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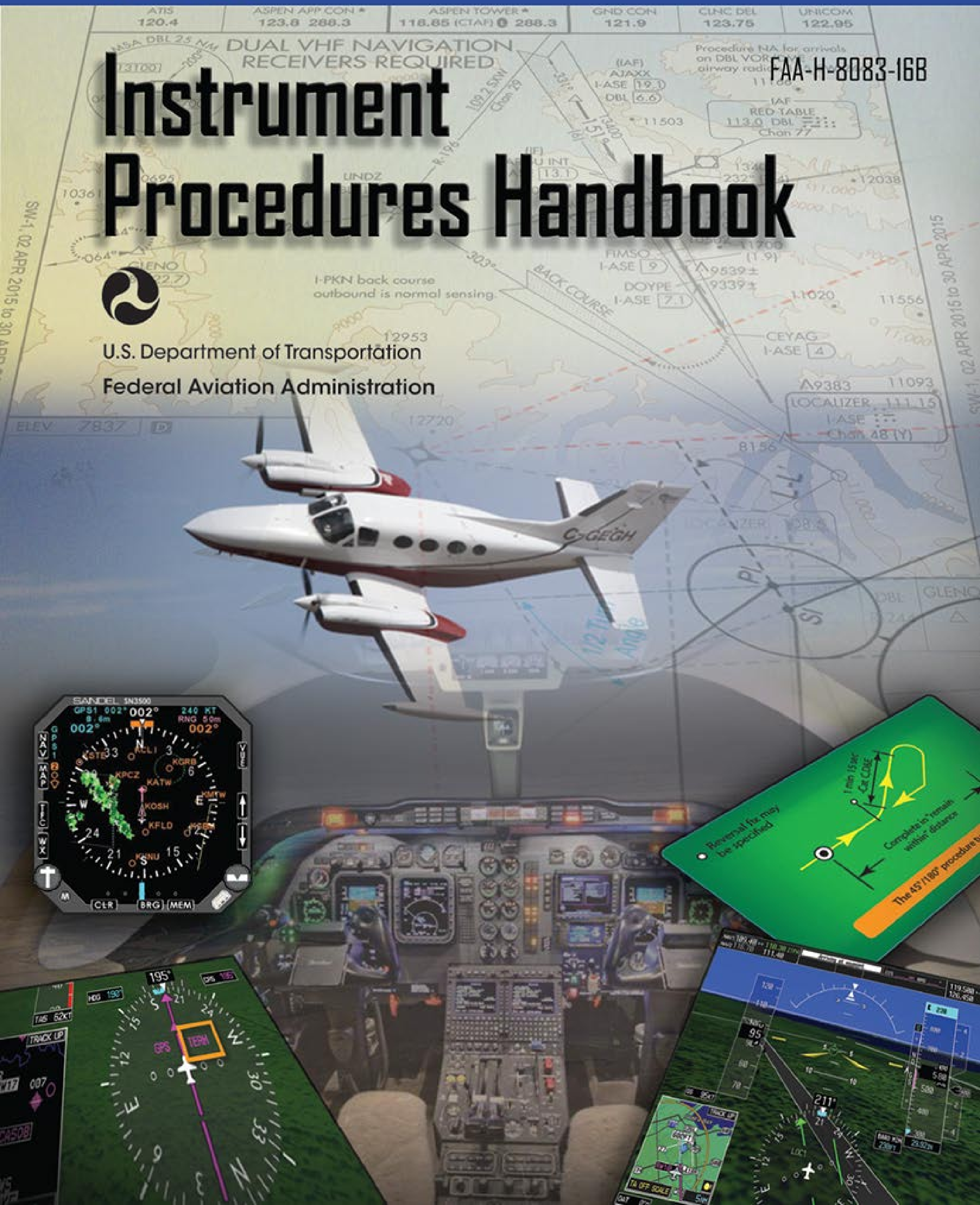
Instrument Procedures Handbook

U.S. Department of Transportation

Federal Aviation Administration



Instrument Procedures Handbook

2017

U.S. Department of Transportation
FEDERAL AVIATION ADMINISTRATION
Flight Standards Service

Instrument Procedures Handbook
2017
FAA-H-8083-16B

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Preface

This handbook supersedes FAA-H-8261-16A, Instrument Procedures Handbook, dated 2015. It is designed as a technical reference for all pilots who operate under instrument flight rules (IFR) in the National Airspace System (NAS). It expands and updates information contained in the FAA-H-8083-15B, Instrument Flying Handbook, and introduces advanced information for IFR operations. Instrument flight instructors, instrument pilots, and instrument students will also find this handbook a valuable resource since it is used as a reference for the Airline Transport Pilot and Instrument Knowledge Tests and for the Practical Test Standards. It also provides detailed coverage of instrument charts and procedures including IFR takeoff, departure, en route, arrival, approach, and landing. Safety information covering relevant subjects such as runway incursion, land and hold short operations, controlled flight into terrain, and human factors issues also are included.

This handbook conforms to pilot training and certification concepts established by the Federal Aviation Administration (FAA). The discussion and explanations reflect the most commonly used instrument procedures. Occasionally, the word "must" or similar language is used where the desired action is deemed critical. The use of such language is not intended to add to, interpret, or relieve pilots of their responsibility imposed by Title 14 of the Code of Federal Regulations (14 CFR).

It is essential for persons using this handbook to also become familiar with and apply the pertinent parts of 14 CFR and the Aeronautical Information Manual (AIM). The CFR, AIM, this handbook, AC 00-2.15, Advisory Circular Checklist, which transmits the current status of FAA advisory circulars, and other FAA technical references are available via the internet at the FAA Home Page http://www.faa.gov. Information regarding the purchase of FAA subscription aeronautical navigation products, such as charts, Chart Supplements (including the Airport/Facility Directory), and other publications can be accessed at http://faacharts.faa.gov.

This handbook is available for download, in PDF format, from the FAA's Regulations and Policies website at:

http://www.faa.gov/regulations_policies/handbooks_manuals/aviation/instrument_procedures_handbook/

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Comments regarding this publication should be sent, in email form, to the following address: 9-AWA-AFS400-Coord@faa.gov.

John Barbagello for John S. Duncan
Executive Director, Flight Standards Service

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Chapter 1

Departure Procedures

Introduction

Thousands of instrument flight rules (IFR) takeoffs and departures occur daily in the National Airspace System (NAS). In order to accommodate this volume of IFR traffic, air traffic control (ATC) must rely on pilots to use charted airport sketches and diagrams, as well as departure procedures (DPs) that include both standard instrument departures (SIDs) and obstacle departure procedures (ODPs). While many charted (and uncharted) departures are based on radar vectors, the bulk of IFR departures in the NAS require pilots to navigate out of the terminal environment to the en route phase.

IFR takeoffs and departures are fast-paced phases of flight, and pilots often are overloaded with critical flight information. While preparing for takeoff, pilots are busy requesting and receiving clearances, preparing their aircraft for departure, and taxiing to the active runway. During IFR conditions, they are doing this with minimal visibility, and they may be without constant radio communication if flying out of a non-towered airport. Historically, takeoff minimums for commercial operations have been successively reduced through a combination of improved signage, runway markings and lighting aids, and concentrated pilot training and qualifications. Today at major terminals, some commercial operators with appropriate equipment, pilot qualifications, and approved Operations Specifications (OpSpecs) may takeoff with visibility as low as 300 feet runway visual range (RVR). One of the consequences of takeoffs with reduced visibility is that pilots are challenged in maintaining situational awareness during taxi operations.

Surface Movement Safety

One of the biggest safety concerns in aviation is the surface movement accident. As a direct result, the FAA has rapidly expanded the information available to pilots, including the addition of taxiway and runway information in FAA publications, particularly the IFR U.S. Terminal Procedures Publication (TPP) booklets and the Chart Supplement (CS) volumes. The FAA has also implemented new procedures and created educational and awareness programs for pilots, ATC, and ground operators. By focusing resources to attack this problem head on, the FAA hopes to reduce and eventually eliminate surface movement accidents.

Airport Sketches and Diagrams

Airport sketches and diagrams provide pilots of all levels with graphical depictions of the airport layout. Aeronautical Information Services, formerly known as Aeronautical Products (AeroNav), provide an airport sketch on the lower left or right portion of every instrument approach chart. [Figure 1-1] This sketch depicts the runways, their length, width and slope, the touchdown zone elevation, the lighting system installed on the end of the runway, and taxiways. Graphical depictions of NOTAMS are also available for selected airports as well as for temporary flight restriction (TFRs) areas on the defense internet NOTAM service (DINS) website.

For select airports, typically those with heavy traffic or complex runway layouts, Aeronautical Information Services also prints an airport diagram. The diagram is located in the IFR TPP booklet following the instrument approach chart for a particular airport. It is a full page depiction of the airport that includes the same features of the airport sketch plus additional details, such as taxiway identifiers,

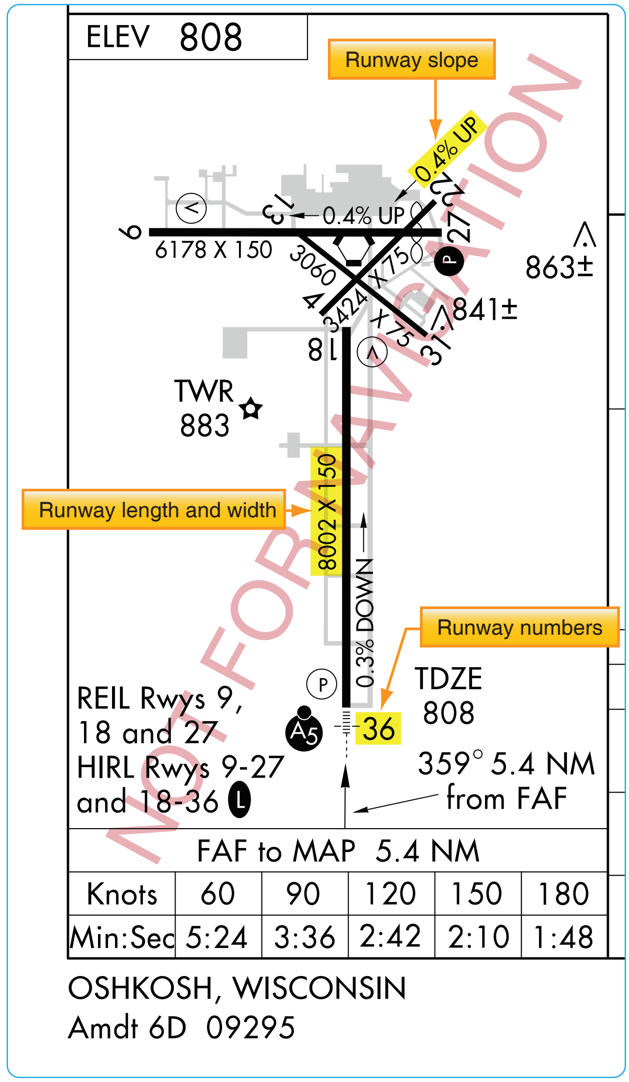

Figure 1-1. Airport diagram included on the Oshkosh, Wisconsin VOR RWY 9 Approach Chart as depicted in the IFR TPP.

airport latitude and longitude, and building identification. The airport diagrams are also available in the Airport/Facility Directory section of the Chart Supplement (CS) and on the Aeronautical Information Services' website, located at www.aeronav.faa.gov. [Figure 1-2]

Chart Supplements (CS)

In recent years, the former Airport/Facility Directory (A/FD) booklet was incorporated as a section in the Chart Supplement (CS). [Figure 2-14] The Chart Supplement (CS) is published by Aeronautical Information Services in regional booklets and online at: [https://www.faa.gov/air_traffic/flight_info/aeronav/digital_products/dafd/] The online version is known as the digital Chart Supplement (d-CS). The d-CS and the CS are identical and provide textual and graphic information about all airports, both Visual Flight Rules (VFR) and IFR. The Airport/Facility Directory (A/FD) section of the CS includes runway length

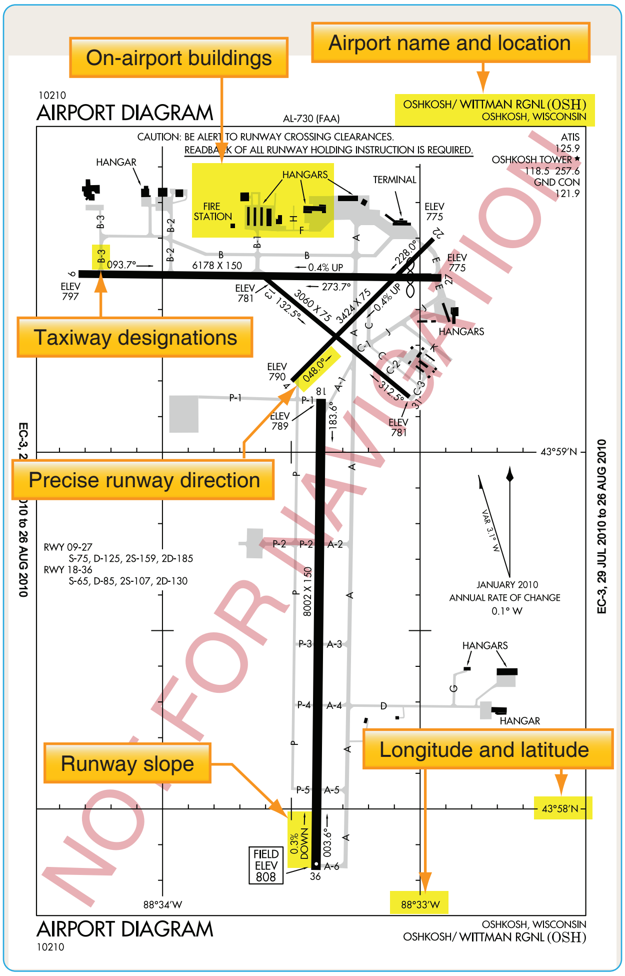

Figure 1-2. Airport diagram of Oshkosh, Wisconsin as depicted in the A/FD section of the CS.

and width, runway surface, load bearing capacity, runway slope, runway declared distances, airport services, and hazards, such as birds and reduced visibility. [Figure 1-3] Sketches of airports also are being added to aid VFR pilots in surface movement activities. In support of the FAA Runway Incursion Program, full page airport diagrams and "Hot Spot" locations are included in the A/FD section of the CS. These charts are the same as those published in the IFR TPP and are printed for airports with complex runway or taxiway layouts.

Surface Movement Guidance Control System (SMGCS)

The Surface Movement Guidance Control System (SMGCS) was developed to facilitate the safe movement of aircraft and vehicles at airports where scheduled air carriers were conducting authorized operations. Advisory Circular 120-57 was developed in 1992. In 2012, FAA Order 8000.94, Procedures for Establishing Airport Low-Visibility Operations and Approval of Low-Visibility Operations/Surface Movement Guidance and Control System Operations, was published to provide procedures for establishing Airport Low-Visibility Operations (LVO) and Surface Movement Guidance and Control Systems. It established the necessary FAA headquarters and operating services, roles, responsibilities, and activities for operations at 14 CFR Part 139 airports using RVRs of less than 1,200 feet for each runway. The order applies to all users of the system at all levels who are formally listed. The FAA requires the commissioning of an "FAA approved LVO/SMGCS Operation" for all new Category III ILS supported runways. Since there are no regulatory takeoff minimums for 14 CFR Part 91 operations, the information provided by FAA AC 120-57 and FAA Order 8000.94 must be understood so that the general aviation pilot can understand LVO and SMGCS during day or night.

The SMGCS low visibility taxi plan includes the enhancement of taxiway and runway signs, markings, and lighting, as well as the creation of SMGCS visual aid diagrams. [Figure 1-4] The plan also clearly identifies taxi routes and their supporting facilities and equipment. Airport enhancements that are part of the SMGCS program include, but are not limited to:

- Controllable Stop bars lights—these consist of a row of red, unidirectional, in-pavement lights that can be controlled by ATC. They provide interactions with and aircraft that prevent runway incursions during takeoff operations. These are required for operations at less than 500 ft RVR.
- Non-Controllable Stop bars lights—these are red, unidirectinoal lights place at intersections where a restriction to movement is required. They must be in continuous operation at less than 500 ft RVR.
- Taxiway centerline lead-on lights—guide ground traffic under low visibility conditions and at night. These lights consist of alternating green/yellow in-pavement lights.
- Runway guard lights—either elevated or in-pavement, may be installed at all taxiways that provide access to an active runway. They consist of alternately flashing yellow lights. These lights are used to denote both the presence of an active runway and identify the location of a runway holding position marking.
- Geographic position markings—ATC verifies the position of aircraft and vehicles using geographic position markings. The markings can be used either as hold points or for position reporting. These checkpoints or "pink spots" are outlined with a black and white circle and designated with a number or a number and a letter.

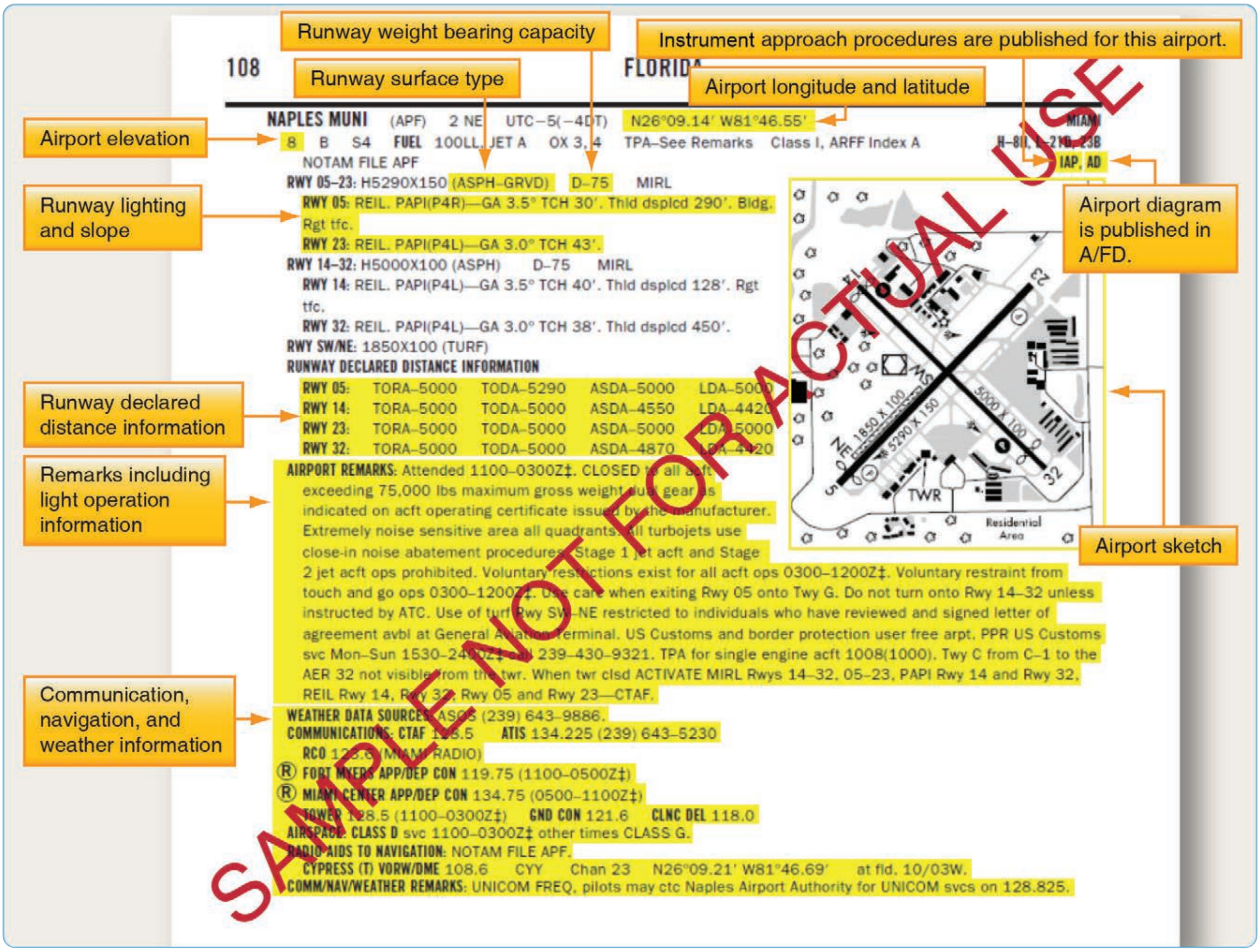

Figure 1-3. Excerpts from the Chart Supplement (Airport Facility Directory section) of Naples Muni, Naples, Florida.

- Clearance bar lights—three yellow in-pavement clearance bar lights used to denote holding positions for aircraft and vehicles. When used for hold points, they are co-located with geographic position markings.

Both flight and ground crews, Part 121 and 135 operators, are required to comply with SMGCS plans when implemented at their specific airport. All airport tenants are responsible for disseminating information to their employees and conducting training in low visibility operating procedures. Anyone operating in conjunction with the SMGCS plan must have a copy of the low visibility taxi route chart for their given airport as these charts outline the taxi routes and other detailed information concerning low visibility operations. These charts are available from private sources outside of the FAA. Government sources for SMGCS charts may be available in the future. Part 91 operators are expected to comply with the guidelines listed in AC 120-57, and should expect "Follow Me" service (when available) when low visibility operations are in use. Any SMGCS outage that would adversely affect operations at the airport is issued as a Notice to Airmen (NOTAM).

Advanced Surface Movement Guidance Control System (A-SMGCS)

With the increasing demand for airports to accommodate higher levels of aircraft movements, it is becoming more difficult for the existing infrastructure to safely handle greater capacities of traffic in all weather conditions. As a result, the FAA is implementing runway safety systems, such as Airport Surface Detection Equipment-Model X (ASDE-X) and Advanced Surface Movement Guidance and Control System (A-SMGCS) at various airports. The data that these systems use comes from surface movement radar and aircraft transponders. The combination of these data sources allows the systems to determine the position and identification of aircraft on the airport movement area and decreases the potential of collisions on airport runways and taxiways.

Additional information concerning airport lighting, markings, and signs can be found in the Aeronautical Information Manual (AIM) and the Pilot's Handbook of

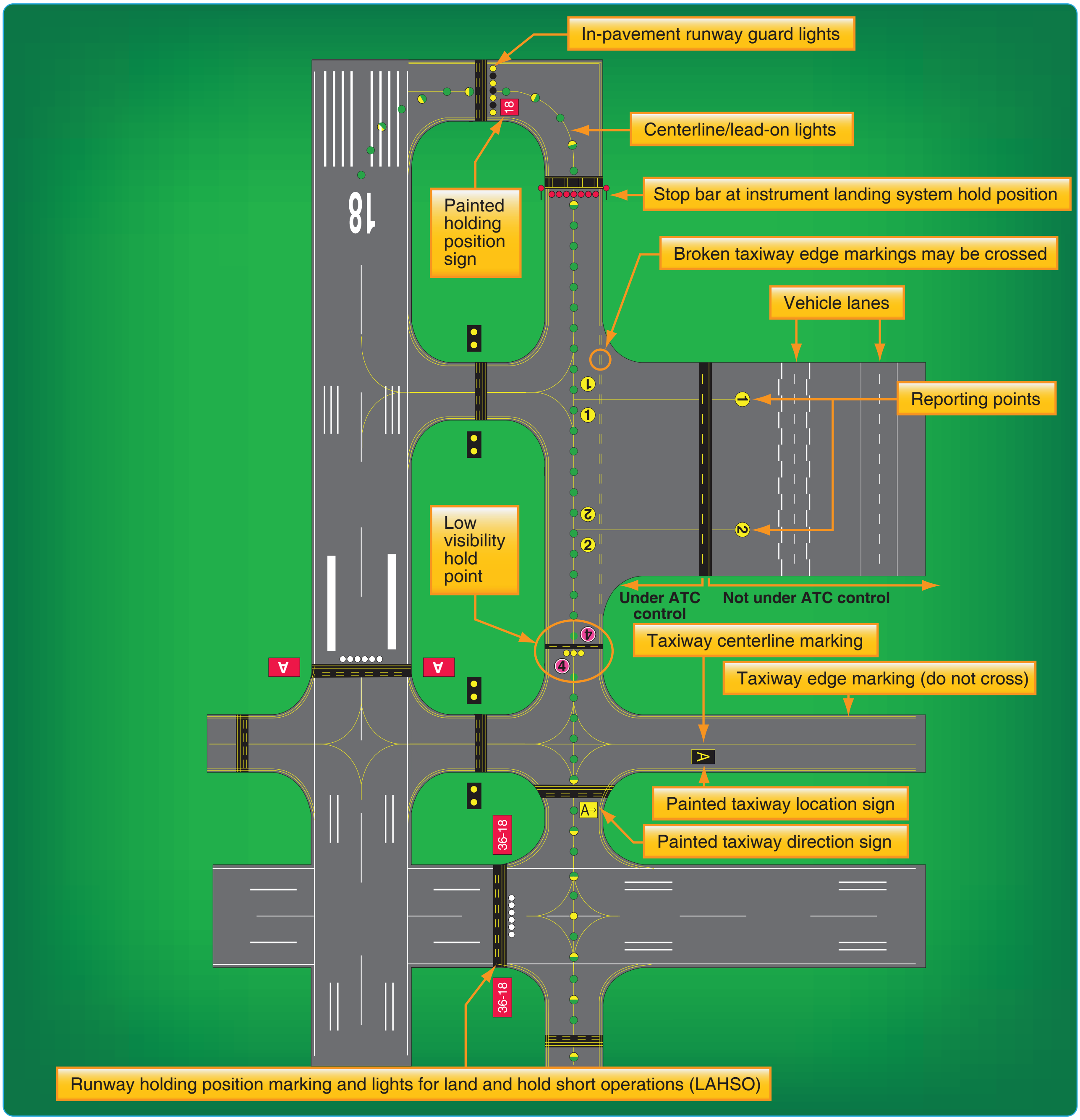

Figure 1-4. Key airport lighting and markings.

Aeronautical Knowledge, appendix 1, as well as on the FAA's website at http://www.faa.gov/airports/runway_safety/.

Airport Signs, Lighting, and Markings

Flight crews use airport lighting, markings, and signs to help maintain situational awareness. These visual aids provide information concerning the aircraft's location on the airport, the taxiway in use, and the runway entrance being used. Overlooking this information can lead to ground accidents that are entirely preventable. If you encounter unfamiliar markings or lighting, contact ATC for clarification and, if necessary, request progressive taxi instructions. Pilots are encouraged to notify the appropriate authorities of erroneous, misleading, or decaying signs or lighting that would contribute to the failure of safe ground operations.

Runway Incursions

On any given day, the NAS may handle almost 200,000 takeoffs and landings. Due to the complex nature of the airport environment and the intricacies of the network of people that make it operate efficiently, the FAA is constantly looking to maintain the high standard of safety that exists at airports today. Runway safety is one of its top priorities. The FAA defines a runway incursion as: "Any occurrence at an aerodrome 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."

The four categories of runway incursions are listed below:

- Category A—a serious incident in which a collision was narrowly avoided.
- Category B—an incident in which separation decreases and there is a significant potential for collision that may result in a time critical corrective/evasive response to avoid a collision.
- Category C—an incident characterized by ample time and/or distance to avoid a collision.
- Category D—an incident that meets the definition of runway incursion, such as incorrect presence of a single vehicle/person/aircraft on the protected area of a surface designated for the landing and takeoff of aircraft but with no immediate safety consequences.

The FAA recommends that you:
• Receive and understand all NOTAMs, particularly those concerning airport construction and lighting.
• Read back, in full, all clearances involving holding short, line up and wait, and crossing runways to ensure proper understanding.
• Abide by the sterile cockpit rule.
• Develop operational procedures that minimize distractions during taxiing.
• Ask ATC for directions if you are lost or unsure of your position on the airport.
• Adhere to takeoff and runway crossing clearances in a timely manner.
• Position your aircraft so landing traffic can see you.
• Monitor radio communications to maintain a situational awareness of other aircraft.
• Remain on frequency until instructed to change.
• Make sure you know the reduced runway distances and whether or not you can comply before accepting a land and hold short clearance or clearance for shortened runway.
• Report confusing airport diagrams to the proper authorities.
• Use exterior taxi and landing lights when practical.

NOTE:
The sterile cockpit rule refers to a concept outlined in 14 CFR Part 121, § 121.542 and 135.100 that requires flight crews to refrain from engaging in activities that could distract them from the performance of their duties during critical phases of flight.

Figure 1-5. FAA recommendations for reducing runway incursions.

Figure 1-5 highlights several steps that reduce the chances of being involved in a runway incursion.

In addition to the SMGCS program, the FAA has implemented additional programs to reduce runway incursions and other surface movement issues. They identified runway hotspots, designed standardized taxi routes, and instituted the Runway Safety Program.

Runway Hotspots

ICAO defines runway hotspots as a location on an aerodrome movement area with a history or potential risk of collision or runway incursion and where heightened attention by pilots and drivers is necessary. Hotspots alert pilots to complex or potentially confusing taxiway geometry that could make surface navigation challenging. Whatever the reason, pilots need to be aware that these hazardous intersections exist, and they should be increasingly vigilant when approaching and taxiing through these intersections. These hotspots are depicted on some airport charts as circled areas. [Figure 1-6] The FAA Office of Runway Safety has links to the FAA regions that maintain a complete list of airports with runway hotspots at http://www.faa.gov/airports/runway_safety.

Standardized Taxi Routes

Standard taxi routes improve ground management at high-density airports, namely those that have airline service. At these airports, typical taxiway traffic patterns used to move aircraft between gate and runway are laid out and coded. The ATC specialist (ATCS) can reduce radio communication time and eliminate taxi instruction misinterpretation by simply clearing the pilot to taxi via a specific, named route. An example of this would be Los Angeles International Airport (KLAX), where North Route is used to transition to Runway 24L. [Figure 1-7] These routes are issued by ground control, and if unable to comply, pilots must advise ground control on initial contact. If for any reason the pilot becomes uncertain as to the correct taxi route, a request should be made for progressive taxi instructions. These step-by-step routing directions are also issued if the controller deems it necessary due to traffic, closed taxiways, airport construction, etc. It is the pilot's responsibility to know if a particular airport has preplanned taxi routes, to be familiar with them, and to have the taxi descriptions in their possession. Specific information about airports that use coded taxiway routes is included in the Notices to Airmen Publication (NTAP).

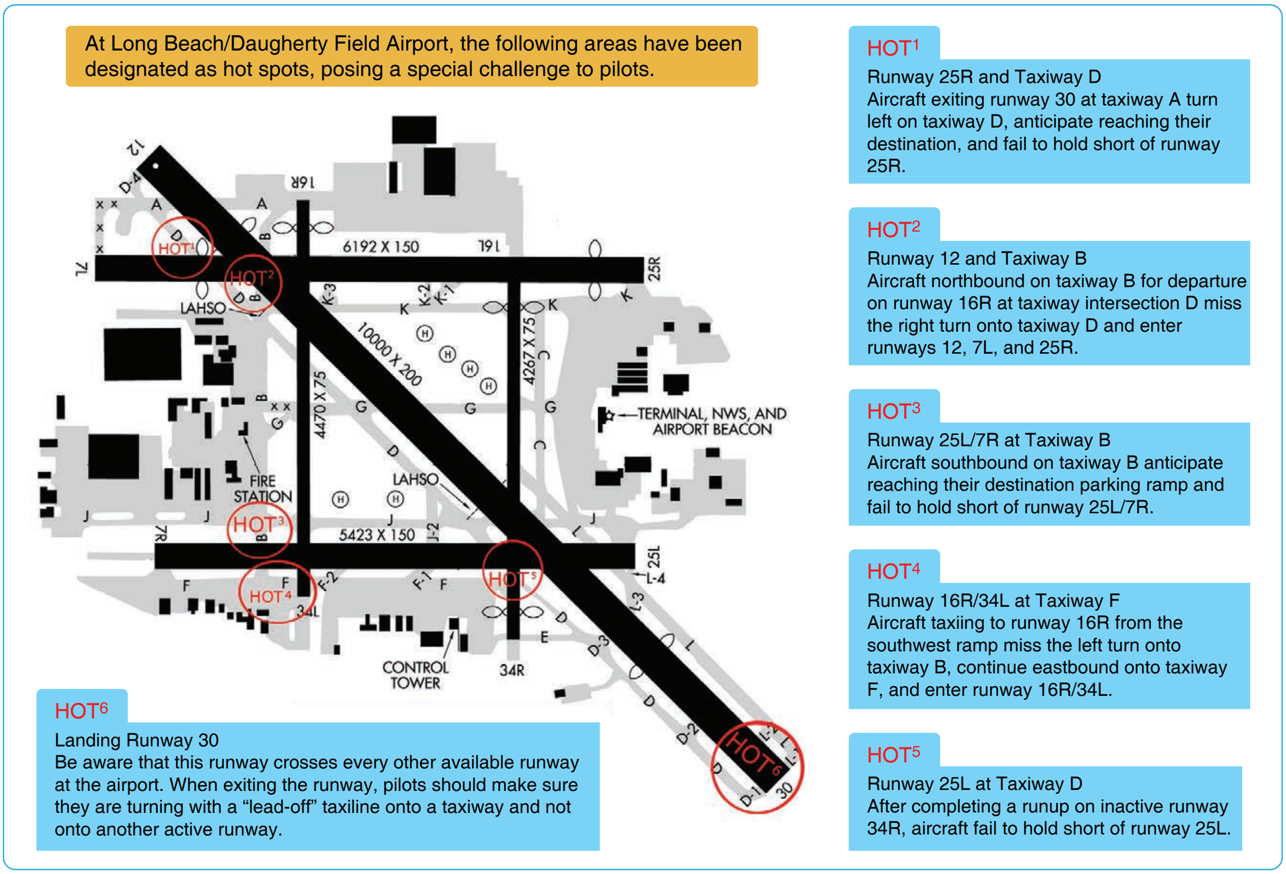

Figure 1-6. Example of runway hot spots located at Long Beach/Daugherty Field Airport (KLGB).

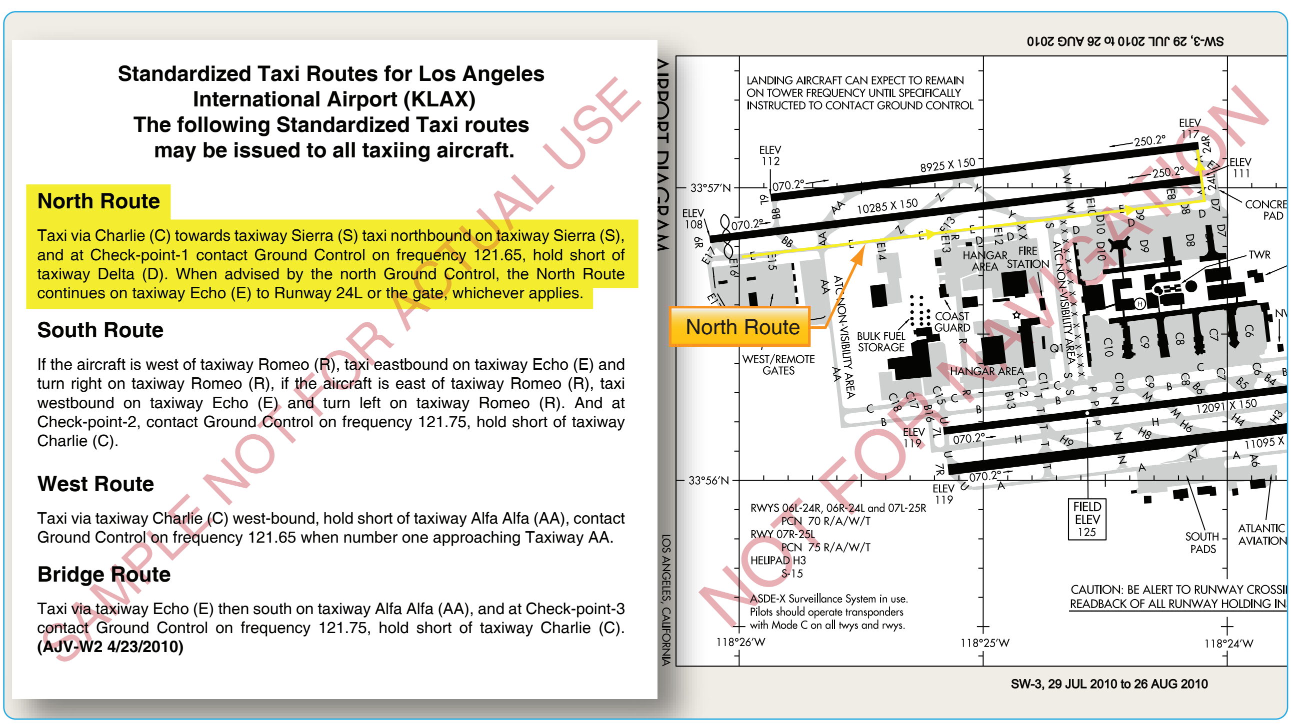

Figure 1-7. Los Angeles International Airport diagram, North Route, and standardized taxi route.

Taxi and Movement Operations Change

As of June 30, 2010, controllers are required to issue explicit instructions to cross or hold short of each runway that intersects a taxi route. Following is a summary of these procedural changes:

- "Taxi to" is no longer used when issuing taxi instructions to an assigned takeoff runway.
- Instructions to cross a runway are issued one at a time. Instructions to cross multiple runways are not issued. An aircraft or vehicle must have crossed the previous runway before another runway crossing is issued. This applies to any runway, including inactive or closed runways.
- Never cross a runway hold marking without explicit ATC instructions. If in doubt, ask!

Reminder: You may not enter a runway unless you have been:

1. Instructed to cross or taxi onto that specific runway;
2. Cleared to take off from that runway; or
3. Instructed to line up and wait on that specific runway.

For more information on the change, refer to FAA Order JO 7110.65, Air Traffic Control, which can be found at www.faa.gov.

Weather and the Departure Environment

Takeoff Minimums

While mechanical failure is potentially hazardous during any phase of flight, a failure during takeoff under instrument conditions is extremely critical. In the event of an emergency, a decision must be made to either return to the departure airport or fly directly to a takeoff alternate. If the departure weather were below the landing minimums for the departure airport, the flight would be unable to return for landing, leaving few options and little time to reach a takeoff alternate.

In the early years of air transportation, landing minimums for commercial operators were usually lower than takeoff minimums. Therefore, it was possible that minimums allowed pilots to land at an airport but not depart from that airport. Additionally, all takeoff minimums once included ceiling, as well as visibility requirements. Today, takeoff minimums are typically lower than published landing minimums, and ceiling requirements are only included if it is necessary to see and avoid obstacles in the departure area.

The FAA establishes takeoff minimums for every airport that has published Standard Instrument Approaches. These minimums are used by commercially operated aircraft, namely Part 121 and Part 135 operators. At airports where minimums are not established, these same carriers are required to use FAA-designated standard minimums: 1 statute mile (SM) visibility for single- and twin-engine aircraft, and 1⁄2 SM for helicopters and aircraft with more than two engines.

Aircraft operating under 14 CFR Part 91 are not required to comply with established takeoff minimums. Legally, a zero/zero departure may be made, but it is never advisable. If commercial pilots who fly passengers on a daily basis must comply with takeoff minimums, then good judgment and common sense would tell all instrument pilots to follow the established minimums as well.

Aeronautical Information Services charts list takeoff minimums only for the runways at airports that have other than standard minimums. These takeoff minimums are listed by airport in alphabetical order in the front of the TPP booklet. If an airport has non-standard takeoff minimums, a ▼T (referred to by some as either the "triangle T" or "trouble T") is placed in the notes sections of the instrument procedure chart. In the front of the TPP booklet, takeoff minimums are listed before the obstacle departure procedure. Some departure procedures allow a departure with standard minimums provided specific aircraft performance requirements are met. [Figure 1-8]

Takeoff Minimums for Commercial Operators

While Part 121 and Part 135 operators are the primary users of takeoff minimums, they may be able to use alternative takeoff minimums based on their individual OpSpecs. Through these OpSpecs, operators are authorized to depart with lower-than-standard minimums provided they have the necessary equipment and crew training.

Operations Specifications (OpSpecs)

Within the air transportation industry, there is a need to establish and administer safety standards to accommodate many variables. These variables include a wide range of aircraft, varied operator capabilities, the various situations requiring different types of air transportation, and the continual, rapid changes in aviation technology. It is impractical to address these variables through the promulgation of safety regulations for each and every type of air transport situation and the varying degrees of operator capabilities. Also, it is impractical to address the

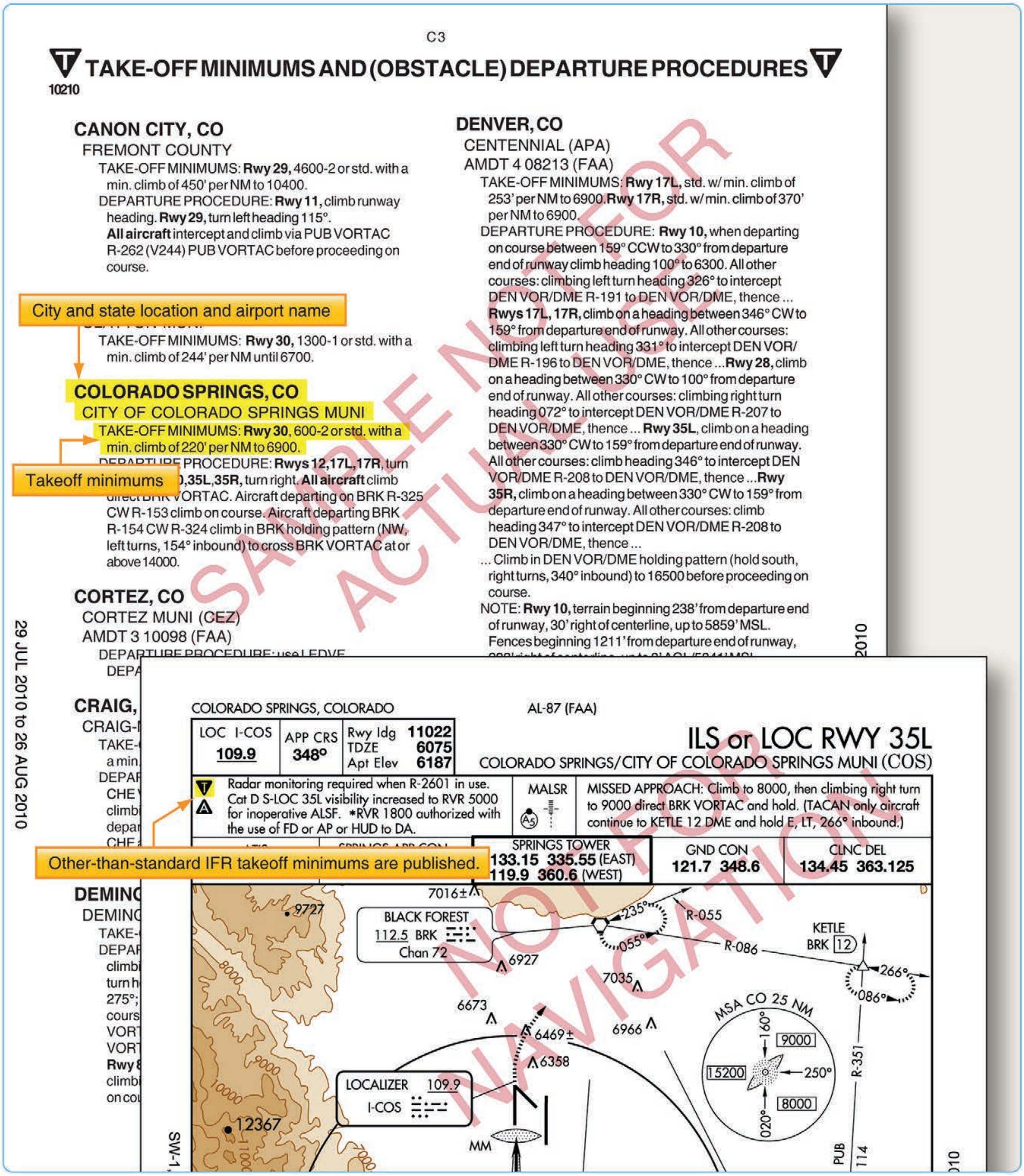

Figure 1-8. Examples of non-standard takeoff minimums for Colorado Springs, Colorado.

rapidly changing aviation technology and environment through the regulatory process. Safety regulations would be extremely complex and unwieldy if all possible variations and situations were addressed by regulation. Instead, the safety standards established by regulation should usually have a broad application that allows varying acceptable methods of compliance. The OpSpecs provide an effective method for establishing safety standards that address a wide range of variables. In addition, OpSpecs can be adapted to a specific certificate holder or operator's class and size of aircraft and type and kinds of operations. OpSpecs can be tailored to suit an individual certificate holder or operator's needs.

Part 121 and Part 135 certificate holders have the ability, through the use of approved OpSpecs, to use lower-than-standard takeoff minimums. Depending on the equipment installed in a specific type of aircraft, the crew training, and the type of equipment installed at a particular airport, these operators can depart from appropriately equipped runways with as little as 300 feet RVR. Additionally, OpSpecs outline provisions for approach minimums, alternate airports, and weather services in Volume 3 of FAA Order 8900.1, Flight Standards Information Management System (FSIMS).

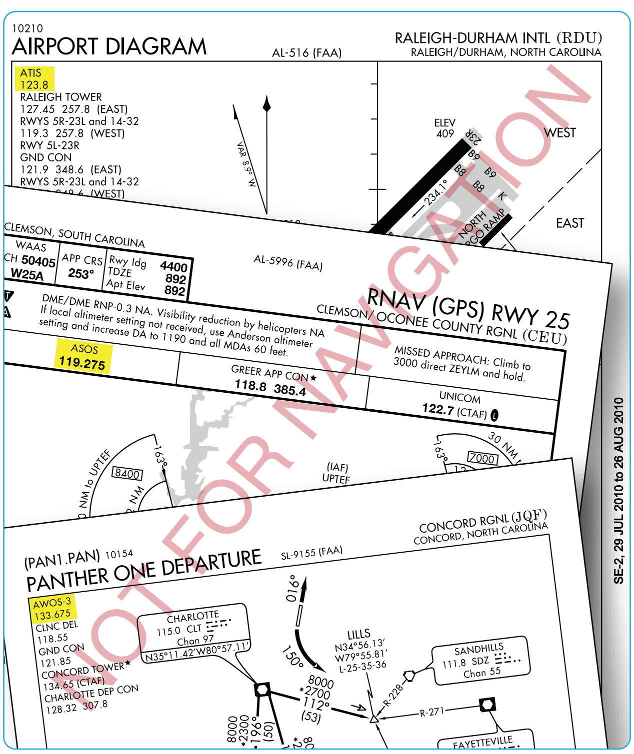

Figure 1-9. Examples of weather information of various flight information publications (FLIP).

Ceiling and Visibility Requirements

All takeoffs and departures have visibility minimums (some may have minimum ceiling requirements) incorporated into the procedure. There are a number of methods to report visibility and a variety of ways to distribute these reports, including automated weather observations. Flight crews should always check the weather, including ceiling and visibility information, prior to departure. Never launch an IFR flight without obtaining current visibility information immediately prior to departure. Further, when ceiling and visibility minimums are specified for IFR departure, both are applicable.

Weather reporting stations for specific airports across the country can be located by reviewing the CS. Weather sources along with their respective phone numbers and frequencies are listed by airport. Frequencies for weather sources, such as Automatic Terminal Information Service (ATIS), Digital Automatic Terminal Information Service (D-ATIS), Automated Weather Observing System (AWOS), Automated Surface Observing System (ASOS), and FAA Automated Flight Service Station (AFSS) are published on approach charts as well. [Figure 1-9]

Visibility

Visibility is the ability, as determined by atmospheric conditions and expressed in units of distance, to see and identify prominent unlighted objects by day and prominent lighted objects by night. Visibility is reported as statute miles, hundreds of feet, or meters.

Prevailing Visibility

Prevailing visibility is the greatest horizontal visibility equaled or exceeded throughout at least half the horizon circle, which need not necessarily be continuous. Prevailing visibility is reported in statute miles or fractions of miles.

Runway Visibility Value (RVV)

Runway visibility value is the visibility determined for a particular runway by a transmissometer. A meter provides

Conversion	
RVR (feet)	Visibility (sm)
1,600	1/4
2,400	1/2
3,200	5/8
4,000	3/4
4,500	7/8
5,000	1
6,000	11/4

Figure 1-10. RVR conversion table.

continuous indication of the visibility (reported in statute miles or fractions of miles) for the runway. RVV is used in lieu of prevailing visibility in determining minimums for a particular runway.

Tower Visibility

Tower visibility is the prevailing visibility determined from the airport traffic control tower at locations that also report the surface visibility.

Runway Visual Range (RVR)

Runway visual range is an instrumentally derived value, based on standard calibrations, that represents the horizontal distance a pilot sees down the runway from the approach end. It is based on the sighting of either high intensity runway lights or on the visual contrast of other targets, whichever yields the greater visual range. RVR, in contrast to prevailing or runway visibility, is based on what a pilot in a moving aircraft should see looking down the runway. RVR is horizontal visual range, not slant visual range. RVR is reported in hundreds of feet, so the values must be converted to SM if the visibility in SM is not reported. [Figure 1-10] It is based on the measurement of a transmissometer made near the touchdown point of the instrument runway and is reported in hundreds of feet. RVR is used in lieu of RVV and/or prevailing visibility in determining minimums for a particular runway.

Types of RVR

The following are types of RVR that may be used:

- Touchdown RVR—the RVR visibility readout values obtained from RVR equipment serving the runway touchdown zone.
- Mid-RVR—the RVR readout values obtained from RVR equipment located near the runway midpoint .
- Rollout RVR—the RVR readout values obtained from RVR equipment located nearest the rollout end of the runway.
- Far End RVR—when four RVR visibility sensors (VS) are installed, the far end RVR VS is the touchdown RVR VS on the reciprocal runway. The far end sensor will serve as additional information.

RVR is the primary visibility measurement used by Part 121 and Part 135 operators with specific visibility reports and controlling values outlined in their respective OpSpecs. Under their OpSpecs agreements, the operator must have specific, current RVR reports, if available, to proceed with an instrument departure. OpSpecs also outline which visibility report is controlling in various departure scenarios.

Figure 1-11. AWSS installation at Driggs-Reed, Idaho.

Adequate Visual Reference

Another set of lower-than-standard takeoff minimums is available to Part 121 and Part 135 operations as outlined in their respective OpSpecs document. When certain types of visibility reports are unavailable or specific equipment is out of service, the flight can still depart the airport if the pilot can maintain adequate visual reference. An appropriate visual aid must be available to ensure the takeoff surface can be continuously identified, and directional control can be maintained throughout the takeoff run. Appropriate visual aids include high intensity runway lights, runway centerline lights, runway centerline markings, or other runway lighting and markings. With adequate visual references and appropriate OpSpec approval, commercial operators may take off with a visibility of 1600 RVR or ¼ SM.

Ceilings

Ceiling is the height above the earth's surface of the lowest layer of clouds or obscuring phenomena that is reported as broken, overcast, or obscuration and not classified as thin or partial.

Instrument Procedures Handbook

FAA-H-8083-16B

U.S. Department of Transportation

Federal Aviation Administration

The *Instrument Procedures Handbook* is a technical reference manual for professional pilots who operate under instrument flight rules (IFR). It provides real-world guidance on how instrument-rated pilots can best use the system they've trained for, as well as in-depth coverage of instrument charts and procedures for IFR takeoff, departure, en route, arrival, approach, and landing.

For every navigation receiver and phase of flight, this handbook details the required precision that is needed to stay within protected airspace and make a successful approach. Safety information for relevant subjects such as runway incursion, land and hold short operations, controlled flight into terrain, and human factors issues are covered here. The emphasis is on airplane operations, but the book also contains a chapter dedicated to helicopter instrument procedures.

The *Instrument Procedures Handbook* expands on the FAA's *Instrument Flying Handbook* (FAA-H-8083-15). This handbook introduces advanced information for IFR operations. Airline Transport Pilots (ATP), Instrument pilots, Instrument Flight Instructors (CFIIs), and students preparing for the instrument rating will find this a valuable resource in studying for the FAA Knowledge Exams and getting ready for their checkrides. Illustrated throughout with detailed, full-color drawings and photographs; also includes acronyms list, glossary and index.

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