1498.14	
08-000692	T-L TWR	393132.00N-1074041.00W	A	5801.00	-100.51	W	2.61	58.00	200	50/3	10566.28	759.36	773.19	1814.57	2570.66	
08-000689	POLE	393128.00N-1074236.00W	A	5580.00	-113.71	Y	0.00	58.00	200	20/3	1550.93	923.91	448.64	845.25	1204.69	
08-000690	POLE	393126.00N-1074239.00W	A	5592.00	-120.61	Y	0.00	58.00	200	50/10	1310.61	1119.83	439.99	819.42	1168.28	
08-000691	T-L TWR	393144.00N-1074044.00W	A	5755.00	-139.35	W	2.20	58.00	200	50/3	10363.50	460.14	765.89	1792.80	2540.02	
KRILT021	TWR	393132.65N-1074041.20W	A	5760.00	-141.02	W	2.21	58.00	200	50/20	10552.36	693.23	772.68	1813.07	2568.55	
08-023988	T-L TWR	393130.53N-1074041.93W	A	5752.00	-180.71	X	1.81	58.00	200	50/20	10489.53	906.06	770.42	1806.32	2559.03	
KRILT022	TWR	393130.53N-1074041.93W	A	5752.00	-180.71	X	1.81	58.00	200	50/20	10489.53	906.06	770.42	1806.32	2559.03	
AA007	TERRAIN	393133.00N-1073348.00W	A	6856.96	-186.00	W	3.16	58.00	200	164/98	42907.46	1493.35	1937.47	5291.85	7470.91	
AA001	TERRAIN	393151.00N-1073400.00W	A	6820.87	-190.55	W	3.14	58.00	200	164/98	42013.73	350.32	1905.30	5195.88	7335.76	
AA009	TERRAIN	393130.00N-1073345.00W	A	6860.24	-190.74	W	3.15	58.00	200	164/98	43134.73	1802.60	1945.65	5316.29	7505.35	
08-000693	T-L TWR	393123.00N-1074025.00W	A	5973.00	-193.13	X	1.90	58.00	200	50/3	11795.05	1702.44	817.43	1946.70	2756.86	
AA003	TERRAIN	393145.00N-1073357.00W	A	6824.15	-195.02	W	3.13	58.00	200	164/98	42233.33	262.27	1913.19	5219.35	7368.74	
AA002	TERRAIN	393148.00N-1073357.00W	A	6824.15	-195.29	W	3.13	58.00	200	164/98	42240.97	41.06	1913.48	5220.32	7370.20	
AA006	TERRAIN	393139.00N-1073351.00W	A	6837.27	-197.94	W	3.13	58.00	200	164/98	42687.84	880.77	1929.56	5268.23	7437.62	
AA005	TERRAIN	393142.00N-1073348.00W	A	6843.86	-199.91	W	3.13	58.00	200	164/98	42930.38	583.36	1938.29	5294.30	7474.36	
08-023981	FENCE	393125.86N-1074208.84W	A	5608.00	-204.95	Y	0.00	58.00	200	20/3	3671.80	1197.22	524.99	1073.29	1526.04	
KRIL0004	FENCE POST	393125.86N-1074208.84W	A	5608.00	-204.95	Y	0.00	58.00	200	20/2	3671.80	1197.22	524.99	1073.29	1526.04	
AA008	TERRAIN	393130.00N-1073348.00W	A	6834.86	-207.83	W	3.11	58.00	200	164/98	42899.82	1796.68	1937.19	5291.03	7469.76	
08-024001	POLE	393124.18N-1074203.97W	A	5642.00	-210.92	Y	0.00	58.00	200	50/20	4048.59	1377.27	538.55	1113.80	1583.13	
KRILT027	POLE	393124.18N-1074203.97W	A	5642.00	-210.92	Y	0.00	58.00	200	50/20	4048.59	1377.27	538.55	1113.80	1583.13	
08-023986	T-L TWR	393132.30N-1073350.21W	A	6817.00	-219.79	W	3.08	58.00	200	50/20	42732.63	1559.77	1931.17	5273.05	7444.42	
KRILT004	POLE	393132.30N-1073350.21W	A	6817.00	-219.79	W	3.08	58.00	200	50/20	42732.63	1559.77	1931.17	5273.05	7444.42	
08-023980	FENCE	393121.05N-1074142.82W	A	5653.00	-313.75	Y	0.00	58.00	200	20/20	5696.25	1737.92	597.87	1290.96	1832.79	
KRIL0003	FENCE POST	393121.05N-1074142.82W	A	5653.00	-313.75	Y	0.00	58.00	200	40/20	5696.25	1737.92	597.87	1290.96	1832.79	
KRILT005	TREE	393157.06N-1073407.80W	A	6669.00	-321.41	W	2.81	58.00	200	50/20	41418.49	978.45	1883.87	5131.87	7245.56	
08-023995	T-L TWR	393115.55N-1074025.45W	A	5962.00	-335.69	Y	0.63	58.00	200	50/20	11739.92	2454.76	815.45	1940.78	2748.52	
KRILT015	TWR	393115.55N-1074025.45W	A	5962.00	-335.69	Y	0.63	58.00	200	50/20	11739.92	2454.76	815.45	1940.78	2748.52	
08-023998	T-L TWR	393123.14N-1074047.02W	A	5767.00	-338.86	X	0.09	58.00	200	50/20	10071.19	1642.69	755.37	1761.35	2495.67	
KRILT023	TWR	393123.14N-1074047.02W	A	5767.00	-338.86	X	0.09	58.00	200	50/20	10071.19	1642.69	755.37	1761.35	2495.67	
08-023994	T-L TWR	393116.66N-1074013.53W	A	5955.00	-365.58	Y	0.61	58.00	200	50/20	12676.29	2367.16	849.15	2041.46	2890.40	
KRILT014	TWR	393116.66N-1074013.53W	A	5955.00	-365.58	Y	0.61	58.00	200	50/20	12676.29	2367.16	849.15	2041.46	2890.40	
08-023999	T-L TWR	393119.79N-1074057.94W	A	5728.00	-403.05	Y	0.00	58.00	200	50/20	9207.14	1958.74	724.26	1668.45	2364.75	
KRILT024	TWR	393119.79N-1074057.94W	A	5728.00	-403.05	Y	0.00	58.00	200	50/20	9207.14	1958.74	724.26	1668.45	2364.75	
08-023987	TOWER	393115.60N-1074036.24W	A	5858.00	-403.83	Y	0.00	58.00	200	50/20	10895.14	2427.37	785.03	1849.95	2620.52	
KRILT017	TWR	393115.60N-1074036.24W	A	5858.00	-403.83	Y	0.00	58.00	200	50/20	10895.14	2427.37	785.03	1849.95	2620.52	
08-020984	TOWER	393121.64N-1074040.58W	A	5710.00	-450.27	X	0.00	58.00	200	500/125	10571.45	1807.70	773.38	1815.14	2571.47	
08-023997	T-L TWR	393115.48N-1074042.81W	A	5762.00	-480.15	Y	0.00	58.00	200	50/20	10380.35	2425.89	766.50	1794.60	2542.52	
KRILT018	POLE	393115.48N-1074042.81W	A	5762.00	-480.15	Y	0.00	58.00	200	50/20	10380.35	2425.89	766.50	1794.60	2542.52	
KRILT006	TREE	393213.63N-1073430.10W	A	6588.00	-561.15	X	2.16	58.00	200	50/20	39714.91	2697.99	1822.53	4948.68	6987.39	
08-021384	TOWER	393105.70N-1073340.50W	A	6894.00	-745.32	X	1.84	58.00	200	500/125	43425.27	4268.44	1956.12	5347.57	7549.42	
KRILT013	TREE	393106.39N-1073803.64W	A	6125.00	-765.55	Y	0.15	58.00	200	50/20	22820.46	3671.78	1214.35	3132.16	4427.44	
08-000709	CATENARY	393126.00N-1073649.00W	A	5820.00	-825.51	X	0.65	58.00	200	500/125	28716.54	1840.20	1426.60	3766.07	5320.75	
KRILT003	TREE	393102.24N-1073344.00W	A	6887.00	-830.61	X	1.63	58.00	200	50/20	43142.38	4611.39	1945.94	5317.15	7506.57	
KRILT007	TREE	393046.04N-1073432.53W	A	6478.00	-1390.24	Y	0.00	58.00	200	50/20	39300.40	6153.40	1807.64	4904.09	6924.48	
KRILT008	TREE	393040.73N-1073427.92W	A	6501.00	-1458.38	Y	0.00	58.00	200	50/20	39647.85	6699.44	1820.15	4941.46	6977.13	


NM 1 2 3 4 5 6 7 8 9 10 11 12 13 14
FT 8000 16000 24000 32000 40000 48000 56000 64000 72000 80000
anmfcm | ril (PROD) | 12 Mar 2015 08:45:28 | 1" = 8350.0 feet (MAP)
GRAND
HOGBACK
New Castle
Chacra
COLORADO
Cactus
Valley
Silt
Antlers
AAAAA
BBBBB
CCCCC
DDDDD
YOBUB
RIL;D
6588
6669
6861
6894
6125
6509
7048
7221
7337
6086

APPENDIX G

LETTER FROM DAVID KUXHAUSEN, WOOLPERT TO FAA

RE: OBJECT KRILTO29, RIFLE AIRPORT

MARCH 5, 2015

WOOLPERT

March 05, 2015
Fred Mitchell
Senior Specialist
FAA, ATO Western Service Center
Flight Procedures Team, AJV-W24

Dear Mr. Mitchell:

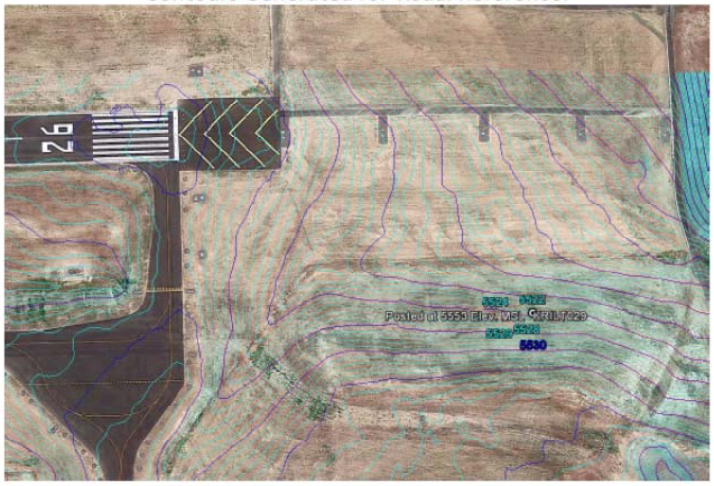
Rifle Colorado Ground Point Verification concerning obstacle point # KRILT029 listed on the 8260-3

Form 8260-3 has a ground point listed for RIL in the ILS procedure for Runway 26.
The location of point KRILT029 according to the 8260 form that was provided by Jviation is listed below: (See Exhibit A)

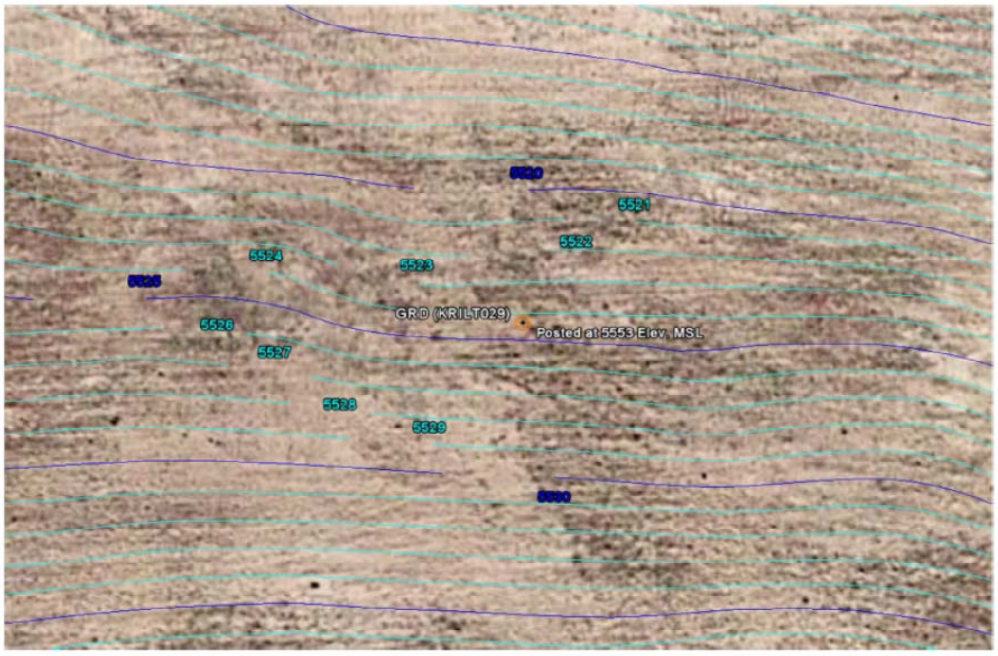
39° 31' 33".30 N Latitude
107° 42' 47".28 W Longitude
5553' (2C) Elevation

Woolpert was tasked with verifying the elevation of the ground obstacle KRILT029 utilizing the existing stereo imagery. A recent 18B-VGA obstruction study was done for RIL with stereo aerial images captured on 9/16/2010. A recent stereo measurement was taken at the above location as listed on the existing 8260-3 report. The measurement resulted in a ground elevation of **5524.35 ft. +/- 0.5 ft**. The Woolpert stereo compiled elevation is 28.65' lower than the 8260-3 reported elevation.

Contours Generated for visual Reference:



Woolpert, Inc.
116 Inverness Drive East, Suite 105
Englewood, CO 80112-5125
303.925.1400



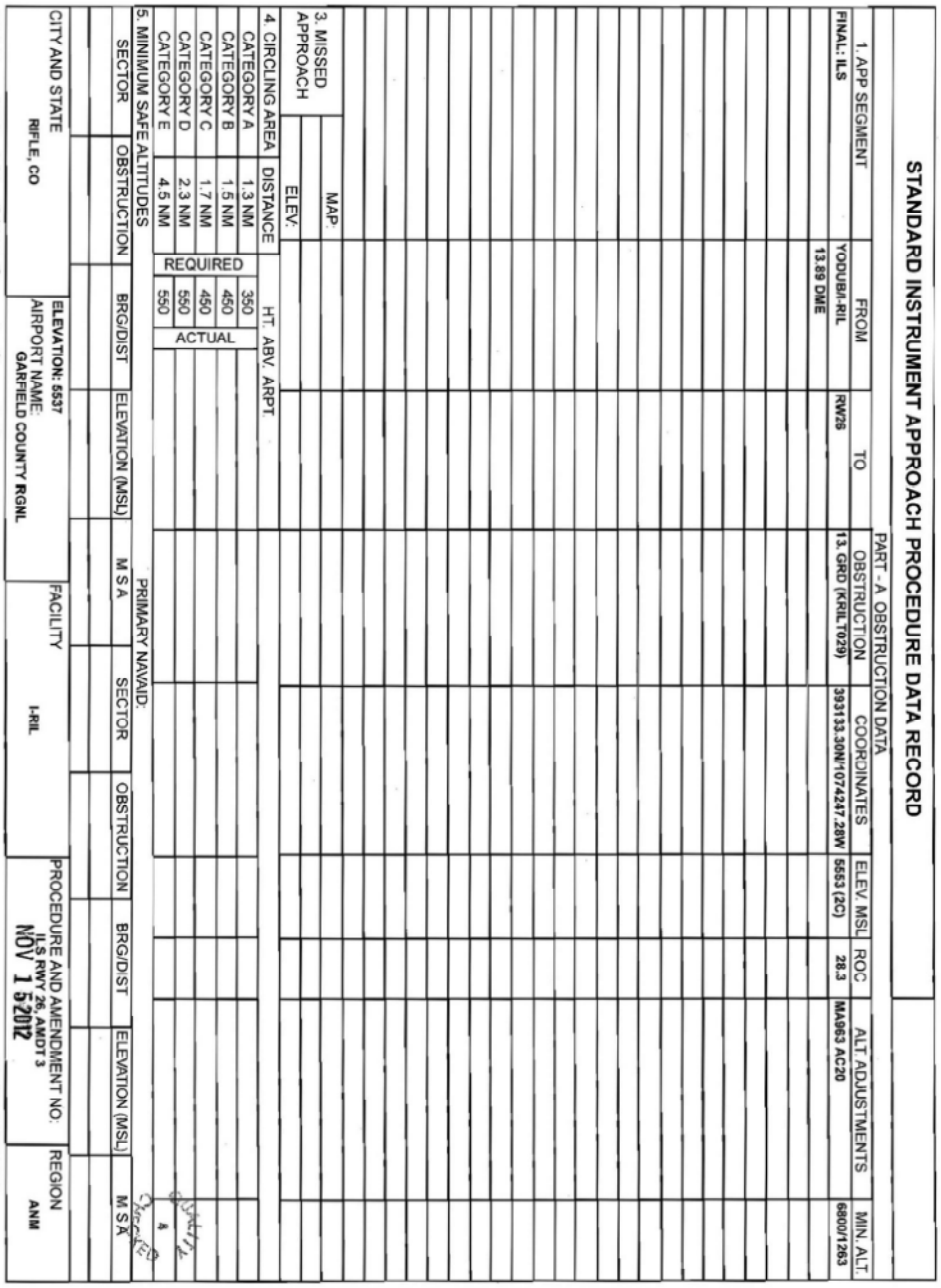
Sincerely,

Woolpert, Inc.

David Kuxhausen, PLS

Woolpert, Inc.
116 Inverness Drive East, Suite 105
Englewood, CO 80112-5125
303.925.1400

Exhibit A:



STANDARD INSTRUMENT APPROACH PROCEDURE DATA RECORD

1. APP SEGMENT	FROM	TO	PART - A OBSTRUCTION DATA OBSTRUCTION	COORDINATES	ELEV MSL	ROC	ALT ADJUSTMENTS	MIN. ALT.
FINAL: ILS	YODUB/I-RIL	RW26	13. GRD (KRIL 7029)	393133.30N/1074247.28W	5553 (2C)	28.3	MA963 AC20	6600/1263
	13.89 DME							

3. MISSED APPROACH	MAP	ELEV.	DISTANCE	HT. ABV. ARPT.
4. CIRCLING AREA			REQUIRED	ACTUAL
CATEGORY A			350	
CATEGORY B			450	
CATEGORY C			450	
CATEGORY D			550	
CATEGORY E			550	

5. MINIMUM SAFE ALTITUDES	PRIMARY NAVAID:							
SECTOR	OBSTRUCTION	BRG/DIST	ELEVATION (MSL)	M S A	SECTOR	OBSTRUCTION	BRG/DIST	ELEVATION (MSL)

CITY AND STATE	ELEVATION: 5537	FACILITY	PROCEDURE AND AMENDMENT NO:	REGION
RIFLE, CO	AIRPORT NAME: GARFIELD COUNTY RGNL	I-RIL	ILS RWY 26, AMDT 3 NOV 15 2012	ANM

FAA Form 8260 - 9 / April 2006 (Computer Generated) PAGE 2 OF 2 PAGES

Woolpert, Inc.
116 Inverness Drive East, Suite 105
Englewood, CO 80112-5125
303.925.1400

APPENDIX D
RIL PRELIMINARY COST ESTIMATES

Garfield County Regional Airport
Rifle, Colorado
Engineer's Opinion of Probable Cost

July 1, 2013

Auto Parking - Alternate 1

ITEM	ITEM DESCRIPTION	UNIT	Quantity	Auto Parking - Alternate 1 Engineer's Estimate Unit $	Item $
P-100	**MOBILIZATION**				
P-100a	Mobilization	LS	1	$ 82,400	$ 82,400.00
P-150	**PAVEMENT REMOVAL**				
P-150a	Pavement Removal (2" - Partial Depth)	SY	16,105	$ 12.00	$ 193,260.00
P-150b	Pavement Removal (Complete)	SY	500	$ 15.00	$ 7,500.00
P-152	**EMBANKMENT AND EXCAVATION**				
P-152a	Unclassified Excavation	CY	1,900	$ 16.00	$ 30,400.00
P-152b	Subgrade Preparation (12 -Inches)	SY	4,020	$ 10.00	$ 40,200.00
P-222	**SOIL STERILIZATION**				
P-222a	Soil Sterilization	SY	4,020	$ 2.00	$ 8,040.00
P-310	**GEOTEXTILE FABRIC**				
P-310a	Stabilization Fabric	SY	4,020	$ 2.50	$ 10,050.00
CDOT 304	**AGGREGATE BASE COURSE**				
CDOT 304a	Aggregate Base Course - Class 6	CY	1,150	$ 55.00	$ 63,250.00
CO-401	**PLANT MIX PAVEMENTS**				
CO-401a	Bituminous Paving Course	TON	1,800	$ 100.00	$ 180,000.00
CO-403	**COLORADO MODIFIED PLANT MIX ASPHALT PAVEMENTS**				
CO-403a	Bituminous Paving Course (Apron)	TON	1,670	$ 100.00	$ 167,000.00
P-603	**BITUMINOUS TACK COAT**				
P-603a	Tack Coat	GAL	3,500	$ 1.00	$ 3,500.00
P-620	**PAINTING**				
P-620a	Temporary Pavment Markings	SF	2,675	$ 3.00	$ 8,025.00
P-620b	Permanent Pavement Markings	SF	2,674	$ 4.00	$ 10,696.00
D-701	**PIPE FOR STORM DRAINS AND CULVERTS**				
D-701a	Reinforce Concrete Pipe	LF	500	$ 100.00	$ 50,000.00
D-701b	Reinforced Concrete Pipe - FES	EA	2	$ 2,000.00	$ 4,000.00
D-751	**MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES**				
D-751a	Install Parking Lot Inlet	EA	2	$ 4,000.00	$ 8,000.00
D-751b	Install Aircraft Rated Inlet	EA	1	$ 10,000.00	$ 10,000.00
D-751c	Install Inspection Pit	EA	1	$ 4,000.00	$ 4,000.00
D-751d	Install Underdrain Clean Out	EA	3	$ 2,000.00	$ 6,000.00
T-901	**SEEDING AND EROSION CONTROL**				
T-901a	Seeding with Hydromulch	AC	2	$ 2,500.00	$ 5,000.00
T-901b	Erosion Control	LS	1	15,000	$ 15,000.00
DIV 16	**ELECTRICAL**				
Div 16a	Micellaneous Electrical	LS	1	$ 25,000.00	$ 25,000.00
				TOTAL	**$ 931,321.00**
				10% CONTINGENCY	**$ 93,132.10**
				18% ENGINEERING of (TOTAL + CONTINGENCY)	**$ 167,637.78**
				TOTAL	**$ 1,192,090.88**

ASSUMPTIONS:

* FBO Parking Lot section is 6" CO-401 on 6' of CDOT Crushed Aggregate Base Course.
* Expanded Apron section is 8" CO-403 on 12" COT Crushed Aggregate Base Course.
* Soil Sterilization to be sprayed on all paved area subgrade.
* Class 6 Aggregrate Base course to be utilized under all pavement.
* Unit Weight for Asphalt Cement assumed to be 150 lb/cf.
* Tack Coat placed at 0.15 gal/sy.
* Stabilization Fabric to be placd under new construction.
* Aircraft Pavment to utilize Aircraft Rated Inlets, parking lot to use standard CDOT Inlets.
* Aircraft Pavement to have underdrains and associated structures.
* Temporary and Permanent Paint to be applied in two applications.

Garfield County Regional Airport
Rifle, Colorado
Engineer's Opinion of Probable Cost

July 1, 2013

Auto Parking - Alternate 2

ITEM	ITEM DESCRIPTION	UNIT	Auto Parking - Alternate 2 Quantity	Engineer's Estimate Unit $	Engineer's Estimate Item $
P-100	**MOBILIZATION**				
P-100a	Mobilization	LS	1	$ 153,000	$ 153,000.00
P-150	**PAVEMENT REMOVAL**				
P-150a	Pavement Removal (2" - Partial Depth)	SY	16,105	$ 12.00	$ 193,260.00
P-150b	Pavement Removal (Complete)	SY	500	$ 15.00	$ 7,500.00
P-152	**EMBANKMENT AND EXCAVATION**				
P-152a	Unclassified Excavation	CY	1,900	$ 16.00	$ 30,400.00
P-152b	Subgrade Preparation (12 -Inches)	SY	13,700	$ 10.00	$ 137,000.00
P-222	**SOIL STERILIZATION**				
P-222a	Soil Sterilization	SY	13,700	$ 2.00	$ 27,400.00
P-310	**GEOTEXTILE FABRIC**				
P-310a	Stabilization Fabric	SY	13,700	$ 2.50	$ 34,250.00
CDOT 304	**AGGREGATE BASE COURSE**				
CDOT 304a	Aggregate Base Course - Class 6	CY	3,450	$ 55.00	$ 189,750.00
CO-401	**PLANT MIX PAVEMENTS**				
CO-401a	Bituminous Paving Course	TON	4,170	$ 100.00	$ 417,000.00
CO-403	**COLORADO MODIFIED PLANT MIX ASPHALT PAVEMENTS**				
CO-403a	Bituminous Paving Course (Apron)	TON	3,010	$ 100.00	$ 301,000.00
P-603	**BITUMINOUS TACK COAT**				
P-603a	Tack Coat	GAL	5,500	$ 1.00	$ 5,500.00
P-620	**PAINTING**				
P-620a	Temporary Pavment Markings	SF	3,710	$ 3.00	$ 11,130.00
P-620b	Permanent Pavement Markings	SF	3,710	$ 4.00	$ 14,840.00
D-701	**PIPE FOR STORM DRAINS AND CULVERTS**				
D-701a	Reinforce Concrete Pipe	LF	850	$ 100.00	$ 85,000.00
D-701b	Reinforced Concrete Pipe - FES	EA	2	$ 2,000.00	$ 4,000.00
D-751	**MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES**				
D-751a	Install Parking Lot Inlet	EA	3	$ 4,000.00	$ 12,000.00
D-751b	Install Aircraft Rated Inlet	EA	2	$ 10,000.00	$ 20,000.00
D-751c	Install Inspection Pit	EA	2	$ 4,000.00	$ 8,000.00
D-751d	Install Underdrain Clean Out	EA	6	$ 2,000.00	$ 12,000.00
T-901	**SEEDING AND EROSION CONTROL**				
T-901a	Seeding with Hydromulch	AC	2	$ 2,500.00	$ 5,000.00
T-901b	Erosion Control	LS	1	15,000	$ 15,000.00
DIV 16	**ELECTRICAL**				
Div 16a	Miscellaneous Electrical	LS	1	$ 30,000.00	$ 30,000.00
				TOTAL	**$ 1,713,030.00**
				10% CONTINGENCY	**$ 171,303.00**
				18% ENGINEERING of (TOTAL + CONTINGENCY)	**$ 308,345.40**
				TOTAL	**$ 2,192,678.40**

ASSUMPTIONS:

*Parking Lot section is 6" CO-401 on 6' of CDOT Crushed Aggregate Base Course.
* Expanded Apron section is 8" CO-403 on 12" COT Crushed Aggregate Base Course.
* Soil Sterilant to be sprayed on all paved areas.
* Class 6 Aggregrate Base course to be utilized under all pavement.
* Unit Weight for Asphalt Cement assumed to be 150 lb/cf.
* Tack Coat placed at 0.15 gal/sy.
* Stabilization Fabric to be placd under new construction.
* Aircraft Pavment to utilize Aircraft Rated Inlets, parking lot to use standard CDOT Inlets.
* Aircraft Pavement to have underdrains and associated structures.
* Temporary and Permanent Paint to be applied in two applications.

Garfield County Regional Airport
Rifle, Colorado
Engineer's Opinion of Probable Cost

July 1, 2013

Auto Parking - Alternate 3

ITEM	ITEM DESCRIPTION	UNIT	Auto Parking - Alternate 3 Quantity	Engineer's Estimate Unit $	Engineer's Estimate Item $
P-100	**MOBILIZATION**				
P-100a	Mobilization	LS	1	$ 165,800	$ 165,800.00
P-150	**PAVEMENT REMOVAL**				
P-150a	Pavement Removal (2" - Partial Depth)	SY	16,105	$ 12.00	$ 193,260.00
P-150b	Pavement Removal (Complete)	SY	500	$ 15.00	$ 7,500.00
P-152	**EMBANKMENT AND EXCAVATION**				
P-152a	Unclassified Excavation	CY	11,500	$ 16.00	$ 184,000.00
P-152b	Subgrade Preparation (12 -Inches)	SY	17,500	$ 10.00	$ 175,000.00
P-222	**SOIL STERILIZATION**				
P-222a	Soil Sterilization	SY	17,500	$ 2.00	$ 35,000.00
P-310	**GEOTEXTILE FABRIC**				
P-310a	Stabilization Fabric	SY	4,020	$ 2.50	$ 10,050.00
CDOT 304	**AGGREGATE BASE COURSE**				
CDOT 304a	Aggregate Base Course - Class 6	CY	1,150	$ 55.00	$ 63,250.00
CO-401	**PLANT MIX PAVEMENTS**				
P-401a	Bituminous Paving Course	TON	6,900	$ 100.00	$ 690,000.00
CO-403	**COLORADO MODIFIED PLANT MIX ASPHALT PAVEMENTS**				
CO-403a	Bituminous Paving Course (Apron)	TON	1,100	$ 100.00	$ 110,000.00
P-603	**BITUMINOUS TACK COAT**				
P-603a	Tack Coat	GAL	5,400	$ 1.00	$ 5,400.00
P-620	**PAINTING**				
P-620a	Temporary Pavment Markings	SF	3,710	$ 3.00	$ 11,130.00
P-620b	Permanent Pavement Markings	SF	3,710	$ 4.00	$ 14,840.00
D-701	**PIPE FOR STORM DRAINS AND CULVERTS**				
D-701a	Reinforce Concrete Pipe	LF	700	$ 100.00	$ 70,000.00
D-701b	Reinforced Concrete Pipe - FES	EA	2	$ 2,000.00	$ 4,000.00
D-705	**PIPE UNDERDRAINS FOR AIRPORTS**				
D-705a	Perforated Polyetyhlene Pipe (6 -Inch)	LF	750	$ 30.00	$ 22,500.00
D-705b	Non-Perforated Polyetyhlene Pipe (6 -Inch)	LF	150	$ 30.00	$ 4,500.00
D-751	**MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES**				
D-751a	Install Parking Lot Inlet	EA	3	$ 4,000.00	$ 12,000.00
D-751b	Install Aircraft Rated Inlet	EA	1	$ 10,000.00	$ 10,000.00
D-751c	Install Inspection Pit	EA	1	$ 4,000.00	$ 4,000.00
D-751d	Install Underdrain Clean Out	EA	2	$ 2,000.00	$ 4,000.00
T-901	**SEEDING AND EROSION CONTROL**				
T-901a	Seeding with Hydromulch	AC	5	$ 2,500.00	$ 12,500.00
T-901b	Erosion Control	LS	1	15,000	$ 15,000.00
DIV 16	**ELECTRICAL**				
Div 16a	Entrance Road Lighting and Miscellaneous Electrical	LS	1	$ 100,000.00	$ 100,000.00
				TOTAL	**$ 1,923,730.00**
				10% CONTINGENCY	**$ 192,373.00**
				18% ENGINEERING of (TOTAL + CONTINGENCY)	**$ 34,627.14**
				TOTAL	**$ 2,150,730.14**

ASSUMPTIONS:

* Parking Lot and Entrance Road section is 6" CO-401 on 6' of CDOT Crushed Aggregate Base Course.
* Entrance Road assumes approximate 2' of cut entire length.
* Expanded Apron section is 8" CO-403 on 12" COT Crushed Aggregate Base Course.
* Class 6 Aggregrate Base course to be utilized under all pavement.
* Unit Weight for Asphalt Cement assumed to be 150 lb/cf.
* Tack Coat placed at 0.15 gal/sy.
* Stabilization Fabric to be placd under new construction.
* Aircraft Pavment to utilize Aircraft Rated Inlets, parking lot to use standard CDOT Inlets.
* Aircraft Pavement to have underdrains and associated structures.
* Temporary and Permanent Paint to be applied in two applications.
* Entrance Road to be lighted.

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July 2, 2013

GA Development - Alternate 1

ITEM	ITEM DESCRIPTION	UNIT	GA Development - Alternate 1 Quantity	Engineer's Estimate Unit $	Engineer's Estimate Item $
P-100	**MOBILIZATION**				
P-100a	Mobilization	LS	1	$ 393,500	$ 393,500.00
P-150	**PAVEMENT REMOVAL**				
P-150a	Pavement Removal (2" - Partial Depth)	SY	980	$ 12.00	$ 11,760.00
P-152	**EMBANKMENT AND EXCAVATION**				
P-152a	Unclassified Excavation	CY	28,000	$ 14.00	$ 392,000.00
P-152b	Subgrade Preparation (12 -Inches)	SY	41,600	$ 8.00	$ 332,800.00
P-222	**SOIL STERILIZATION**				
P-222a	Soil Sterilization	SY	41,600	$ 1.00	$ 41,600.00
P-310	**GEOTEXTILE FABRIC**				
P-310a	Stabilization Fabric	SY	41,600	$ 2.50	$ 104,000.00
CDOT 304	**AGGREGATE BASE COURSE**				
CDOT 304a	Aggregate Base Course - Class 6	CY	13,900	$ 55.00	$ 764,500.00
CO-403	**COLORADO MODIFIED PLANT MIX ASPHALT PAVEMENTS**				
CO-403a	Bituminous Paving Course (Apron)	TON	18,100	$ 100.00	$ 1,810,000.00
P-603	**BITUMINOUS TACK COAT**				
P-603a	Tack Coat	GAL	12,500	$ 1.00	$ 12,500.00
P-620	**PAINTING**				
P-620a	Temporary Pavment Markings	SF	2,500	$ 3.00	$ 7,500.00
P-620b	Permanent Pavement Markings	SF	2,500	$ 4.00	$ 10,000.00
P-640	**AIRCRAFT TIE DOWN ANCHORS**				
P-640a	Install Aircraft Tie Downs	EA	60	$ 500.00	$ 30,000.00
D-701	**PIPE FOR STORM DRAINS AND CULVERTS**				
D-701a	Reinforce Concrete Pipe	LF	2,800	$ 100.00	$ 280,000.00
D-701b	Reinforced Concrete Pipe - FES	EA	6	$ 2,000.00	$ 12,000.00
D-705	**PIPE UNDERDRAINS FOR AIRPORTS**				
D-705a	Perforated Polyetyhlene Pipe (6 -Inch)	LF	1,800	$ 30.00	$ 54,000.00
D-705b	Non-Perforated Polyetyhlene Pipe (6 -Inch)	LF	300	$ 30.00	$ 9,000.00
D-751	**MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES**				
D-751a	Install Inspection Pit	EA	3	$ 4,000.00	$ 12,000.00
D-751b	Install Underdrain Clean Out	EA	8	$ 2,000.00	$ 16,000.00
D-751c	Install Aircraft Rated Inlet	EA	6	$ 10,000.00	
T-901	**SEEDING AND EROSION CONTROL**				
T-901a	Seeding with Hydromulch	AC	4	$ 2,500.00	$ 10,000.00
T-901b	Erosion Control	LS	1	25,000	$ 25,000.00
L-125	**AIRFIELD ELECTRICAL**				
L-125a	Install Airfield Lighting	LS	1	$ 110,000.00	$ 110,000.00
				TOTAL	**$ 4,438,160.00**
				10% CONTINGENCY	**$ 443,816.00**
				18% ENGINEERING of (TOTAL + CONTINGENCY)	**$ 79,886.88**
				TOTAL	**$ 4,961,862.88**

ASSUMPTIONS:

* Apron section is 8" CO-403 on 12" CDOT Crushed Aggregate Base Course.
* Class 6 Aggregrate Base course to be utilized under all pavement.
* Unit Weight for Asphalt Cement assumed to be 150 lb/cf.
* Tack Coat placed at 0.15 gal/sy.
* Stabilization Fabric to be placd under new construction.
* Aircraft Pavment to sheet flow to north for drainage
* Aircraft Pavement to have underdrains and associated structures.
* Temporary and Permanent Paint to be applied in two applications.
* Tie down anchors not include in associated costs.

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GA Development - Alternate 2

ITEM	ITEM DESCRIPTION	UNIT	GA Development - Alternate 2 Quantity	Engineer's Estimate Unit $	Engineer's Estimate Item $
P-100	**MOBILIZATION**				
P-100a	Mobilization	LS	1	$ 408,400	$ 408,400.00
P-150	**PAVEMENT REMOVAL**				
P-150a	Pavement Removal (2" - Partial Depth)	SY	980	$ 12.00	$ 11,760.00
P-152	**EMBANKMENT AND EXCAVATION**				
P-152a	Unclassified Excavation	CY	28,400	$ 14.00	$ 397,600.00
P-152b	Subgrade Preparation (12 -Inches)	SY	42,600	$ 8.00	$ 340,800.00
P-222	**SOIL STERILIZATION**				
P-222a	Soil Sterilization	SY	42,600	$ 1.00	$ 42,600.00
P-310	**GEOTEXTILE FABRIC**				
P-310a	Stabilization Fabric	SY	42,600	$ 2.50	$ 106,500.00
CDOT 304	**AGGREGATE BASE COURSE**				
CDOT 304a	Aggregate Base Course - Class 6	CY	13,900	$ 55.00	$ 764,500.00
CO-403	**COLORADO MODIFIED PLANT MIX ASPHALT PAVEMENTS**				
CO-403a	Bituminous Paving Course (Apron)	TON	19,200	$ 100.00	$ 1,920,000.00
P-603	**BITUMINOUS TACK COAT**				
P-603a	Tack Coat	GAL	12,800	$ 1.00	$ 12,800.00
P-620	**PAINTING**				
P-620a	Temporary Pavment Markings	SF	2,450	$ 3.00	$ 7,350.00
P-620b	Permanent Pavement Markings	SF	2,450	$ 4.00	$ 9,800.00
P-640	**AIRCRAFT TIE DOWN ANCHORS**				
P-640a	Install Aircraft Tie Downs	EA	104	$ 500.00	$ 52,000.00
D-701	**PIPE FOR STORM DRAINS AND CULVERTS**				
D-701a	Reinforce Concrete Pipe	LF	2,800	$ 100.00	$ 280,000.00
D-701b	Reinforced Concrete Pipe - FES	EA	6	$ 2,000.00	$ 12,000.00
D-705	**PIPE UNDERDRAINS FOR AIRPORTS**				
D-705a	Perforated Polyetyhlene Pipe (6 -Inch)	LF	1,800	$ 30.00	$ 54,000.00
D-705b	Non-Perforated Polyetyhlene Pipe (6 -Inch)	LF	300	$ 30.00	$ 9,000.00
D-751	**MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES**				
D-751a	Install Inspection Pit	EA	3	$ 4,000.00	$ 12,000.00
D-751b	Install Underdrain Clean Out	EA	8	$ 2,000.00	$ 16,000.00
D-751c	Install Aircraft Rated Inlet	EA	6	$ 10,000.00	
T-901	**SEEDING AND EROSION CONTROL**				
T-901a	Seeding with Hydromulch	AC	4	$ 2,500.00	$ 10,000.00
T-901b	Erosion Control	LS	1	25,000	$ 25,000.00
L-125	**AIRFIELD ELECTRICAL**				
L-125a	Install Airfield Lighting	LS	1	$ 110,000.00	$ 110,000.00
				TOTAL	**$ 4,602,110.00**
				10% CONTINGENCY	**$ 460,211.00**
				18% ENGINEERING of (TOTAL + CONTINGENCY)	**$ 82,837.98**
				TOTAL	**$ 5,145,158.98**

ASSUMPTIONS:

* Apron section is 8" CO-403 on 12" CDOT Crushed Aggregate Base Course.
* Class 6 Aggregrate Base course to be utilized under all pavement.
* Unit Weight for Asphalt Cement assumed to be 150 lb/cf.
* Tack Coat placed at 0.15 gal/sy.
* Stabilization Fabric to be placd under new construction.
* Aircraft Pavment to sheet flow to north for drainage
* Aircraft Pavement to have underdrains and associated structures.
* Temporary and Permanent Paint to be applied in two applications.
* Tie down anchors not include in associated costs.

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April 7, 2014

Helipad Development

ITEM	ITEM DESCRIPTION	UNIT	Helipad Development - Alternate 1 Quantity	Engineer's Estimate Unit $	Item $
P-100	**MOBILIZATION**				
P-100a	Mobilization	LS	1	$ 10,200	$ 10,200.00
P-150	**PAVEMENT REMOVAL**				
P-150a	Pavement Removal (2" - Partial Depth)	SY	60	$ 20.00	$ 1,200.00
P-152	**EMBANKMENT AND EXCAVATION**				
P-152a	Unclassified Excavation	CY	240	$ 14.00	$ 3,360.00
P-152b	Subgrade Preparation (12 -Inches)	SY	300	$ 8.00	$ 2,400.00
P-222	**SOIL STERILIZATION**				
P-222a	Soil Sterilization	SY	300	$ 1.50	$ 450.00
P-310	**GEOTEXTILE FABRIC**				
P-310a	Stabilization Fabric	SY	300	$ 2.50	$ 750.00
CDOT 304	**AGGREGATE BASE COURSE**				
CDOT 304a	Aggregate Base Course - Class 6	CY	100	$ 65.00	$ 6,500.00
P-403	**BITUMINOUS TACK COAT**				
P-403a	Bituminous Paving Course (Butt Joint)	Tons	35	$ 150.00	$ 5,250.00
P-403b	Bituminous Asphalt Binder	Tons	2.5	$ 250.00	$ 625.00
P603	**BITUMINOUS TACK COAT**				
P-603a	Tack Coat	GAL	30	$ 5.00	$ 150.00
P-610	**PORTLAND CEMENT CONCRETE**				
P-610a	6" Structural Portland Cement Concrete (Concrete Hard Stand)	SY	300	$ 150.00	$ 45,000.00
P-620	**PAINTING**				
P-620a	Temporary Pavment Markings	SF	270	$ 5.00	$ 1,350.00
P-620b	Permanent Pavement Markings	SF	270	$ 4.00	$ 1,080.00
D-705	**PIPE UNDERDRAINS FOR AIRPORTS**				
D-705a	Perforated Polyetyhlene Pipe (6 -Inch)	LF	150	$ 50.00	$ 7,500.00
D-751	**MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES**				
D-751a	Install Inspection Pit	EA	3	$ 4,000.00	$ 12,000.00
D-751b	Install Underdrain Clean Out	EA	1	$ 2,000.00	$ 2,000.00
D-751c	Install Aircraft Rated Inlet	EA	1	$ 10,000.00	$ 10,000.00
T-901	**SEEDING AND EROSION CONTROL**				
T-901a	Seeding with Hydromulch	AC	0.5	$ 2,500.00	$ 1,250.00
T-901b	Erosion Control	LS	1	$ 1,500.00	$ 1,500.00
L-107	**INSTALLATION OF AIRPORT 8-FOOT WIND CONES**				
L-107a	Installation of Airport 8-foot Wind Cones and Segmented Circle	EA	1	$ 7,000.00	$ 7,000.00
L-125	**AIRFIELD ELECTRICAL**				
L-125a	Install Airfield Lighting associated with Helipad	LS	1	$ 10,000.00	$ 10,000.00
				TOTAL	**$ 129,565.00**
				10% CONTINGENCY	**$ 12,956.50**
				18% ENGINEERING of (TOTAL + CONTINGENCY)	**$ 25,653.87**
				TOTAL	**$ 168,175.37**

ASSUMPTIONS:

* Helipad size is the minimum of 50' length by 50' width
* Helipad section is 6" P-610 on 12" CDOT Crushed Aggregate Base Course.
* Class 6 Aggregrate Base course to be utilized under all pavement.
* Stabilization Fabric to be placd under new construction.
* Aircraft Pavment to have 2.0% max gradient flow
* Aircraft Pavement to have underdrains and associated structures.
* Temporary and Permanent Paint to be applied in two applications.
* Tie down anchors not include in associated costs.

Garfield County Regional Airport
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April 4, 2014

Runway Rehabilitation - Alternate 1

ITEM	ITEM DESCRIPTION	UNIT	Auto Parking - Alternate 1 Quantity	Engineer's Estimate Unit $	Engineer's Estimate Item $
P-100	**MOBILIZATION**				
P-100a	Mobilization	LS	1	$ 368,500	$ 368,500.00
P-140	**PAVEMENT REMOVAL**				
P-140a	Pavement Removal (2" - Partial Depth)	SY	88,250	$ 12.00	$ 1,059,000.00
P-310	**GEOTEXTILE FABRIC**				
P-310a	Paving Fabric	SY	88,250	$ 2.50	$ 220,625.00
P-401	**PLANT MIX PAVEMENTS**				
P-401a	Bituminous Paving Course	TON	9,925	$ 100.00	$ 992,500.00
P-401b	Modified Bituminous Binder	TON	645	$ 250.00	$ 161,250.00
P-601	**CRACK REPAIR**				
P-603a	Minor Crack Repair	LF	14,500	$ 5.00	$ 72,500.00
P-603b	Major Crack Repair	LF	14,500	$ 15.00	$ 217,500.00
P-603	**BITUMINOUS TACK COAT**				
P-603a	Tack Coat	GAL	8,825	$ 2.00	$ 17,650.00
P-603b	Fog Seal	SY	88,250	$ 2.00	$ 176,500.00
P-620	**PAINTING**				
P-620a	Temporary Pavment Markings	SF	96,700	$ 3.00	$ 290,100.00
P-620b	Permanent Pavement Markings	SF	96,700	$ 4.00	$ 386,800.00
P-650a	**GROOVING**				
T-901a	Sawcut Grooving	SY	65,150	$ 1.00	$ 65,150.00
DIV 16	**ELECTRICAL**				
Div 16a	Micellaneous Electrical	LS	1	$ 25,000.00	$ 25,000.00
				TOTAL	**$ 4,053,075.00**
				10% CONTINGENCY	**$ 405,307.50**
				18% ENGINEERING of (TOTAL + CONTINGENCY)	**$ 729,553.50**
				TOTAL	**$ 5,187,936.00**

ASSUMPTIONS:

* Existing pavement will require a Geosynthetic Pavement Fabric
* Existing runway grades are to be retained
* Unit Weight for Asphalt Cement assumed to be 150 lb/cf.
* Tack Coat placed at 0.15 gal/sy.
* Temporary and Permanent Paint to be applied in two applications.
*Runway will be grooved 10' out from edge of pavement
*No taxiways or taxiway connectors to be accounted for as a part of this project

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June 28, 2013

Runway 8/26 - 500' Extension with no Parallel Taxiway

ITEM	ITEM DESCRIPTION	UNIT	500-Foot Runway 26 Extension Quantity	Engineer's Estimate Unit $	Engineer's Estimate Item $
P-100	**MOBILIZATION**				
P-100a	Mobilization	LS	1	$ 1,071,100	$ 1,071,100.00
P-140	**PAVEMENT REMOVAL**				
P-140a	Asphalt Removal (Full Depth)	SY	3,120	$ 10.00	$ 31,200.00
P-140b	2" Butt Joint - 10' Wide	SY	115	$ 8.00	$ 920.00
P-152	**EXCAVATION AND EMBANKMENT**				
P-152a	Subgrade Preparation	SY	8,667	$ 10.00	$ 86,666.67
P-152b	Embankment (In Place) - Finish Grading Necessary	CY	1,589,000	$ 3.00	$ 4,767,000.00
P-164	**REINFORCED SOIL SLOPE, COMPLETE**				
P-164a	Reinforced Soil Slope, Complete	VFF	78,150	$ 50.00	$ 3,907,500.00
P-222	**SOIL STERILIZATION**				
P-222a	Soil Sterilization	SY	8,667	$ 1.50	$ 13,000.00
P-209	**CRUSHED AGGREGATE BASE COURSE**				
P-209a	Crushed Aggregate Base Course (12 Inches)	TON	4,800	$ 55.00	$ 264,000.00
P-310	**GEOTEXTILE FABRIC**				
P-310a	Stabilization Fabric	SY	8,667	$ 3.00	$ 26,000.00
P-401	**BITUMINOUS PAVING COURSE**				
P-401a	Bituminous Paving Course	TON	3,200	$ 100.00	$ 320,000.00
P-603	**BITUMINOUS TACK COAT**				
P-603a	Tack Coat	GAL	2,140	$ 1.00	$ 2,140.00
P-609	**POLYMER MODIFIED PAVEMENT SEALER AND REJUVENATOR**				
P-609a	Asphalt Rejuvenator with Sand (GSB-88)	SY	78,000	$ 1.50	$ 117,000.00
P-650	**RUNWAY GROOVING**				
P-650a	Runway Grooving	SY	7,225	$ 3.00	$ 21,675.00
P-620	**RUNWAY TAXIWAY PAINTING**				
P-620a	Temporary Pavment Markings	SF	112,500	$ 1.50	$ 168,750.00
P-620b	Permanent Pavement Markings	SF	112,500	$ 2.00	$ 225,000.00
P-620c	Permanent Paint Obliteration	SF	105,000	$ 2.50	$ 262,500.00
D-701	**PIPE FOR STORM DRAINS AND CULVERTS**				
D-701a	Reinforced Concrete Pipe - Class V	LF	500	$ 100.00	$ 50,000.00
D-701b	Reinforced Concrete Pipe - Flared End Section	EA	4	$ 2,000.00	$ 8,000.00
D-705	**PIPE UNDERDRAINS FOR AIRPORTS**				
D-705a	Perforated Polyetyhlene Pipe (6 -Inch)	LF	1,000	$ 30.00	$ 30,000.00
D-705b	Non-Perforated Polyetyhlene Pipe (6 -Inch)	LF	500	$ 30.00	$ 15,000.00
D-751	**MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES**				
D-705a	Aircraft Rated Inlet - Type 1	EA	4	$ 10,000.00	$ 40,000.00
D-705b	Inspection Pit	EA	2	$ 4,000.00	$ 8,000.00
D-705c	Underdrain Clean Out	EA	8	$ 2,000.00	$ 16,000.00
T-901	**SEEDING AND EROSION CONTROL**				
T-901a	Seeding with Hydromulch	AC	5	$ 2,500.00	$ 12,500.00
T-901b	Temporary Erosion Control	LS	5	$ 50,000.00	$ 250,000.00
L-108	**AIRPORT LIGHTING**				
L-108a	Installation of Airfield Electrical System	LS	1	$ 100,000.00	$ 100,000.00
				TOTAL	**$ 11,813,951.67**
				10% CONTINGENCY	**$ 1,181,395.17**
				18% ENGINEERING of (TOTAL + CONTINGENCY)	**$ 2,126,511.30**
				TOTAL	**$ 15,121,858.13**

ASSUMPTIONS:

*The term "vff" will references to the square foot of vertical finish face. This measurement applies to the Reinforced. Soil Slope and Mechanically Stabilized Earth wall. The method of measurement is the projected vertical elevation difference multiplied by the horizontal length.
*The EMBANKMENT quantity was calculated by applying a 20% contingency factor to the raw earthwork number. This calculation also assumes that a Mechanically Stabilized Earth wall will be utilized on the north side of the runway extension.
*RW 8/26 is a CII category runway
*Polymer Modified Pavement to be applied to Runway Surface after obliteration to rejuvenate surface.
*15% of pavement area will require painting and obliteration.
*Tack Coat to be applied at 0.15 gal/sy. 2 applications on runway and 1 application on blast pad.
* 8 inch of runway asphalt section, 4 inch blast pad section with unit weight of 150 lb/cy for asphalt.

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Engineer's Opinion of Probable Cost

June 28, 2013

Runway 8/26 - 500' Extension and Parallel Taxiway

ITEM	ITEM DESCRIPTION	UNIT	500' Runway 26 Extension Quantity	Engineer's Estimate Unit $	Engineer's Estimate Item $
P-100	**MOBILIZATION**				
P-100a	Mobilization	LS	1	$ 1,148,900	$ 1,148,900.00
P-140	**PAVEMENT REMOVAL**				
P-140a	Asphalt Removal (Full Depth)	SY	3,120	$ 10.00	$ 31,200.00
P-140b	2" Butt Joint - 10' Wide	SY	115	$ 8.00	$ 920.00
P-152	**EXCAVATION AND EMBANKMENT**				
P-152a	Subgrade Preparation	SY	14,040	$ 8.00	$ 112,320.00
P-152b	Embankment (In Place) - Finish Grading Necessary	CY	1,589,000	$ 3.00	$ 4,767,000.00
P-164	**REINFORCED SOIL SLOPE, COMPLETE**				
P-164a	Reinforced Soil Slope, Complete	VFF	78,150	$ 50.00	$ 3,907,500.00
P-222	**SOIL STERILIZATION**				
P-222a	Soil Sterilization	SY	14,040	$ 1.50	$ 21,060.00
P-209	**CRUSHED AGGREGATE BASE COURSE**				
P-209a	Crushed Aggregate Base Course (12 Inches)	TON	9,475	$ 55.00	$ 521,125.00
P-310	**GEOTEXTILE FABRIC**				
P-310a	Stabilization Fabric	SY	14,040	$ 3.00	$ 42,120.00
P-401	**BITUMINOUS PAVING COURSE**				
P-401a	Bituminous Paving Course	TON	5,620	$ 100.00	$ 562,000.00
P-603	**BITUMINOUS TACK COAT**				
P-603a	Tack Coat	GAL	3,800	$ 1.00	$ 3,800.00
P-609	**POLYMER MODIFIED PAVEMENT SEALER AND REJUVENATOR**				
P-609a	Asphalt Rejuvenator with Sand (GSB-88)	SY	78,000	$ 1.50	$ 117,000.00
P-620	**RUNWAY TAXIWAY PAINTING**				
P-620a	Temporary Pavment Markings	SF	113,500	$ 1.50	$ 170,250.00
P-620b	Permanent Pavement Markings	SF	113,500	$ 2.00	$ 227,000.00
P-620c	Permanent Paint Obliteration	SF	105,000	$ 2.50	$ 262,500.00
D-701	**PIPE FOR STORM DRAINS AND CULVERTS**				
D-701a	Reinforced Concrete Pipe - Class V	LF	750	$ 100.00	$ 75,000.00
D-701b	Reinforced Concrete Pipe - Flared End Section	EA	4	$ 2,000.00	$ 8,000.00
D-705	**PIPE UNDERDRAINS FOR AIRPORTS**				
D-705a	Perforated Polyetyhlene Pipe (6 -Inch)	LF	2,650	$ 30.00	$ 79,500.00
D-705b	Non-Perforated Polyetyhlene Pipe (6 -Inch)	LF	1,000	$ 30.00	$ 30,000.00
D-751	**MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES**				
D-705a	Aircraft Rated Inlet - Type 1	EA	6	$ 10,000.00	$ 60,000.00
D-705b	Inspection Pit	EA	4	$ 4,000.00	$ 16,000.00
D-705c	Underdrain Clean Out	EA	16	$ 2,000.00	$ 32,000.00
T-901	**SEEDING AND EROSION CONTROL**				
T-901a	Seeding with Hydromulch	AC	10	$ 2,500.00	$ 25,000.00
T-901b	Temporary Erosion Control	LS	5	$ 50,000.00	$ 250,000.00
L-108	**AIRPORT LIGHTING**				
L-108a	Installation of Airfield Electrical System	LS	1	$ 200,000.00	$ 200,000.00
				TOTAL	**$ 12,670,195.00**
				10% CONTINGENCY	**$ 1,267,019.50**
				18% ENGINEERING of (TOTAL + CONTINGENCY)	**$ 2,280,635.10**
				TOTAL	**$ 16,217,849.60**

ASSUMPTIONS:
*The term "vff" will references to the square foot of vertical finish face. This measurement applies to the Reinforced. Soil Slope and Mechanically Stabilized Earth wall. The method of measurement is the projected vertical elevation difference multiplied by the horizontal length.
*The EMBANKMENT quantity was calculated by applying a 20% contingency factor to the raw earthwork number. This calculation also assumes that a Mechanically Stabilized Earth wall will be utilized on the north side of the runway extension.
*RW 8/26 is a CII category runway
*Polymer Modified Pavement to be applied to Runway Surface after obliteration to rejuvenate surface.
*15% of pavement area will require painting and obliteration.
*Tack Coat to be applied at 0.15 gal/sy. 2 applications on runway and 1 application on blast pad.
* 8 inch of runway asphalt section, 4 inch blast pad section with unit weight of 150 lb/cy for asphalt.

Garfield County Regional Airport
Rifle, Colorado
Engineer's Opinion of Probable Cost

November 11, 2013

Runway 8/26 and Taxiway Shoulder Widening

ITEM	ITEM DESCRIPTION	UNIT	Runway Shoulder Widening to RSA Quantity	Engineer's Estimate Unit $	Engineer's Estimate Item $	UNIT	Taxiway Shoulder Widening to RSA Quantity	Engineer's Estimate Unit $	Engineer's Estimate Item $
P-100	**MOBILIZATION**								
P-100a	Mobilization	LS	1	$ 236,200	$ 236,200.00	LS	1	$ 204,200	$ 204,200.00
P-140	**PAVEMENT REMOVAL**								
P-140aa	Butt Joint (2')	SY	3,380	$ 16.00	$ 54,080.00	SY	3,150	$ 16.00	$ 50,400.00
P-152	**EXCAVATION AND EMBANKMENT**								
P-152a	Subgrade Preparation	SY	33,600	$ 8.00	$ 268,800.00	SY	29,500	$ 8.00	$ 236,000.00
P-152b	Unclassified Excavation	CY	12,000	$ 18.00	$ 216,000.00	CY	10,000	$ 18.00	$ 180,000.00
P-222	**SOIL STERILIZATION**								
P-222a	Soil Sterilization	SY	33,600	$ 1.50	$ 50,400.00	SY	29,500	$ 1.50	$ 44,250.00
P-209	**CRUSHED AGGREGATE BASE COURSE**								
P-209a	Crushed Aggregate Base Course (8 Inches)	CY	7,500	$ 55.00	$ 412,500.00	CY	6,600	$ 55.00	$ 363,000.00
P-310	**GEOTEXTILE FABRIC**								
P-310a	Stabilization Fabric	SY	33,600	$ 3.00	$ 100,800.00	SY	29,500	$ 3.00	$ 88,500.00
P-401	**BITUMINOUS PAVING COURSE**								
P-401a	Bituminous Paving Course (4 Inches)	TON	8,000	$ 55.00	$ 440,000.00	TON	7,000	$ 55.00	$ 385,000.00
P-401b	Bituminous Binder	TON	520	$ 800.00	$ 416,000.00	TON	455	$ 800.00	$ 364,000.00
P-603	**BITUMINOUS TACK COAT**								
P-603a	Tack Coat	GAL	5,500	$ 1.00	$ 5,500.00	GAL	5,000	$ 1.00	$ 5,000.00
P-620	**RUNWAY TAXIWAY PAINTING**								
P-620b	Permanent Pavement Markings	SF	42,000	$ 2.00	$ 84,000.00	SF	2,500	$ 4.00	$ 10,000.00
D-751	**MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES**								
D-751a	Adjust Inspection Pit	EA	10	$ 2,000.00	$ 20,000.00	EA	10	$ 2,000.00	$ 20,000.00
D-751b	Adjust Underdrain Clean Out	EA	35	$ 1,000.00	$ 35,000.00	EA	35	$ 1,000.00	$ 35,000.00
T-901	**SEEDING AND EROSION CONTROL**								
T-901a	Seeding with Hydromulch	AC	3.5	$ 2,500.00	$ 8,750.00	AC	3	$ 2,500.00	$ 7,500.00
T-901b	Temporary Erosion Control	LS	1	$ 50,000.00	$ 50,000.00	LS	1	$ 50,000.00	$ 50,000.00
L-108	**UNDERGROUND POWER CABLE FOR AIRPORTS**								
L-108a	L-824C #8 AWG 5000V Wire	LF	2,500	$ 2.00	$ 5,000.00	LF	2,500	$ 2.00	$ 5,000.00
L-108b	#6 AWG Bare Couterpoise Wire	LF	15,300	$ 3.00	$ 45,900.00	LF	14,200	$ 3.00	$ 42,600.00
L-110	**AIRPORT UNDERGROUND ELECTRICAL DUCT BANKS**								
L-110a	Instal 1 - 2" Schedule 40 Conduit (DEB)	LF	1,500	$ 15.00	$ 22,500.00	LF	1	$ 15.00	$ 15.00
L-110b	Extend Existing Duct Banks	LF	1,000	$ 50.00	$ 50,000.00	LF	1,000	$ 50.00	$ 50,000.00
L-125	**AIRPORT LIGHTING**								
L-125a	Adjust Runway/ Taxiway Edge Lights	EA	117	$ 650.00	$ 76,050.00	EA	172	$ 650.00	$ 111,800.00
L-125b	Remove and Install Guidance Sign on New Base	EA	10	$ 5,500.00	$ 55,000.00	EA	8	$ 5,500.00	$ 44,000.00
				TOTAL	**$ 2,652,480.00**				**$ 2,296,265.00**
				10% CONTINGENCY	**$ 265,248.00**				**$ 229,626.50**
				18% ENGINEERING of (TOTAL + CONTINGENCY)	**$ 477,446.40**				**$ 413,327.70**
				TOTAL	**$ 3,395,174.40**				**$ 2,939,219.20**

ASSUMPTIONS:
- Shoulders shall tie to existing pavement with 2' Butt Joint.
- Quanity for Unclassified Excavation is the volume of the pavement section and include grading out 10 feet from edge of pavement.
- Subgrade to be prepared to a depth of 12 inches.
- Dry unit weight of aggregate for P-401 is 150 lb/cy. Percent Bituminous Binder assumed to be 6.5% og aggregate weight.
- Tack Coat applicatio rate is 0.15 gal/sy.
- Runway edge stripes and hold short markings will be required to be repainted with a permannet application rate only.
- Underdrain structures will require adjustment. Assumed clean outs every 400 feet and inspection pits every 1200 feet.
- Seeding shall be from edge of pavement out 10 feet.
- Assume some cable will need to be rehabed, but the goal is use existing cable.
- Assume all bare counterpoise will be replaced in pavement section.
- Conduit will need to be replaced in various locations and used to extend signs. The goal is to use existing conduit for runway edge lighting.
- Duct banks extending underneath paved sections will be extended out from underneath widened pavements.
- Existing Runway/Taxiway edge lights will be raised with extensions.
- All guidance signs within limits of shoulder widening will be removed and relocated using the existing sign on a new concrete base.

Garfield County Regional Airport
Rifle, Colorado
Engineer's Opinion of Probable Cost

May 12, 2014

SE Hangar Development - Alternate 1

ITEM	ITEM DESCRIPTION	UNIT	SE Hangar Development - Alternate 1 Quantity	Engineer's Estimate Unit $	Engineer's Estimate Item $
P-100	**MOBILIZATION**				
P-100a	Mobilization	LS	1	$ 172,100	$ 172,100.00
P-150	**PAVEMENT REMOVAL**				
P-150a	Pavement Removal (2" - Partial Depth)	SY	250	$ 12.00	$ 3,000.00
P-152	**EMBANKMENT AND EXCAVATION**				
P-152a	Unclassified Excavation	CY	8,000	$ 18.00	$ 144,000.00
P-152b	Subgrade Preparation (12 -Inches)	SY	13,000	$ 10.00	$ 130,000.00
P-222	**SOIL STERILIZATION**				
P-222a	Soil Sterilization	SY	13,000	$ 1.00	$ 13,000.00
P-310	**GEOTEXTILE FABRIC**				
P-310a	Stabilization Fabric	SY	12,000	$ 2.50	$ 30,000.00
CDOT 304	**AGGREGATE BASE COURSE**				
CDOT 304a	Aggregate Base Course - Class 6	CY	4,200	$ 55.00	$ 231,000.00
CO-401	**PLANT MIX PAVEMENTS**				
CO-401a	Bituminous Paving Course	TON	400	$100.00	$ 40,000.00
CO-403	**COLORADO MODIFIED PLANT MIX ASPHALT PAVEMENTS**				
CO-403a	Bituminous Paving Course (Apron)	TON	3,450	$ 100.00	$ 345,000.00
P-501	**PORTLAND CEMENT CONCRETE PAVEMENT**				
P-501a	6" Portland Cement Concrete Pavment	SY	4,325	$ 110.00	$ 475,750.00
P-603	**BITUMINOUS TACK COAT**				
P-603a	Tack Coat	GAL	3,600	$ 1.00	$ 3,600.00
P-620	**PAINTING**				
P-620a	Temporary Pavment Markings	SF	1,200	$ 3.00	$ 3,600.00
P-620b	Permanent Pavement Markings	SF	1,200	$ 4.00	$ 4,800.00
D-701	**PIPE FOR STORM DRAINS AND CULVERTS**				
D-701a	Reinforce Concrete Pipe	LF	1,500	$ 100.00	$ 150,000.00
D-701b	Reinforced Concrete Pipe - FES	EA	2	$ 2,000.00	$ 4,000.00
D-705	**PIPE UNDERDRAINS FOR AIRPORTS**				
D-705a	Perforated Polyetyhlene Pipe (6 -Inch)	LF	1,000	$ 30.00	$ 30,000.00
D-705b	Non-Perforated Polyetyhlene Pipe (6 -Inch)	LF	20	$ 30.00	$ 600.00
D-751	**MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES**				
D-751a	Install Inspection Pit	EA	2	$ 4,000.00	$ 8,000.00
D-751b	Install Underdrain Clean Out	EA	6	$ 2,000.00	$ 12,000.00
D-751c	Install Aircraft Rated Inlet	EA	6	$ 10,000.00	$ 60,000.00
T-901	**SEEDING AND EROSION CONTROL**				
T-901a	Seeding with Hydromulch	AC	3	$ 2,500.00	$ 7,500.00
T-901b	Erosion Control	LS	1	25,000	$ 25,000.00
L-125	**AIRFIELD ELECTRICAL**				
L-125a	Install Airfield Lighting	LS	1	$ 100,000.00	$ 100,000.00
U-100	**UTILITIES**				
U-101a	Hangar Utilities	LS	1	$ 100,000.00	$ 100,000.00
				TOTAL	**$ 2,092,950.00**
				10% CONTINGENCY	**$ 209,295.00**
				18% ENGINEERING of (TOTAL + CONTINGENCY)	**$ 37,673.10**
				TOTAL	**$ 2,339,918.10**

ASSUMPTIONS:
* Hangar pavement section to be 6" PCCP on 12" CDOT Crushed Aggregate Base Course.
* Apron section is 8" CO-403 on 12" CDOT Crushed Aggregate Base Course.
* Parking Lot section is 6" CO-401 on 6" CDOT Crushed Aggregate Base Course.
* Class 6 Aggregrate Base course to be utilized under all pavement.
* Unit Weight for Asphalt Cement assumed to be 150 lb/cf.
* Tack Coat placed at 0.15 gal/sy.
* Stabilization Fabric to be placd under new construction.
* Aircraft Pavement to have underdrains and associated structures.
* Temporary and Permanent Paint to be applied in two applications.
* Utilites include gas, power, water, and sanitary.

Garfield County Regional Airport
Rifle, Colorado
Engineer's Opinion of Probable Cost

July 2, 2013

SE Hangar Development - Alternate 1

ITEM	ITEM DESCRIPTION	UNIT	Quantity	SE Hangar Development - Alternate 1 Engineer's Estimate Unit $	Item $
P-100	**MOBILIZATION**				
P-100a	Mobilization	LS	1	$ 252,500	$ 252,500.00
P-150	**PAVEMENT REMOVAL**				
P-150a	Pavement Removal (2" - Partial Depth)	SY	250	$ 12.00	$ 3,000.00
P-152	**EMBANKMENT AND EXCAVATION**				
P-152a	Unclassified Excavation	CY	12,000	$ 16.00	$ 192,000.00
P-152b	Subgrade Preparation (12 -Inches)	SY	20,300	$ 10.00	$ 203,000.00
P-222	**SOIL STERILIZATION**				
P-222a	Soil Sterilization	SY	20,300	$ 1.00	$ 20,300.00
P-310	**GEOTEXTILE FABRIC**				
P-310a	Stabilization Fabric	SY	20,300	$ 2.50	$ 50,750.00
CDOT 304	**AGGREGATE BASE COURSE**				
CDOT 304a	Aggregate Base Course - Class 6	CY	8,789	$ 55.00	$ 483,395.00
CO-401	**PLANT MIX PAVEMENTS**				
CO-401a	Bituminous Paving Course	TON	2,750	$100.00	$ 417,000.00
CO-403	**COLORADO MODIFIED PLANT MIX ASPHALT PAVEMENTS**				
CO-403a	Bituminous Paving Course (Apron)	TON	5,423	$ 100.00	$ 542,300.00
P-603	**BITUMINOUS TACK COAT**				
P-603a	Tack Coat	GAL	3,000	$ 1.00	$ 3,000.00
P-620	**PAINTING**				
P-620a	Temporary Pavment Markings	SF	2,000	$ 3.00	$ 6,000.00
P-620b	Permanent Pavement Markings	SF	2,000	$ 4.00	$ 8,000.00
D-701	**PIPE FOR STORM DRAINS AND CULVERTS**				
D-701a	Reinforce Concrete Pipe	LF	2,000	$ 100.00	$ 200,000.00
D-701b	Reinforced Concrete Pipe - FES	EA	3	$ 2,000.00	$ 6,000.00
D-705	**PIPE UNDERDRAINS FOR AIRPORTS**				
D-705a	Perforated Polyetyhlene Pipe (6 -Inch)	LF	4,000	$ 30.00	$ 120,000.00
D-705b	Non-Perforated Polyetyhlene Pipe (6 -Inch)	LF	600	$ 30.00	$ 18,000.00
D-751	**MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES**				
D-751a	Install Inspection Pit	EA	3	$ 4,000.00	$ 12,000.00
D-751b	Install Underdrain Clean Out	EA	20	$ 2,000.00	$ 40,000.00
D-751c	Install Aircraft Rated Inlet	EA	16	$ 10,000.00	$ 160,000.00
T-901	**SEEDING AND EROSION CONTROL**				
T-901a	Seeding with Hydromulch	AC	6	$ 2,500.00	$ 15,000.00
T-901b	Erosion Control	LS	1	25,000	$ 25,000.00
L-125	**AIRFIELD ELECTRICAL**				
L-125a	Install Airfield Lighting	LS	1	$ 100,000.00	$ 100,000.00
U-100	**UTILITIES**				
U-101a	Hangar Utilities	LS	1	$ 100,000.00	$ 100,000.00
				TOTAL	**$ 2,977,245.00**
				10% CONTINGENCY	**$ 297,724.50**
				18% ENGINEERING of (TOTAL + CONTINGENCY)	**$ 53,590.41**
				TOTAL	**$ 3,328,559.91**

ASSUMPTIONS:

* Apron section is 8" CO-403 on 12" CDOT Crushed Aggregate Base Course.
* Parking Lot section is 6" CO-401 on 6" CDOT Crushed Aggregate Base Course.
* Class 6 Aggregrate Base course to be utilized under all pavement.
* Unit Weight for Asphalt Cement assumed to be 150 lb/cf.
* Tack Coat placed at 0.15 gal/sy.
* Stabilization Fabric to be placd under new construction.
* Aircraft Pavement to have underdrains and associated structures.
* Temporary and Permanent Paint to be applied in two applications.
* Utilites include gas, power, water, and sanitary.

Garfield County Regional Airport
Rifle, Colorado
Engineer's Opinion of Probable Cost

July 2, 2013

SE Hangar Development - Alternate 2

ITEM	ITEM DESCRIPTION	UNIT	SE Hangar Development - Alternate 2 Quantity	Engineer's Estimate Unit $	Engineer's Estimate Item $
P-100	**MOBILIZATION**				
P-100a	Mobilization	LS	1	$ 347,300	$ 347,300.00
P-150	**PAVEMENT REMOVAL**				
P-150a	Pavement Removal (2" - Partial Depth)	SY	200	$ 12.00	$ 2,400.00
P-152	**EMBANKMENT AND EXCAVATION**				
P-152a	Unclassified Excavation	CY	18,400	$ 16.00	$ 294,400.00
P-152b	Subgrade Preparation (12 -Inches)	SY	19,600	$ 10.00	$ 196,000.00
P-222	**SOIL STERILIZATION**				
P-222a	Soil Sterilization	SY	19,600	$ 1.00	$ 19,600.00
P-310	**GEOTEXTILE FABRIC**				
P-310a	Stabilization Fabric	SY	19,600	$ 2.50	$ 49,000.00
CDOT 304	**AGGREGATE BASE COURSE**				
CDOT 304a	Aggregate Base Course - Class 6	CY	11,800	$ 55.00	$ 649,000.00
CO-401	**PLANT MIX PAVEMENTS**				
CO-401a	Bituminous Paving Course	TON	3,200	$100.00	$ 417,000.00
CO-403	**COLORADO MODIFIED PLANT MIX ASPHALT PAVEMENTS**				
CO-403a	Bituminous Paving Course (Apron)	TON	13,800	$ 100.00	$ 1,380,000.00
P-603	**BITUMINOUS TACK COAT**				
P-603a	Tack Coat	GAL	10,600	$ 1.00	$ 10,600.00
P-620	**PAINTING**				
P-620a	Temporary Pavment Markings	SF	900	$ 3.00	$ 2,700.00
P-620b	Permanent Pavement Markings	SF	900	$ 4.00	$ 3,600.00
D-701	**PIPE FOR STORM DRAINS AND CULVERTS**				
D-701a	Reinforce Concrete Pipe	LF	2,000	$ 100.00	$ 200,000.00
D-701b	Reinforced Concrete Pipe - FES	EA	4	$ 2,000.00	$ 8,000.00
D-705	**PIPE UNDERDRAINS FOR AIRPORTS**				
D-705a	Perforated Polyetyhlene Pipe (6 -Inch)	LF	800	$ 30.00	$ 24,000.00
D-705b	Non-Perforated Polyetyhlene Pipe (6 -Inch)	LF	200	$ 30.00	$ 6,000.00
D-751	**MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES**				
D-751a	Install Inspection Pit	EA	2	$ 4,000.00	$ 8,000.00
D-751b	Install Underdrain Clean Out	EA	4	$ 2,000.00	$ 8,000.00
D-751c	Install Aircraft Rated Inlet	EA	16	$ 10,000.00	$ 160,000.00
T-901	**SEEDING AND EROSION CONTROL**				
T-901a	Seeding with Hydromulch	AC	4	$ 2,500.00	$ 10,000.00
T-901b	Erosion Control	LS	1	25,000	$ 25,000.00
L-125	**AIRFIELD ELECTRICAL**				
L-125a	Install Airfield Lighting	LS	1	$ 75,000.00	$ 75,000.00
U-100	**UTILITIES**				
U-101a	Hangar Utilities	LS	1	$ 100,000.00	$ 100,000.00
				TOTAL	**$ 3,895,600.00**
				10% CONTINGENCY	**$ 389,560.00**
				18% ENGINEERING of (TOTAL + CONTINGENCY)	**$ 70,120.80**
				TOTAL	**$ 4,355,280.80**

ASSUMPTIONS:

* Apron section is 8" CO-403 on 12" CDOT Crushed Aggregate Base Course.
* Parking Lot section is 6" CO-401 on 6" CDOT Crushed Aggregate Base Course.
* Class 6 Aggregrate Base course to be utilized under all pavement.
* Unit Weight for Asphalt Cement assumed to be 150 lb/cf.
* Tack Coat placed at 0.15 gal/sy.
* Stabilization Fabric to be placd under new construction.
* Aircraft Pavement to have underdrains and associated structures.
* Temporary and Permanent Paint to be applied in two applications.
* Utilites include gas, power, water, and sanitary.

Garfield County Regional Airport
Rifle, Colorado
Engineer's Opinion of Probable Cost

July 2, 2013

SE Hangar Development - Alternate 3

ITEM	ITEM DESCRIPTION	UNIT	SE Hangar Development - Alternate 3 Quantity	Engineer's Estimate Unit $	Engineer's Estimate Item $
P-100	**MOBILIZATION**				
P-100a	Mobilization	LS	1	$ 373,700	$ 373,700.00
P-150	**PAVEMENT REMOVAL**				
P-150a	Pavement Removal (2" - Partial Depth)	SY	200	$ 12.00	$ 2,400.00
P-152	**EMBANKMENT AND EXCAVATION**				
P-152a	Unclassified Excavation	CY	18,300	$ 16.00	$ 292,800.00
P-152b	Subgrade Preparation (12 -Inches)	SY	39,650	$ 10.00	$ 396,500.00
P-222	**SOIL STERILIZATION**				
P-222a	Soil Sterilization	SY	39,650	$ 1.00	$ 39,650.00
P-310	**GEOTEXTILE FABRIC**				
P-310a	Stabilization Fabric	SY	39,650	$ 2.50	$ 99,125.00
CDOT 304	**AGGREGATE BASE COURSE**				
CDOT 304a	Aggregate Base Course - Class 6	CY	11,700	$ 55.00	$ 643,500.00
CO-401	**PLANT MIX PAVEMENTS**				
CO-401a	Bituminous Paving Course	TON	3,100	$100.00	$ 417,000.00
CO-403	**COLORADO MODIFIED PLANT MIX ASPHALT PAVEMENTS**				
CO-403a	Bituminous Paving Course (Apron)	TON	13,800	$ 100.00	$ 1,380,000.00
P-603	**BITUMINOUS TACK COAT**				
P-603a	Tack Coat	GAL	10,600	$ 1.00	$ 10,600.00
P-620	**PAINTING**				
P-620a	Temporary Pavment Markings	SF	900	$ 3.00	$ 2,700.00
P-620b	Permanent Pavement Markings	SF	900	$ 4.00	$ 3,600.00
D-701	**PIPE FOR STORM DRAINS AND CULVERTS**				
D-701a	Reinforce Concrete Pipe	LF	2,000	$ 100.00	$ 200,000.00
D-701b	Reinforced Concrete Pipe - FES	EA	4	$ 2,000.00	$ 8,000.00
D-705	**PIPE UNDERDRAINS FOR AIRPORTS**				
D-705a	Perforated Polyetyhlene Pipe (6 -Inch)	LF	800	$ 30.00	$ 24,000.00
D-705b	Non-Perforated Polyetyhlene Pipe (6 -Inch)	LF	200	$ 30.00	$ 6,000.00
D-751	**MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES**				
D-751a	Install Inspection Pit	EA	2	$ 4,000.00	$ 8,000.00
D-751b	Install Underdrain Clean Out	EA	4	$ 2,000.00	$ 8,000.00
D-751c	Install Aircraft Rated Inlet	EA	16	$ 10,000.00	$ 160,000.00
T-901	**SEEDING AND EROSION CONTROL**				
T-901a	Seeding with Hydromulch	AC	4	$ 2,500.00	$ 10,000.00
T-901b	Erosion Control	LS	1	25,000	$ 25,000.00
L-125	**AIRFIELD ELECTRICAL**				
L-125a	Install Airfield Lighting and Electrical	LS	1	$ 75,000.00	$ 75,000.00
U-100	**UTILITIES**				
U-101a	Hangar Utilities	LS	1	$ 100,000.00	$ 100,000.00
	LAND ACQUISTION				
	Acquire . 26 acres	LS	1	$ 85,000.00	$ 85,000.00
				TOTAL	**$ 4,370,575.00**
				10% CONTINGENCY	**$ 437,057.50**
				18% ENGINEERING of (TOTAL + CONTINGENCY)	**$ 78,670.35**
				TOTAL	**$ 4,886,302.85**

ASSUMPTIONS:

* Apron section is 8" CO-403 on 12" CDOT Crushed Aggregate Base Course.
* Parking Lot section is 6" CO-401 on 6" CDOT Crushed Aggregate Base Course.
* Class 6 Aggregrate Base course to be utilized under all pavement.
* Unit Weight for Asphalt Cement assumed to be 150 lb/cf.
* Tack Coat placed at 0.15 gal/sy.
* Stabilization Fabric to be placd under new construction.
* Aircraft Pavement to have underdrains and associated structures.
* Temporary and Permanent Paint to be applied in two applications.
* Utilites include gas, power, water, and sanitary.

Garfield County Regional Airport
Rifle, Colorado
Engineer's Opinion of Probable Cost

July 1, 2013

Transient Hangar Expansion

ITEM	ITEM DESCRIPTION	UNIT	Tranisient Hangar Expansion Quantity	Engineer's Estimate Unit $	Item $
P-100	**MOBILIZATION**				
P-100a	Mobilization	LS	1	$ 177,500	$ 177,500.00
P-150	**PAVEMENT REMOVAL**				
P-150a	Pavement Removal (2" - Partial Depth)	SY	675	$ 12.00	$ 8,100.00
P-152	**EMBANKMENT AND EXCAVATION**				
P-152a	Unclassified Excavation	CY	12,643	$ 16.00	$ 202,288.00
P-152b	Subgrade Preparation (12 -Inches)	SY	19,000	$ 10.00	$ 190,000.00
P-222	**SOIL STERILIZATION**				
P-222a	Soil Sterilization	SY	19,000	$ 2.00	$ 38,000.00
P-310	**GEOTEXTILE FABRIC**				
P-310a	Stabilization Fabric	SY	19,000	$ 2.50	$ 47,500.00
CDOT 304	**AGGREGATE BASE COURSE**				
CDOT 304a	Aggregate Base Course - Class 6	CY	6,325	$ 55.00	$ 347,875.00
CO-403	**COLORADO MODIFIED PLANT MIX ASPHALT PAVEMENTS**				
CO-403a	Bituminous Paving Course (Apron)	TON	8,635	$ 100.00	$ 863,500.00
P-603	**BITUMINOUS TACK COAT**				
P-603a	Tack Coat	GAL	5,700	$ 1.00	$ 5,700.00
P-620	**PAINTING**				
P-620a	Temporary Pavment Markings	SF	1,000	$ 3.00	$ 3,000.00
P-620b	Permanent Pavement Markings	SF	1,000	$ 4.00	$ 4,000.00
D-705	**PIPE UNDERDRAINS FOR AIRPORTS**				
D-705a	Perforated Polyetyhlene Pipe (6 -Inch)	LF	1,000	$ 30.00	$ 30,000.00
D-705b	Non-Perforated Polyetyhlene Pipe (6 -Inch)	LF	200	$ 30.00	$ 6,000.00
D-751	**MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES**				
D-751a	Install Inspection Pit	EA	1	$ 4,000.00	$ 4,000.00
D-751b	Install Underdrain Clean Out	EA	5	$ 2,000.00	$ 10,000.00
T-901	**SEEDING AND EROSION CONTROL**				
T-901a	Seeding with Hydromulch	AC	2	$ 2,500.00	$ 5,000.00
T-901b	Erosion Control	LS	1	10,000	$ 10,000.00
L-125	**AIRFIELD ELECTRICAL**				
L-125a	Airfield Lighting	LS	1	$ 40,000.00	$ 40,000.00
				TOTAL	**$ 1,992,463.00**
				10% CONTINGENCY	**$ 199,246.30**
				18% ENGINEERING of (TOTAL + CONTINGENCY)	**$ 35,864.33**
				TOTAL	**$ 2,227,573.63**

ASSUMPTIONS:

* Expanded Apron section is 8" CO-403 on 12" CDOT Crushed Aggregate Base Course.
* Class 6 Aggregrate Base course to be utilized under all pavement.
* Soil Sterilant to be place on all areas to be paved.
* Unit Weight for Asphalt Cement assumed to be 150 lb/cf.
* Tack Coat placed at 0.15 gal/sy.
* Stabilization Fabric to be placd under new construction.
* Aircraft Pavment to sheet flow to north for drainage
* Aircraft Pavement to have underdrains and associated structures.
* Temporary and Permanent Paint to be applied in two applications.
* Tie down anchors not include in associated costs.