Policies and Standards

Texas Department of Transportation
Aviation Division

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Contents

Contents (Con't)

Tables

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Introduction/Executive Summary

Pursuant to the Texas Statutes Transportation Code, Title 3, Chapter 21, "Administration of Aeronautics", the Aviation Division of the Texas Department of Transportation is to "establish, prepare, and adopt an aviation facilities development program to provide for a statewide airport system that serves the state's air transportation needs for the least practicable cost". This Policies and Standards document not only serves as a resource and planning guide to provide efficient facilities development, it aids in identifying and establishing a system of airports through the Texas Airport System Plan (TASP).

The TASP was first published in 1970 as the Texas Aeronautical Facilities Plan (TAFP) and is revised continuously through an ongoing airport system planning process comprised of the use of yearly Regional Planning Meetings, sponsor/stakeholder meetings, and approval of letters of interest. A TASP summary report is published on an approximate four year rotation. This summary report not only identifies a system of airports that meets specific goals and objectives for the state's airport system, it describes the extent, type, nature, location, and timing of airport development needed in the state to establish a viable, balanced, integrated system of airports. The continuous airport system planning process:

- Identifies the cost and the level of federal, state, and local capital investment required to maintain and develop system airports;
- Satisfies the requirements of the Texas Transportation Code, Chapter 21;
- Provides guidance for the expenditure of funds under the Federal Aviation Administration (FAA) Airport Improvement Program;
- Provides guidance for expenditure of funds under TXDOT Aviation Division Facilities Development Program; and
- Supports development of state aviation policy.

The states' airport system goals include:

- Protecting the viability and vitality of airports as an important asset to both the state and local economies;
- Providing a safe, efficient, cost effective, well-maintained, and environmentally sound air transportation system;
- Providing adequate access by air to the population and economic activity centers of the state;
- Maximizing the opportunities for economic growth, international trade, and tourism in Texas; and
- Effectively integrating the airport system with other modes of transportation,

while the objectives include:

- Providing airports capable of supporting scheduled commercial service within a 60-minute drive of major population centers;
- Providing airports capable of supporting business jet aircraft within a 30-minute drive of population and mineral resource centers and the economic activity generated by urban development;
- Providing airports capable of supporting single- and twin-engine powered aircraft within a 30-minute drive of agricultural resource centers;
- Providing adequate airport capacity to meet forecast aviation demand;
- Providing an airport system developed to appropriate federal and state planning and design standards; and
- Encouraging community support of and involvement in the development and maintenance of local airports.

Texas Airport System Plan (TASP)

Airport Roles

Within the National Plan of Integrated Airport Systems (NPIAS), airports have been categorized to reflect the type of service the airport provides to the community, currently: commercial service or general aviation. While this generalized approach to planning is sufficient on a macro-, national scale, it lacks the micro-, detailed analysis needed for a more identifiable statewide planning approach. Therefore, the TASP airports are classified on a more hierarchical manner according to their role in meeting airport system goals and objectives. The roles of airports include:

- Basic Service
- Community Service
- Business/Corporate
- Reliever
- Commercial Service

Basic Service Airport

Basic Service airports are those airports that are publicly owned, represent an established public investment for preservation purposes, and typified by activity from small single- and twin-piston aircraft less than 12,500 pounds. This type of facility is not designed to accommodate turbine aircraft activity.

Community Service Airport

Community Service airports primarily provide access to smaller communities, capacity in metropolitan areas, access to the state's agricultural and mineral production areas, and access to important recreational resources generally by single- and twin-engine piston powered aircraft. Turbine activity may occur at these airports. In order to be classified as a community service airport, the facility must meet either criterion 1 *or* 2 *and* one of 3 through 6:

1. Provide capacity within the service area of an existing business/corporate, reliever, or commercial service airport that is or is forecast to be at 60 percent of its annual capacity within 10 years; or
2. Serve a community located beyond a 25-mile driving distance (average ground travel time of 30-minutes) from the nearest business/corporate, reliever, or commercial service airport; and
3. Serve an area of intense agricultural or mineral production; or
4. Have, or be forecast to have within five years, at least 20 based aircraft; or
5. Have, or be forecast to have within five years, 6,000 or more annual aircraft operations; or
6. Be located within 25 miles of a significant recreational area such as a National or State Park, National Forest, National Wildlife Refuge, National Seashore, State Natural Area, State Historical Park, or National or State Recreation Area which attracts at least 200,000 annual visitors.

Business/Corporate Airport

Business/Corporate airports accommodate aircraft operations within the turbo-prop and turbojet arena although single- and twin-engine aircraft operations are accommodated as well. These airports are commonly located where there is sufficient population or economic activity to support a moderate to high level of business/corporate aircraft activity and/or to provide capacity in metropolitan areas. Inclusion as a business/corporate airport is contingent upon meeting 1 and 2 *and* one of 3 through 6:

1. Serve a community located beyond a 25-mile driving distance (average ground travel time of 30 minutes) from the nearest commercial service or reliever airport having or planned to have business/corporate jet capabilities; and
2. Be located beyond a 25-mile driving distance from the nearest existing business/ corporate airport; and
3. Serve an area of concentrated population, purchasing power, or mineral production; or
4. Have, or be forecast to have within five years, 500 or more annual operations by business/corporate jet aircraft; or

5. Have two jet aircraft that are expected to be permanently based at the airport for the next five years; or
6. Be located within 25 miles of a significant recreational area such as a National or State Park, National Forest, National Wildlife Refuge, National Seashore, State Natural Area, State Historical Park, or National or State Recreational Area which attracts at least 500,000 annual visitors.

Reliever Airport

Reliever airports, either public or private, are airports designated by the FAA as having the function of relieving congestion at commercial service airports and providing and enhancing general aviation access to the overall community. In order to be designated as a reliever airport, the facility must be able to meet the following criteria:

1. Must provide substantial capacity, as evidenced by a current or forecast activity level of at least 100 based aircraft or 25,000 annual itinerant operations; and
2. The relieved airport:
    a. Is a commercial service airport that serves a metropolitan area with a population of at least 250,000 or has at least 250,000 annual enplaned passengers; and
    b. Is operating at 60 percent of it capacity or would be operated at such a level before being relieved by one or more reliever airports.

Commercial Service Airport

Commercial service airports are those airports which accommodate regularly scheduled passenger service operations and enplane a certain number of individuals annually. These types of airports are described as either Non-Primary Commercial Service or Primary Commercial Service. A non-primary airport is an airport that enplanes between 2,500 and 10,000 passengers annually and a primary airport is one that enplanes more than 10,000 passengers annually. Currently, the state has 27 primary commercial service airports and zero non-primary commercial service airports. AIP funding for primary commercial service airports is based on the number of annual enplanements and is provided by the FAA.

Airport Entry Criteria

The entry criteria used for airports to be included in the TASP are strongly influenced by principles outlined in the NPIAS. The TASP entry criteria extend these principles to recognize airport locations that are of *state* interest. The criteria for an existing or proposed new airport to be included in the TASP are described below:

1. Existing General Aviation Airports:
    a. Not be classified as a reliever;
    b. Serve a community located beyond a 25-mile driving distance (average 30-minute ground travel time) from the nearest existing or planned TASP

airport, or provide needed capacity within a Metropolitan Statistical Area (MSA);

c. Be capable of being economically developed to the standards applicable to the role identified for the airport; and

d. Be publicly-owned or suitable for public acquisition, which would be preferable to replacing the airport with a new airport on a different site.

2. Proposed new airports:

   a. Meet the system goals and objectives discussed earlier, as well as the airport role (described in a previous section);

   b. Documentation from the sponsor that at least 20 aircraft will be based at the airport, which include the type and coinciding "N" or tail number of the aircraft, and the number of expected annual operations; and

   c. If documentation is provided and criteria for entry into the NPIAS are met, a letter from TxDOT to the FAA will be sent on behalf of the sponsor for inclusion in the NPIAS. If the site is acceptable, the Aviation Division will include the site in the TASP, which then becomes eligible for programming of a feasibility study, site selection, airport master plan, and environmental assessment.

3. Reliever Airports
   a. All reliever airports are included within the TASP

4. Commercial Service Airports
   a. All commercial service airports are included within the TASP.

Relationship of the Texas Airport System Plan to the National Plan of Integrated Airport Systems

The NPIAS, a plan submitted to Congress by the Secretary of Transportation every two years, identifies 3,344 public-use airports which are significant to the national air system; thus enabling such airports to receive grants under the Federal Airport Improvement Program (AIP). This plan not only helps Federal Aviation Administration (FAA) management officials in administering and supporting the FAA's goals for safety and capacity, but also helps to identify specific airport improvements which contribute to the achievement of their goals.

While the FAA's program includes those airports significant to the national system, the state planning process takes the additional step of evaluating and identifying those airports that do not necessarily meet the national interest criteria, but are needed for a cohesive statewide system. This state system ensures that those airports not included in the NPIAS, which are automatically eligible for federal funding, are recognized for their significance and contribution, ensuring eligibility for state financial assistance. Currently, there are 303 airports within the statewide air transportation system of which 219 are classified as NPIAS airports.

According to FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems, the national airport system should have the following attributes to meet the demand for air transportation:

- Airports should be safe and efficient; located at optimum sites; and developed and maintained to appropriate standards,
- Airports should be affordable to both users and government, relying primarily on user fees and placing minimal burden on the general revenues of local, state, and federal government,
- Airports should be flexible and expandable, able to meet increased demand and accommodate new aircraft types,
- Airports should be permanent, with assurance that they will remain open for aeronautical use over the long-term,
- Airports should be compatible with surrounding communities, maintaining a balance between the needs of aviation and the requirements of residents of neighboring areas,
- Airports should be developed in concert with improvements to the air traffic control system,
- The airport system should support national objectives for defense, emergency readiness, and postal delivery,
- The airport system should be extensive, providing as many people as possible with convenient access to air transportation, typically not more than 20-miles travel to the nearest NPIAS airport, and
- The airport system should help air transportation contribute to a productive national economy and international competitiveness.

Airport Development Categories

As discussed in a previous section, the TASP identifies a role for each airport in the system plan. Within each role, the TASP also identifies a range of design standards to accommodate the types of aircraft that will utilize each airport.

A design standard is identified for each of the current, short-, intermediate-, and long-range planning periods. The current design standard reflects the existing configuration of the airport, while the short-range reflects the desired design standard within five years, the intermediate-range within 10-years, and the long-range within 20-years. The long-range design standard always reflects the standard associated with the TASP role for the airport.

Comparing the current design of the airport to fundamental airport development and the desired design standard for each time period identifies development needed at a particular airport. FAA Advisory Circular 150/5300-13, Airport Design, illustrates the mandated design criteria elements.

Airport Development identified in the TASP is classified according to the need it addresses. These needs are categorized into seven development categories defined as objective codes, which include:

- Safety/Special Programs
- Preservation/Reconstruction
- Standards
- Upgrade
- Capacity
- New capacity airport
- New community airport.

Safety/Special Programs

Safety/Special Programs projects ensure the continuing safety of persons and property either in the air or on the ground. Examples of such projects include:

- Reconstruction of primary or secondary runway failures severe enough to be a critical safety problem.
- Repair of runway lighting systems and/or rotating beacons which are not functional.
- Removal of an obstruction of Part 77 imaginary surfaces that has caused the need for displacement of the runway threshold and relocation of the runway lighting.
- Installation of security fencing to correct specific safety problems such as documented unauthorized intrusion by vehicles, persons, or animals (does not include general perimeter fencing).
- Signage upgrades or runway safety area standardization to meet federal mandates.

Preservation/Reconstruction

These projects maintain the functional integrity of an existing airport at its current design standard. Examples of preservation/reconstruction projects include:

- Drainage improvements to prevent pavement failure.
- Seal coat or overlay of runway, taxiway, or apron to maintain surface integrity.
- Reconstruction of runway, taxiway, or apron to restore pavement integrity.
- Replacement of Low Intensity Runway Lights (LIRL) or Medium Intensity Runway Lights (MIRL) that have reached the end of their useful life (about 10 years for LIRL and 20 years for MIRL) with new MIRL systems.
- Replacement of a rotating beacon, lighted wind cone, and/or segmented circle that has reached the end of its useful life.
- Reconstruction of an entrance road or auto parking to restore pavement integrity.

Standards

Standards projects provide fundamental development or bring the airport up to recommended standards based on the current design standard of the airport. Capacity development is excluded, as is development for the purpose of accommodating larger aircraft types not included within the current design category of the airport. Examples of projects that would support an airport's current design standard include:

- Grading of runway safety areas.
- Land acquisition for Runway Protection Zones (RPZ) or Runway Safety Areas (RSA) other than for obstruction removal.
- Lighting of existing unlighted pavements.
- Lengthening, widening, and strengthening runways and taxiways to a standard compatible with the current airport design standard.
- Construction of taxiways to support existing runways.
- Construction of a runway on a new orientation to provide adequate wind coverage.
- Construction of perimeter fencing.
- Construction of an auto access road and/or auto parking.

Upgrade

Upgrade projects enable the airport to accommodate larger, more demanding aircraft or to permit longer non-stop flights and greater load factors. Generally, upgrade projects will bring the airport to a higher design standard. For example, an airport with a current B-I design standard may be upgraded to B-II design standard or a Business/Corporate airport with a current design standard of Business/Corporate designed to accommodate 75% of large airplanes of 60,000 pounds or less at 60% useful load may be upgraded to accommodate 100% of large airplanes of 60,000 pounds or less at 90% useful load. Examples of projects to upgrade an airport include:

- Land acquisition to provide for expansion to a higher design standard or provide for a precision instrument approach.
- Extension of an existing runway to a higher design standard.
- Strengthening of an existing runway or taxiway to accommodate larger aircraft.
- Replacement of Low Intensity Runway Lights (LIRL) with new Medium Intensity Runway Lights (MIRL).
- Installation of perimeter fencing associated with an upgrade.

Capacity

Capacity projects enable the airport to accommodate more based aircraft or a higher level of aircraft operations. Capacity improvements do not result in a change to the design standard of airport or permit the airport to accommodate a more demanding critical aircraft. Such

improvements are included in the previous "Upgrade" category. Examples of projects designed to provide additional airport capacity include:

- Land acquisition for additional operational capacity such as taxiways, parallel runways, apron expansion, building area development, etc.
- Construction of a parallel runway.
- Construction of an extension of a short runway.
- Construction of a holding apron or by-pass taxiway.
- Construction of a taxiway to a new apron.
- Construction of a terminal, loading, or parking apron.
- Construction of additional auto access road capacity and auto parking.
- Installation of perimeter fencing associated with capacity improvements.

New Capacity Airport

A new capacity airport is a new reliever or supplementary commercial service airport to increase airport system capacity in a metropolitan area.

New Community Airport

A new community airport is an airport that will be the major airport facility serving a community.

TASP Airport Design Standards

Design standards are an integral and important component for the planning of an airport facility in order that necessary facilities will be adequate to accommodate the activity associated with the role of the airport. Airport role and design standards are intertwined, in that any given role designation for a particular airport will imply a corresponding set of design standards. An airport's role in the TASP is based on the types of aircraft that are to be accommodated on a regular basis at that facility.

The development needs at a particular airport may be identified by comparing the current design of the airport with the design standards associated with the desired role of that airport. The following development items provide guidance for making this comparison:

- fundamental airport development (see Table 1)
- activity levels for capacity development (see Table 2)
- the design standards to accommodate the operational and physical characteristics of the aircraft intended to operate at the airport
- the minimum airport dimensional standards associated with each design standard

- the timing of upgrade projects.

The FAA publishes certain Advisory Circulars (AC) as guidance for use in the design of civil aviation airports. The standards and recommendations contained herein are based on this FAA guidance and have been adapted to suit the particular needs of the state airport system. The TXDOT follows the standards and recommendations contained in this document for airport projects in which it participates unless otherwise directed by the FAA or based on specific justification. At certificated airports, these standards and recommendations may be used to satisfy specific requirements of FAR Part 139, Certification and Operations: Land Airports Serving Certain Air Carriers, Subpart D.

Table 1
FUNDAMENTAL AIRPORT DEVELOPMENT

Airport Development Items	Comment
Land	Airfield development, building area, runway protection zones, approach aids, compatible land use in accordance with current criteria
Single Runway	
Crosswind Runway	Recommended if wind coverage on main runway is less than 95%
Lighting	Type of lighting for runway and taxiway is dependent on the airport and type of approach
Full Parallel Taxiway	
Visual Glide Slope Indicator (VGSI)	
Runway End Identification Lights (REIL)	If runway is approved for night operations and is lighted then it may qualify for a REIL
Runway Marking	Marking as necessary to support the applicable approach
Apron	
Runway Grooving, as appropriate	
Instrument Approach, as appropriate	The introduction of satellite navigation will be able to support instrument approaches to virtually all runway ends, dependent on satellite signal availability
Rotating Beacon	Not required unless the airport is approved for night operations or has a published instrument approach
Wind Cone and Segmented Circle	Wind cone lighted if airport approved for night operations
Obstruction Lighting and Marking	Where necessary
Access and Service Roads	In accordance with Order 5100.17 (paragraph 122)
Perimeter Fencing	

Source: FAA Order 5090.3C, National Plan of Integrated Airport Systems (NPIAS), December 2000.

Table 2
ACTIVITY LEVELS FOR PLANNING CAPACITY DEVELOPMENT

Capacity Development Items	Activity Level	Remarks
New Runway	60% to 75% Annual Capacity	Parallel Preferred; Same length and strength as primary if serving same aircraft
Short Runway	75,000 Total Operations; 20,000 Itinerant Operations	Small aircraft only; Not necessarily parallel
Extension of Short Runway	60% to 75% Annual Operations	If the critical aircraft changes, additional exit taxiways may be warranted
Additional Exit Taxiways	60% to 75% Annual Operations	If the critical aircraft changes, additional exit taxiways may be warranted
Holding Aprons/By-Pass Taxiway	75,000 Total Operations; 20,000 Itinerant Operations or 30 Peak Hour Operations	Consider effect on NAVAID's; Limit holding apron to no more than 4 positions
Terminal Aprons, Aircraft Loading Aprons, Parking Aprons	60% to 75% Annual Capacity	Recommended 5 years before aprons are expected to be congested during peak periods
Replacement/Supplemental Airports	60% to 75% Annual Capacity	Timing depends upon forecasts, type of airport, location (metropolitan area), cost and other factors
Additional Instrumentation	Recommended 5 years before airport is forecast to reach activity levels specified in APS#1	

Source: FAA Order 5090.3C, National Plan of Integrated Airport Systems (NPIAS), December 2000.

Design Standard Definitions

Airport Reference Code

The Airport Reference Code (ARC), as described in FAA advisory circular AC 150/5300-13, Airport Design, is a coding system to help identify and determine the appropriate design criteria for each individual airport. This ARC correlates the design and layout of the airport to the operational and physical characteristics of the 'critical design aircraft', which directly influences pertinent safety criteria such as runway length, runway width, runway/taxiway separation distances, building setbacks, size of required safety and object free areas, etc. The

critical design aircraft is based on the largest type aircraft expected to operate at the airport on a regular basis. Regular basis is defined as a minimum of 250 operations (landings or takeoffs) per year.

The ARC has two components. The first component, depicted by a letter (e.g., A, B, C, D, or E), is the aircraft approach category and relates to aircraft approach speed based on operational characteristics. The second component, depicted by a Roman Numeral (e.g., I, II, III, IV, V, or VI), is the aircraft design group and relates to aircraft wingspan. For example, a Beech King Air 200, with an approach speed of 103 knots and wingspan of 54.5 feet would have an ARC of B-II, while a larger corporate jet such as the Gulfstream IV (G-IV) exhibiting an approach speed of 145 knots and wingspan of 77.8 feet, would have an ARC of D-II. Table 3 illustrates the components comprising the ARC.

Table 3
AIRPORT REFERENCE CODE

Aircraft Approach Category	
Category	*Speed*
A	< 91 Knots
B	91 - < 121 Knots
C	121 - <141 Knots
D	141 - < 166 Knots
E	≥ 166 Knots

Airplane Design Group [1]		
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

Source: FAA Advisory Circular 150/5300-13 Change 10, Airport Design.
[1] Where an airplane is in two categories, the most demanding category should be used.

Aircraft

While the ARC is one factor in determining design criteria for an airport, an additional consideration stems from the size of aircraft operating at the airport. For this document and the TASP, the ability of an airport to accommodate a certain weighted aircraft is not the deciding factor as to how the airport is designed. The deciding factor is the **intended** use of the airport. For example, an airport with a runway 3,200 feet in length exhibiting a 22,000

pound pavement strength is not intended to be used by large aircraft even though there is sufficient strength for such an operation. Thus, as shown in the TASP and Aviation Division's database, the airport's ability to accommodate a particular aircraft is based on the airport's intended use.

- Small Airplane: An airplane of 12,500 pounds or less maximum certificated take-off weight.
- Large Airplane: An airplane of more than 12,500 pounds maximum certificated take-off weight

Runways

- Visual Runway: A runway *without* an existing or planned straight-in instrument approach;
- Non-precision Runway: A runway with an approved or planned straight-in approach procedure giving horizontal guidance only and which has no existing or planned precision approach procedure;
- Precision Runway: A runway with an existing or planned precision approach procedure giving both horizontal and vertical guidance.

Runway Lengths Recommended for Design

Runway length requirements vary not only with an airport's role but also with certain local conditions such as elevation, temperature, runway gradient, etc. An airport's design standards and development needs are determined by considering either a family of aircraft having similar performance characteristics or a specific airplane using or forecast to use the facility. In accordance with FAA A/C 150/5300-13, Airport Design, and AC 150/5325-4B, Runway Length Requirements for Airport Design, runway lengths recommended for design depend on a number of factors, including:

- approach speed, wingspan, and maximum certificated take-off weight of the aircraft forecast to use the facility;
- airport elevation above sea level;
- mean maximum temperature of the hottest month;
- whether the airport serves small or large airplanes;
- if for large airplanes, the percent of the fleet at a particular useful load;
- maximum difference in runway elevations; and
- wet and slippery conditions.

When the maximum certificated takeoff weight of aircraft forecast to use the airport is 60,000 pounds or less, the runway should be designed for a family or group of aircraft. When over 60,000 pounds, the runway is usually designed for a specific airplane using the above mentioned FAA publication.

The "effective runway gradient", increases the length of runway by 10 feet for each one foot of elevation difference between the high and low points of the runway centerline.

The wet and slippery adjustment increases the runway length by 15% only up to a maximum runway length of 5,500 feet. This adjustment is applied if the airport accommodates turbine aircraft and receives more than 35 inches of precipitation annually as reported in the "Monthly Station Normal of Temperature, Precipitation, and Heating and Cooling Degree Days 1971-2000", Texas 41, published by the National Oceanic and Atmospheric Administration (NOAA), http://www5.ncdc.noaa.gov/climatenormals/clim81/TXnorm.pdf.

It should be noted that runway gradient and wet and slippery adjustments are mutually exclusive and therefore not combined since the runway gradient adjustment applies to take-offs and the wet and slippery adjustment applies to landings. The runway length would be increased by only the greater amount of either adjustment.

Additional Design Elements

Additional elements applicable to airport design as mandated by FAA A/C 150/5300-13, Airport Design, can be viewed in Appendix 4. Such elements include safety areas, object free areas, taxiway widths, runway protection zones, etc. The dimensions for each element depend upon the ARC and visibility minimums for each particular runway.

Visual Approach Aids

Precision Approach Path Indicators (PAPI's) and Runway End Identifier Lights (REILs) are visual aids which are effective in providing visual reference during the final phases of the approach. These aids may be justified where the natural environment either fails to provide the required reference or presents illusory or false information to the pilot.

PAPI

The precision approach path indicator (PAPI) provides the pilot with a safe and accurate glide slope on final approach to the runway. A row of PAPI light housing assemblies placed perpendicular to the approach path is seen by the pilot in combinations of red and white to indicate a path that is too high, too low or correctly on slope. These systems have an effective visual range of about 5 miles during the day and up to 20 miles at night. The PAPI system consists of either four identical light units or two identical light units.

When either of the following visual reference deficiencies is documented, the installation of a PAPI to enhance safety may be justified:

- *Deceptive Approach Area* – A situation in which the topography, landmarks, or lights underlying the approach path do not provide the pilot with adequate visual references with which to establish a proper approach to the runway.
- *Obstruction Clearance* – A situation in which the orientation, irregular pattern, or obscurity of natural or manmade obstructions under or penetrating the approach surface, and the

inability to provide appropriate marking or lighting of the obstructions makes pilot judgment of obstruction clearance difficult.

REILs

REILs are installed at many airfields to provide rapid and positive identification of the approach end of a particular runway. The system consists of a pair of synchronized flashing lights located laterally on each side of the runway threshold. REILs may be either omnidirectional or unidirectional facing the approach area. They are effective for:

- Identification of a runway surrounded by a preponderance of other lighting.
- Identification of a runway which lacks contrast with surrounding terrain.
- Identification of a runway during reduced visibility.

Instrument Approach Aids

Global Positioning Systems

The Global Positioning System (GPS) is a system of 24 satellites operated by the Department of Defense (DOD) under joint DOD/Department of Transportation (DOT) management. Published GPS instrument approaches can achieve non-precision approach minimums typical of those using ground-based NAVAIDs. This technology allows many smaller airports to have instrument approaches that they would not otherwise have due to the cost and required infrastructure associated with ground-based systems. Consequently, GPS gives more airports across the state, especially those in rural locations, the opportunity to have instrument approaches.

The overall objective of the FAA is to support the operational use of satellite navigation for all civil aviation needs including departure operations, terminal, oceanic, en route, non-precision and precision approaches, auto-landing, and surface navigation. Some of the incremental steps to achieve this goal have already occurred, many are currently underway, and more are planned for the near future.

The aviation community can expect many benefits from satellite navigation (GPS and its augmentations) including:

- Increased landing capability down to Category III (100' Decision Height (DH) and Runway Visual Range (RVR) of 700') precision approach service to all runways and airports for all aircraft types.
- Improved safety with reduced separation minimums resulting in increased system capacity and capabilities.
- Increased flexibility to implement accurate area navigation by using efficient, optimized, user-preferred flight paths.
- Improved ground and cockpit situational awareness to reduce runway incursions.
- Significant reductions in aircraft operating costs.

- Accurate position reporting to enable uniform high-quality worldwide air traffic management.
- Consolidation of navigation functions into a single satellite-based system thereby enabling the potential phase-out of older navigation aids at substantial savings.

Additionally, the FAA is striving to enhance existing relations with other civil aviation authorities and appropriate organizations to create a seamless, worldwide satellite-based navigation system. Such a system will permit the use of a single piece of equipment to support aviation navigation on a global basis. Furthermore, it will provide the foundation for future communications, navigation, and surveillance systems and increase safety for carriers and passengers internationally.

Wide Area Augmentation System (WAAS)

Unlike traditional ground-based navigation aids, the WAAS covers nearly all of the National Airspace System (NAS). The WAAS provides augmentation information to GPS receivers to enhance the accuracy and reliability of position estimates.

The signals from GPS satellites are received across the NAS at many widely-spaced Wide Area Reference Stations (WRS) sites. The WRS locations are precisely surveyed so that any errors in the received GPS signals can be detected.

The GPS information collected by the WRS sites is forwarded to the WAAS Master Station (WMS) via a terrestrial communications network. At the WMS, the WAAS augmentation messages are generated. These messages contain information that allows GPS receivers to remove errors in the GPS signal, allowing for a significant increase in location accuracy and reliability.

The augmentation messages are sent from the WMS to uplink stations to be transmitted to navigation payloads on Geostationary communications satellites.

The navigation payloads broadcast the augmentation messages on a GPS-like signal. The GPS/WAAS receiver processes the WAAS augmentation message as part of estimating position. The GPS-like signal from the navigation transponder can also be used by the receiver as an additional source for calculation of the user's position.

WAAS also provides indications to GPS/WAAS receivers of where the GPS system is unusable due to system errors or other effects. Further, the WAAS system was designed to the strictest of safety standards – users are notified within six seconds of any issuance of hazardously misleading information that would cause an error in the GPS position estimate.

Types of WAAS capabilities include: Lateral Navigation (LNAV)/Vertical Navigation (VNAV), which is a GPS based non-precision approach category and Localizer Procedure with Vertical guidance (LPV) which is solely GPS based and may operate down to equivalent Category I minimums of a 200 foot ceiling and ½ statute mile visibility.

Local Area Augmentation System (LAAS)

The Local Area Augmentation System is an augmentation to GPS that focuses its service on the airport area (approximately a 20-30 mile radius). It broadcasts its correction message via a very high frequency (VHF) radio data link from a ground-based transmitter. LAAS will yield the extremely high accuracy, availability, and integrity necessary for Category I, II, and III precision approaches, and will provide the ability for more flexible, curved approach paths. LAAS demonstrated accuracy is less than 1 meter in both the horizontal and vertical axis.

Instrument Landing System (ILS)

Instrument Landing System (ILS) is designed to provide an approach path for exact alignment and descent of an aircraft on final approach to a runway in instrument meteorological conditions (IMC). The ground equipment consists of two highly directional transmitting systems and, along the approach, three (or fewer) marker beacons. The directional transmitters are known as the localizer and glide slope transmitters.

The ILS system may be divided functionally into three parts:

- Guidance information: localizer, glide slope;
- Range information: marker beacon, DME; and
- Visual information: approach lights, touchdown and centerline lights, runway lights.

The FAA plans to move away from all ground-based navigation systems, including ILS, toward exclusive use of GPS for civil aeronautical navigation. New ILS installations are not anticipated to be continued after GPS achieves the accuracy necessary to replace the ILS.

Application of Design Standards

An airport's design standard is based on the type of aircraft with the most demanding Airport Reference Code expected to regularly use the facility. Therefore, the design standard must be appropriate and correlated with the projected uses. As described below, certain design standards are associated with each role and provide the foundation and support for minimum facilities to be met by the airport sponsor. These are minimum facilities under ideal circumstances. Exceptions are currently in practice and are related to an airport's role and function. It is important to note that even if a project is eligible for programming, it does not necessarily mean that it is a high priority project or that funding will be available to meet the need.

Basic Service

- *Applicable Design Standard:*
  - A-I/B-I.
- *Minimum Runway:*
  - Length: Designed for 95% of the small aircraft fleet.
  - Width: 60 feet.
  - Strength: 12,500 pounds.
- *Minimum Taxiway:*
  - Stub taxiway to tie-down area and runway end turnarounds.
- *Minimum Apron:*
  - Area needed for itinerant and local parking based on AC 150/5300-13 Airport Design – Appendix 5 - 360 square yards for each itinerant aircraft and 300 square yards for each based aircraft.
- *Minimum Approach:*
  - Visual.
- *Minimum Lighting:*
  - Medium Intensity Runway Lights (MIRL) and Taxiway turnout lights.
- *Minimum Visual Aids:*
  - Lighted wind indicator, segmented circle, and rotating beacon.
- *Minimum Facilities/Services:*
  - Determined by aircraft activity and type.
- *Typical Aircraft:*
  - Refer to Appendix Two.

Community Service, Aircraft ≤ 12,500 Pounds

- *Applicable Design Standard:*
  - B-I/B-II.
- *Minimum Runway:*
  - Length: Designed for 95% of the small aircraft fleet.
  - Width: 60 feet.
  - Strength: 12,500 pounds single wheel loading.
- *Minimum Taxiway:*
  - Stub taxiway to tie-down area and runway end turnarounds.
- *Minimum Apron:*
  - Area needed for itinerant and local parking based on AC 150/5300-13 Airport Design – Appendix 5 - 360 square yards for each itinerant aircraft and 300 square yards for each based aircraft.
- *Minimum Approach:*
  - Non-precision, 1-mile.
- *Minimum Lighting:*

- MIRL and Taxiway turnout lights.

- *Minimum Visual Aids:*
  - Lighted wind indicator, segmented circle, rotating beacon, and Precision Approach Path Indicators (PAPI).
- *Minimum Facilities/Services:*
  - AWOS, fuel, and terminal building (see Appendix 1 for guidelines).
- *Typical Aircraft:*
  - Refer to Appendix Two.

Community Service, Aircraft ≤ 30,000 Pounds

- *Applicable Design Standard:*
  - B-II.
- *Minimum Runway:*
  - Length: Designed for 100% of the small aircraft fleet.
  - Width: 75 feet.
  - Strength: 30,000 pounds single wheel loading.
- *Minimum Taxiway:*
  - Partial parallel taxiway.
- *Minimum Apron:*
  - Area needed for itinerant and local parking based on AC 150/5300-13 Airport Design – Appendix 5 - 360 square yards for each itinerant aircraft and 300 square yards for each based aircraft.
- *Minimum Approach:*
  - Non-precision, 1-mile.
- *Minimum Lighting:*
  - MIRL, taxiway centerline or edge reflectors on taxiway to lighted runway.
- *Minimum Visual Aids:*
  - Lighted wind indicator, segmented circle, rotating beacon, and PAPI.
- *Minimum Facilities/Services:*
  - AWOS, fuel, airfield signage, and terminal building (see Appendix 1 for guidelines).
- *Typical Aircraft:*
  - Refer to Appendix Two.

Business/Corporate

- *Applicable Design Standard:*
  - B-II, C-II, C-III, C-IV, D-II, D-III, D-IV.
- *Minimum Runway:*
  - Length: Designed for 75% of large airplanes less than 60,000 pounds at 60% useful load.

  - Width: 75 feet.
  - Strength: 30,000 pounds single wheel loading.
- *Minimum Taxiway:*
  - Full-length parallel.
- *Minimum Apron:*
  - Area needed for itinerant and local parking based on AC 150/5300-13 Airport Design – Appendix 5 - 360 square yards for each itinerant aircraft and 300 square yards for each based aircraft.
- *Minimum Approach:*
  - GPS LPV, ¾-mile.
- *Minimum Lighting:*
  - MIRL and taxiway centerline striping or reflectors and turnout lights from the active runway.
- *Minimum Visual Approach Aids:*
  - Lighted wind indicator, segmented circle, rotating beacon, PAPI, Runway End Indicator Lights (REILS – in extensive light polluted areas only)
- *Minimum Facilities/Services:*
  - AWOS, fuel, illuminated airfield signage, and terminal building (see Appendix One for guidelines).
- *Typical Aircraft:*
  - Refer to Appendix Two.

Reliever

- *Applicable Design Standard:*
  - B-II, C-II, C-III, D-II, D-III, D-IV
- *Minimum Runway:*
  - Length: Designed for 100% of the small aircraft fleet.
  - Width: 75 feet.
  - Strength: 30,000 pounds single wheel aircraft.
- *Minimum Taxiway:*
  - Full-length parallel.
- *Minimum Apron:*
  - Area needed for itinerant and local parking based on AC 150/5300-13 Airport Design – Appendix 5 - 360 square yards for each itinerant aircraft and 300 square yards for each based aircraft.
- *Minimum Approach:*
  - GPS LPV, ¾-mile.
- *Minimum Lighting:*
  - MIRL and Medium Intensity Taxiway Lights (MITL).
- *Minimum Visual Aids:*

  - Lighted wind cone, segmented circle, rotating beacon, PAPI-4, Runway End Indicator Lights (REILS – in extensive light polluted areas only).
- *Minimum Facilities/Services:*
  - AWOS, fuel, illuminated airfield signage, and terminal building (see Appendix One for guidelines).
- *Typical Aircraft:*
  - Refer to Appendix Two.

Commercial Service

- *Applicable Design Standard:*
  - C-II, C-III, C-IV, D-II, D-IV, D-V, D-VI
- *Minimum Runway:*
  - Length: Per AC 150/5325-4B, Runway Length Requirements for Airport Design. Provide runway length for the critical aircraft forecast to use the airport.
  - Width: 100 feet.
  - Strength: Based on the weight of the critical aircraft forecast to use the airport.
- *Minimum Taxiway:*
  - Full-length parallel for all runways used by scheduled air carriers.
- *Minimum Apron:*
  - Per AC 150/5360-13 Planning and Design Guidelines for Airport Terminal Facilities.
- *Minimum Approach:*
  - GPS LPV, ½-mile or ILS.
- *Minimum Lighting:*
  - HIRL, MITL, and Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) or equivalent.
- *Minimum Visual Aids:*
  - Lighted wind indicator, segmented circle, rotating beacon, and PAPI-4.
- *Minimum Facilities/Services:*
  - AWOS, fuel, and terminal building (see Appendix One for guidelines).
- *Typical Aircraft:*
  - Refer to Appendix Two.

Functional Categories

In addition to the specific role each airport exhibits, the TASP further sub-divides the airports into functional categories related specifically to the type of use that the airport accommodates or is expected to accommodate. These functional categories include: access, remote, agricultural, special use, industrial, multi-purpose, regional, reliever, and commercial.

As previously discussed, the role of the airport influences the design which determines the type of aircraft it can accommodate. Similarly, the main functional use of the airport further determines what design elements must be in place to meet the needs of the users of the community. An airport is designated a specific function whenever its primary use is at least 60% of its total operations. For some functional categories, the design elements are more demanding and for other functional categories, the design elements are less demanding. The following is a description of the nine functional categories and associated design elements.

Access

This functional category includes airports that provide only minimal service to the community. As a result, funds would not likely be available to replace these facilities. However, they are eligible to receive funding for pavement preservation.

Applicable Design Standard

- A-I, B-I.

Design Element Deviations

- Minimum runway width of 50 feet paved is acceptable.

Remote

This functional category includes airports serving remote areas. Many communities are separated by 100 or more miles from major population centers and even other rural populations. This is frequently true in west and south Texas. Many typical rural activities such as ranching and oil production require access to these communities by air transportation. In addition, emergency medical access by air is essential to remote communities.

Applicable Design Standard

- A-I, B-I.

Design Element Deviations

- Non-precision approach.

Agricultural

This functional category includes airports that serve areas of intense agricultural production. Agricultural spraying services are required to support the production capability within many agrarian communities; therefore, many of the design standards of these general aviation airports are specifically related to the needs of agricultural operators. Terminal facilities and runway lights may not be required. Agricultural activities may occur at a variety of airports and the special needs of this type of activity, including use of chemicals and non-standard traffic patterns, may require additional features for safe operations. Additional roads may be required to provide access for chemical trucks and to prevent trucks from operating on the aircraft aprons, runways, or taxiways. Segregated agricultural aprons may need to be constructed when there are also significant non-agricultural operations.

Applicable Design Standard

- A-I, B-I.

Design Element Deviations

- *Minimum Runway*: Width of 50 feet paved or 75 feet stabilized turf
- *Minimum Apron*: Add agricultural apron; 80,000 pound PCC agricultural chemical truck parking pad adjacent to PCC agricultural aircraft loading apron designed for chemical wash-down and containment.
- *Other*: Access road, paved or gravel, suitable for carrying an 80,000 pound chemical truck from the public road to the agricultural chemical truck parking pad.

  Note: The truck and airplane loading design elements shown for agricultural airports may be appropriate at any airport with significant agricultural operations regardless of the functional classification of the airport.

Special Use

Special use airports include airports that are used on a seasonal basis primarily related to tourism, hunting, or other recreational purposes. Many of these airports are in rural areas located near significant parks or lakes or provide access to various types of hunting activities. The operations at these airports are typically low volume except in season and may include large and small airplanes. Many of these airports provide a significant contribution to the local economy. Special use airports in South Texas serve exotic game ranch hunting, deer hunting, and bird hunting in season.

Applicable Design Standard

- A-I, B-I, B-II, C-II.

Design Element Deviations

- *Minimum Runway*: For A-I and B-I airports, minimum runway width of 50 feet is acceptable.
- *Minimum Taxiway*: Delete need for full-length parallel taxiway.
- *Minimum Service*: Delete need for AWOS, illuminated signage, and terminal building.

Industrial

This functional category describes the type of businesses associated with the airport, particularly those that are aviation-related. The itinerant traffic is specifically there to conduct business with a tenant or industry based at or near the airport. These visitors may not have a need for access or other direct business within the community; however, their transactions support the economy and tax revenue base of that community. The need for a terminal or meeting facility would be based upon total operations, exclusive of the associated industrial activity. The airside facilities should provide the best technology available for weather, approach minimums, and approach aids.

Applicable Design Standard

- B-II, C-II, C-III, C-IV, D-II, D-III, D-IV.

Design Element Deviations

- *Minimum Runway*: Add runway strength appropriate to specifically identified critical airplane.
- *Minimum Apron:* Add apron lighting.

Multi-purpose

The operations at these airports are diversified and are not dominated by any one type of activity. The general criteria used for the airport roles are adequate for planning purposes; however, special features may still be required to meet the needs of specific users.

Applicable Design Standard

- A-I, B-I, B-II, C-II.

Design Element Deviations

- None.

Regional

These airports are designed to support higher performance aircraft than the surrounding smaller general aviation facilities in the area and are the focal point of aviation activity for a region or the largest population center. These facilities may experience air taxi, commuter, or charter service periodically. The airside facilities should provide the best technology available for weather, approach minimums, and approach aids.

Applicable Design Standard

- B-II, C-II, C-III.

Design Element Changes

- Add apron lighting.

Reliever

Reliever airports are airports designated by the FAA to relieve congestion at large commercial service airports and increase access to general aviation in the community.

Applicable Design Standard

- B-II, C-II, C-III, D-II.

Design Element Changes

- None.

Commercial

Commercial airports are publicly-owned airports which receive scheduled passenger service with enplanements exceeding 2,500 passengers annually.

Applicable Design Standard

- C-II, C-III, C-IV, D-II, D-III, D-IV, D-V, D-VI.

Design Element Changes

- None.

Programming Criteria

Up to this point, previous sections of this document have discussed the criteria for airport development assuming **unconstrained** funding. These criteria are used as guidelines to determine the overall needs of an airport appropriate to its role, design standard, and functional category. The purpose of this section is to consolidate programming criteria – that is, those criteria that are used to program airport improvements given **constrained** funding. The following presents specific development items along with programming criteria; however, it is important to note that even if a project is eligible for programming, it does not necessarily mean that it is a high priority project or that funding will be available to meet the need. In addition there are numerous grant assurances that accompany airport improvement projects which are found in FAA Order 5100.38C, Airport Improvement Program Handbook.

Runway Lengthening

For all runways less than minimum length, evidence of need for a runway extension to meet standards must be provided for justification. This justification is typically in the form of a letter from an individual, a letter from the chief pilot of a specific business/corporation operating or desiring to operate at the field, and/or the airport sponsor itself. Documentation from such contacts must include detailed information pertaining to tail numbers, aircraft type, stage length (destination points), balanced field length requirements, a break down of the number of operations per day, week, month, or year, and the reason the existing runway length is inadequate. Annual operations (take-offs or landings) by this operator or combination of operators utilizing the same class aircraft should account for the minimum threshold of 250 operations within a year or a forecast of 500 operations within 5 years. Additional factors, such as economic impact on the community, may be taken into consideration in determining the need for an extension.

Runway Strengthening

For all runways less than minimum strength, the criteria for justification of the need for additional strengthening is the same as that stated above in 'runway lengthening'.

For any runway less than minimum strength, strengthening will generally be programmed in conjunction with other significant runway construction such as a rehabilitation or extension.

Based on historical information, there were several occasions when pavements were being designed for 60,000 pound single-wheel aircraft. Due to a lack of general aviation or corporate aircraft within this weight category, it is no longer valid to apply the 60,000 single-wheel aircraft for design purposes across the board. As provided in the 'Design Standards' section above, each role applies the minimum pavement strength requirements. Thus, pavement strength design for single-wheel aircraft greater than 30,000 pounds or 60,000 pounds for dual-wheel aircraft will **not** be programmed unless otherwise justified.

Runway Widening

For all runways less than minimum width, the criteria for justification of the need for additional width is the same as that stated above in 'runway lengthening'.

For any runway less than minimum width, widening will generally be programmed in conjunction with other significant runway construction such as reconstruction or extension.

Crosswind Runway

In addition to the primary runway, if an airport has a non-primary crosswind runway that is being utilized, it is eligible for programming. However, if the airport has more than one non-primary crosswind runway, only one is eligible for programming. One crosswind runway is eligible for lighting if it is determined that it is needed for wind coverage and the main runway is lighted. If wind coverage on the primary runway is less than 95 percent, construction of a crosswind runway is eligible for programming; however, it is considered a low priority and the site must be reasonably capable of accommodating crosswind runway construction. For airports with crosswind runways that are not needed for wind coverage, if/when reconstruction may be required this is a low priority and it may not be funded.

In certain circumstances, a turf runway may be appropriate. This may even be a first step towards a paved, crosswind runway. However, it should not conflict with the primary runway. The guidance for crosswind runway length can be found in AC 150/5325-4B, Runway Length Requirements for Airport Design.

Runway Lighting

Low Intensity Runway Lights (LIRL) should be replaced with Medium Intensity Runway Lights (MIRL) when the LIRL need to be replaced or in conjunction with a runway widening that necessitates relocating the lights.

The lights must be left on from dusk to dawn in accordance with grant assurances. An alternative to this is radio-controlled lighting which allows pilots to activate the lights upon approaching the airport; however, radio controlled lighting should still be left on from dusk to dawn.

Taxiways

Construction of a full-length parallel taxiway is eligible for programming at Community Service airports accommodating aircraft ≤ 30,000 Pounds. At Basic Service and Community Service airports ≤ 12,500 pounds, construction of a **partial**-parallel taxiway can be programmed if activity reaches 10,000 annual operations or 15 based aircraft while construction of a **full**-length parallel can be programmed if activity reaches 20,000 annual operations or 30 based aircraft. Additionally, the criteria may not be limited to an airport's role. Safety and operational factors may play a role in programming taxiways such as visibility, line-of-sight, operational constraints, and flight training activity.

Taxiway Lighting

Medium Intensity Runway Lights (MITL) and taxiway guidance signs may be programmed at any airport with 100 or more based aircraft or at Business/Corporate airports where the configuration of the taxiway system is such that MITL are warranted. Taxiway centerline or edge reflectors may be used at any general aviation airport with less than 100 based aircraft.

Apron Expansion

An apron expansion may be programmed when a ramp survey indicates that the existing apron is 60 percent occupied on at least 15 days per month or when seasonal use consistently exceeds the capacity of existing facilities. In order to justify expanding an apron, photographic documentation should be provided.

Terminal Development

Terminal buildings are eligible for programming and may be funded on a 50/50 matching basis. An airport must have on-site management and fuel available. Additional factors may be taken into consideration in determining the necessary size of the terminal building (see Appendix 1).

Visual Approach Aids

Primary runways and secondary crosswind runways needed for wind coverage at Basic Service and Community Service airports are eligible for either 2-light or 4-light Precision Approach Path Indicators (PAPI-2 or PAPI-4) if there is a visual deficiency that may potentially cause difficulty to a pilot. This may include trees, sloping terrain, cliffs, drop-offs, or structures that cannot reasonably be removed, such as towers, pump jacks, etc., in or adjacent to approach surfaces. In the case of Runway End Identifier Lights (REIL), programming is eligible only for those airports that have extensive light pollution from the surrounding area, such as those in heavily urbanized areas, adjacent to a community park with lighted ball fields, etc. For those airports with existing Visual Approach Slope Indicators (VASI), upgrading to the 2-light or 4-light PAPI is highly recommended and should coincide with a lighting, pavement rehabilitation or overlay project.

Auto Parking

For every 20 based aircraft, five auto parking spaces are eligible to be programmed and may be funded on 50%/50% cost share matching basis. Auto parking is usually programmed in conjunction with a terminal project and is not eligible for federal funding.

Hangar Access Taxiways

Rehabilitation of hangar access taxiways serving facilities owned, operated, or controlled by, or reverting to the airport sponsor is eligible for programming. Written documentation showing commitments for new hangar construction must be provided in order to program new hangar access taxiways.

Fencing

Fencing is eligible to be programmed when necessary to separate incompatible uses from the airport, such as roadways, livestock areas, and urban development and to prevent wildlife encroachment onto the airport. Types of fencing to be used for urban areas, including residential, commercial, and recreational – 6' chain link; to separate landside from airside areas – 4' chain link; for non-urbanized areas, livestock use or agricultural use, and along roadways – 5-strand barbed wire; and game-proof fencing – 6' to 8' woven mesh wire.

Entrance and Access Roads

Entrance roads located on the airport or within a right-of-way acquired by the airport sponsor, serving exclusively airport traffic, are eligible to be programmed and may be funded on a 50%/50% matching basis. At airports with significant agricultural operations, paved or gravel access roads, suitable for carrying an 80,000 pound chemical truck from the public road to the agricultural chemical truck parking pad may be eligible for programming on a 50%/50% matching basis.

Agricultural Aprons

Agricultural aprons are eligible to be programmed at airports with significant agricultural operations and may include a PCC agricultural aircraft loading apron designed for chemical wash-down and containment of sufficient size to accommodate typical agricultural aircraft, and an 80,000 pound PCC agricultural chemical truck parking pad adjacent to the apron.

Airport Rescue and Fire Fighting Facilities and Equipment (ARFF)

TxDOT will not participate with funding assistance for ARFF facilities or equipment unless the airport is an FAA certified Part 139 airport requiring such needs.

Air Traffic Control Towers (ATCT)

The Air Traffic Control Tower building program is a federally funded 90%/10% cost share grant to assist qualifying general aviation airports with the construction of an air traffic control tower and the communication equipment. Candidates are typically airports in the metropolitan areas of the state. The airport sponsor is eligible for assistance if their FAA calculated Benefit/Cost Ratio (B/C) meets or exceeds a 1.0. This also qualifies the airport sponsor to participate in the FAA Contract Tower Funding Program for funding the air traffic controllers to staff the facility.

Hangar Program

If all airside needs are met, an airport sponsor may pursue funding on an 80%/20% cost share basis for the construction of hangars if foundation pavement is non-existent or 75%/25% if pavement is presently in place. The sponsor must provide justification in the form of contracts, lease agreements, and/or an approved resolution for procurement of funding. Additional items that will need to be reviewed before approval are location of the hangar on the latest approved Airport Layout Plan (ALP), a copy of the airport's hangar lease and rate structure, and adopted airport minimum standards. A letter of interest from the sponsor is required for review and inclusion into the CIP.

Fuel Program

Similar to the hangar program, those airports without a fuel dispensing system are eligible to participate in the above ground Fuel Facility Development program. Funding is provided on a 75%/25% cost share basis utilizing NPE funds. Before any funding is approved, the airport's airside needs should be met. In addition, the sponsor should have fuel rate and flowage fee standards, an approved ALP designating the construction area, adopted airport minimum standards, and evidence of compliance with environmental regulations, which includes a Storm Water Pollution Prevention Plan and a Spill Prevention Control and Countermeasure Plan. A letter of interest from the sponsor is required for review and inclusion into the CIP.

AWOS

Automated Weather Observation Systems (AWOS) can be programmed at eligible airports on a 75%/25% cost share basis. The cost of the system does not include utilities or phone lines that may need to be integrated or extended to accommodate the unit. The cost of a new AWOS includes a 5-year maintenance contract. Airports interested need to forward a letter of interest and confirm there is a secure location to house the electronic equipment.

Planning Projects

When deemed appropriate and necessary, Airport Layout Plans, Airport Master Plans, Development Plans, Business Plans, Environmental Assessments, Site Selections, and Feasibility Studies may be eligible for programming. A letter of interest from the sponsor is

required for review. Inclusion into the CIP will depend on specific need and availability of funding. Planning projects are based on a 90%/10% cost share basis.

Zoning

Although the Federal Aviation Administration (FAA) has authority to regulate the flight of aircraft, it has only limited authority to insure that areas surrounding airports are free of hazards. Without regulatory authority at the federal level of government, the responsibility for insuring that areas surrounding an airport are free from hazards is left to the local government.

In order to assist local municipalities in regulating the height of structures and use of land in the vicinity of an airport, the Texas Legislature created the Texas Airport Zoning Act (AZA) which is codified in Chapter 241 of the Texas Local Government Code. The AZA permits political subdivisions, municipalities or counties to adopt, administer, and enforce airport zoning regulations in order to protect the safety of the airport users as well as the public investment in the airport. While the AZA does not identify specific standards that must be used in determining what constitutes incompatible land uses or airport hazards, it is generally accepted that contours based on varying levels of noise generated by an airport and the various imaginary surfaces established in the Federal Aviation Regulations (FAR) Part 77 are the preferred standards to be used in airport zoning.

The need to regulate the construction of tall structures in various critical areas surrounding the airport seems evident, to protect the safety of the users of the airport as well as persons and property on the ground. The requirement to do so is contained in the Texas Administrative Code (TAC), Title 43, Chapter 30, Subchapter C, Aviation Facilities Development and Financial Assistance Rules. These are the rules under which the Aviation Division's airport grant program is operated. Zoning is addressed in several sections including Section §30.210 (d) (13) and §30.215. These sections allow the Aviation Division to review and approve airport zoning prior to considering additional projects for grants or loans under the program. The airport sponsor must certify through their attorney that the airport zoning has been accomplished in accordance with applicable laws, ordinances, rules, and/or regulations and the adopted zoning ordinance is binding, enforceable, and, if associated with the requirements of an airport improvement grant from TxDOT, fulfills the requirements of Texas Administrative Code. No sponsor shall be eligible for a subsequent grant or loan under the program unless the sponsor has adopted and, as called upon to do so, enforced the airport zoning ordinance/order approved by the division.

Concrete vs. Asphalt

In certain circumstances, on a case-by-case basis due to the longevity of the pavement (runways and/or taxiways), concrete will be the preferred construction material if the cost between concrete and asphalt is negligible after receiving construction bids. However, if the cost is significantly cheaper for asphalt but the airport sponsor desires concrete, it is policy of the division that the sponsor and the state split the difference in the cost of the project at a 50%/50% cost share, assuming funding is available, otherwise the difference can be funded 100% locally.

Land Acquisition

On a case-by-case basis, the Aviation Division will help fund the acquisition of land for airports based on language contained in FAA Order 5100.38C, Airport Improvement Program Handbook. "Acquisition of land for future airport development is eligible if it is based on reasonable projections of aeronautical need…" where "future development" is considered to be the development of a facility more than 5 years after acquisition." For additional information see Section 705 of the AIP handbook.

Threshold Siting Surfaces

Those imaginary surfaces that are required for the protection of threshold siting surfaces are eligible for funding. Threshold siting surfaces are not to be confused with departure surfaces, which are NOT eligible. These surfaces will be acquired in fee simple versus avigation easement if at all possible.

Emergency Generators

As stated in FAA Order 5100.38C, Airport Improvement Program Handbook, Section 538, airports in certain regions where extraordinary meteorological conditions exist are eligible for the programming and funding of emergency power sources to provide redundant external supplies. Extraordinary, in the case of Texas, refers to those airports on, or in close proximity to the coastal region. Requests for emergency generators will be evaluated on a case-by-case basis.

Routine Airport Maintenance Program (RAMP)

The Routine Airport Maintenance Program provides assistance to airports on a 50%/50% cost share basis for "lower cost" airside and landside improvements. Before any work is performed, a grant agreement must be in place and executed. See Appendix 3 for eligible work items associated with RAMP.

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APPENDIX 1

Terminal Building Guidelines

GUIDELINES
for the
TEXAS DEPARTMENT OF TRANSPORTATION AVIATION DIVISION
AIRPORT TERMINAL BUILDING GRANT PROGRAM

Purpose

This document provides guidance and sets forth policies and procedures to be used in the administration and conduct of the Texas Department of Transportation Aviation Division's Airport Terminal Building Grant Program.

Overview

The airport terminal building serves as the major interface between air and ground activities on the airport. It is also an important civic building that provides a gateway to the local community. As such, it should reflect the character and aspirations of the community. A typical terminal building will contain administrative offices, public waiting areas and other public accommodations. It may also contain facilities for conferences and meetings, flight instruction, food service, or just watching aircraft.

The Texas Department of Transportation (TxDOT) can provide financial assistance to qualified Airport Sponsors to construct airport terminal buildings through the Airport Terminal Building Grant Program. This program provides the Airport Sponsor with fifty percent matching funds (currently $500,000 maximum) for eligible project costs incurred by the Airport Sponsor in the design and construction of a terminal building.

In addition to the terminal building grant amount, TxDOT may also provide fifty percent matching funds (currently $100,000 maximum), if approved, for appropriate vehicle parking areas and entrance road to serve the terminal building.

Renovation of an existing structure as a terminal building may be eligible for financial assistance provided that the facility is structurally sound and has a remaining life expectancy of at least 20 years. The Airport Sponsor must submit a report from a registered architect or engineer attesting to these conditions before TxDOT will consider providing financial assistance for the renovation of an existing building. However, removal and disposal of asbestos and/or other hazardous materials will be at the sole expense of the airport sponsor.

A new or expanded aircraft parking apron may be needed to serve the new terminal building. If approved, TxDOT may provide 90 percent funding for a new or expanded aircraft parking apron in addition to the terminal building grant amount.

The Texas Department of Aviation will act as Agent for the Airport Sponsor in the design and construction of the airport terminal building and appurtenances.

Project Eligibility

To be eligible for a terminal building grant from TxDOT the airport must meet the following requirements:

1. The airport property must be either publicly owned or leased by a public entity for at least 20 years from the date of the grant.
2. The airport must have an airport manager or other designated person(s) on site on a regular basis during normal daylight business hours.
3. The airport must have aviation fuel available for sale to the flying public.

Project Scope

A typical project consists of site planning, design, and construction of the terminal building and associated site improvements. Site improvements might include an entrance road, vehicle parking, sidewalks, site utilities, site grading and storm drainage, aircraft parking, and security fencing. The Airport Sponsor is encouraged to develop a facility that expresses the needs and character of the community while avoiding extravagant, trendy architectural styles. TxDOT funds are limited and must be prudently allocated.

If approved by TxDOT, demolition and/or relocation of existing buildings and other facilities to accommodate the new terminal building and associated facilities will be included in the terminal building grant. The costs of such relocation and/or demolition will be included in the maximum grant amount.

The terminal building is intended to be a public building and shall not be physically attached to any structure or facility owned by an individual, partnership, corporation, company, etc. Physical attachment includes but is not limited to common walls, common spaces, and corridors either covered or enclosed. A detailed list of items ineligible for reimbursement from TXDOT is given elsewhere in these guidelines.

Planning Objectives

The Airport Sponsor should strive to develop a facility that provides a gateway to and reflects the character and aspirations of the community. The Sponsor should strive to achieve the following objectives:

1. An attractive facility that is fully accessible to the physically impaired.
2. A facility that provides a safe, healthy, efficient, light and airy environment.
3. A facility that is as energy efficient as possible within budget constraints.

Design Considerations

The Airport Sponsor should consider the following in planning and designing the terminal building and associated facilities:

1. The size and function of the facility should meet the needs of the community and the airport.
2. The layout of the facility should be flexible to accommodate future expansion in addition to immediate needs.
3. The facility should be functional, practical, and economical.
4. The facility should be sensitive to environmental concerns.

Design Objectives

The Airport Sponsor should consider the following specific design objectives in planning and designing the terminal building:

1. Comfort, convenience, safety, and Texas Architectural Barrier Act requirements;
2. Convenient access to parking facilities, aircraft parking aprons, and on-site aviation and non-aviation activities;
3. Efficient passenger and baggage flow;
4. Energy conservation;
5. Low maintenance and operating costs; and
6. Expression of the nature, history, culture, etc. of the community.

Project Budget

The Grant Program can provide matching funds for eligible project costs as identified by the Airport Sponsor up to the maximum amount set by TxDOT. In developing the project costs, the Airport Sponsor should identify all anticipated project costs including but not necessarily limited to costs for architect/engineer, surveying, geotechnical investigation, bid advertising, construction, and materials testing. The project costs identified by the Airport Sponsor will be used by TxDOT to determine the amount of the grant. The airport's role in the Texas Airport System Plan, number of based aircraft, number of annual operations, number and type of businesses located on the airport, the local economy, etc. will betaken into account by TxDOT in determining the maximum matching funds available for the terminal project. The Airport Sponsor should endeavor to stay within the approved grant amount as additional matching funds may not be available from TxDOT. The Airport Sponsor will be responsible for any cost overruns.

Force Account Work

Administrative time, force account labor by the Airport Sponsor's staff/employees, and donated labor, materials and equipment will not be credited towards the Sponsors share of the project and will not be eligible for reimbursement from TxDOT. The Aviation Division must approve the use of force account labor and equipment or donated labor, equipment and materials.

Building Spaces

The Airport Sponsor may wish to consider the following rooms/spaces for inclusion in a new terminal; however, local needs, operational requirements, and budgetary constraints may preclude incorporating all of the spaces listed. As a minimum, the terminal building should contain an airport manager's area, a public waiting area, a storage area, and a rest room. Square footage of the various areas will depend upon the Airport Sponsor's needs. Facilities not eligible for state funding may be included in the terminal at the Airport Sponsor's sole expense, provided that the cost of ineligible items can be identified independently of the eligible project costs.

1. Airport Manager's Area: The airport manager's area is usually located in proximity to the public waiting area and is situated to provide as unobstructed view of the terminal apron and runway as physically possible. This area might include any or all of the following: airport manger's office, administrative offices, storage areas, and operations/information areas.
2. Pilots Lounge: The pilot's lounge provides privacy for pilots to relax away from the public waiting area. A flight planning area might be located in or near the lounge. The lounge might contain a separate restroom with or without a shower. When a pilot's lounge is included in the terminal, the Airport Sponsor might wish to consider providing access to this area during hours when the main part of the terminal building will be closed.
3. Public Waiting Area: The waiting area is usually located near the terminal's main entrances with easy access to airside and landside facilities. Preferably, the waiting area will be close to restrooms, snack area and public telephones. It is highly desirable to provide a view of airside activities from the waiting area.
4. Conference/Meeting Room: The conference/meeting room provides privacy for meetings and instructional activities.
5. Public Restrooms: The number and size of restrooms and how they are equipped should comply with local codes and the Texas Architectural Barriers Act. At lower activity airports, a single unisex restroom may be appropriate provided local building codes permit such a facility. Where feasible, a janitor's closet with mop sink should be located in or near the restroom(s).
6. Vending/Snack Area: The vending/snack area provides a separate area for a break room and/or vending machines. The area should be accessible to the public. The Airport Sponsor may wish to consider a refrigerator and a countertop/sink in this area. A secure storage area for supplies may also be desirable.

7. Flight Planning Area: The flight planning area provides space for pilots to prepare flight plans. The space might include counter space for paper work, a computer terminal, and AWOS/ASOS terminal. If included in the terminal building, the Airport Sponsor may wish to consider placing the flight planning area in or near the pilot's lounge.
8. General Storage Room(s): The Airport Sponsor might wish to consider the inclusion of adequate storage area(s) in the terminal building to accommodate equipment and supplies.
9. Corridors, Mechanical and Electrical Closet(s): These spaces should be sized to comply with applicable standards, codes, and building needs. The Airport Sponsor should consider additional space for existing or future weather observation, FAA, and communications equipment.

Eligible and Ineligible Items

As state funds are limited, not all facilities or items that an Airport Sponsor may wish to include in the terminal building may be eligible for reimbursement from TxDOT. A description of eligible and ineligible items is given below. This list is not all inclusive and TxDOT reserves the right to determine eligibility of items not specifically listed herein. Specific questions concerning eligibility should be directed to TxDOT Aviation Division.

1. Terminal Building and Associated Facilities: Typically, costs associated with the design and construction of the terminal building, vehicle parking, site work, aircraft parking apron contiguous to the terminal, and utility connections are eligible for reimbursement subject to the exceptions described herein. Non-aviation related facilities such as restaurants, cafes, and entertainment facilities are not eligible for reimbursement.
2. Utilities: The installation of water, sanitary sewer, gas, electrical and telephone utility extensions from off airport property and the installation of utilities that serve facilities other than the new terminal building are not eligible for reimbursement from TxDOT. Installations of television cable service, special computer or communication lines, including fiber optic cable, are not eligible for reimbursement. Water wells may be eligible for reimbursement when construction of the terminal building or associated facilities displaces or interferes with an existing well. Rerouting of utility lines required by the construction of a terminal building or associated facilities is eligible for reimbursement. If needed, the installation of a septic tank and associated drain field to serve the terminal building is eligible for reimbursement. Eligible work is subject to the limitations of the maximum grant amount.
3. Real Property: Typically, real property is eligible for reimbursement. Furniture, other than built-in magazine racks and bookcases, cork/chalk boards, and built-in counters and cabinets for information/operations centers, storage, flight planning, and break rooms, is not eligible for reimbursement. Venetian blinds, vertical blinds, and energy saving window screens or films are eligible for reimbursement. Curtains, draperies, and associated hardware are not eligible for reimbursement. Eligible work is subject to the limitations of the maximum grant amount.

4. Art Objects: Paintings, sculptures, wall hangings, murals, etc. are not eligible for reimbursement.
5. Food Preparation Areas, Kitchen, and Restaurant Areas: "Finish-out" for areas used for preparing and cooking food except for non-commercial snack/break areas are not eligible for reimbursement. Equipment used in preparing, cooking, heating, or storing of food and food related items such as hot plates, stoves and ovens, vent hoods, refrigerators and freezers, microwave ovens, coffee makers, grease traps, etc. are not eligible for reimbursement. A limited amount of kitchen type counters with sink(s) and cabinets in a vending or meeting area may be eligible for reimbursement. "Finish out", HVAC equipment/duct work, and utilities including electric, water, gas, and sanitary sewer for food service and restaurant areas are not eligible for reimbursement. Storage tanks for propane, butane, or LPG needed for cooking purposes or heating ineligible spaces and facilities are not eligible for reimbursement.
6. Vending machines: Arcade type games, drink and/or food dispensing machines, vending machines, and other machines for revenue or non-revenue producing activities, etc. are not eligible for reimbursement.
7. Communication/Weather Observation Systems: Telephone systems, switch boards, computers and computer systems, AWOS/ASOS equipment, radios and associated equipment, radio antennas, etc. are not eligible for reimbursement. Conduit and wiring for communication or computer connections inside the terminal are eligible for reimbursement. Fire alarm systems required by building code or ordinance are eligible for reimbursement. Eligible work is subject to the limitations of the maximum grant amount.
8. Commercial Equipment: Cash registers, computers, fuel service equipment, etc. are not eligible for reimbursement.
9. Audio/Video Equipment: Televisions, projectors, screens, etc. are not eligible for reimbursement.
10. Landscaping: Trees, shrubs, flowers, planting beds, lawn sprinkler/irrigation systems, hoses, and associated items are not eligible for reimbursement. Seeding and sodding of graded areas adjacent to the building and associated facilities to prevent erosion are eligible for reimbursement and are subject to the limitations of the maximum grant amount.
11. Existing Structures: Demolition or relocation of existing buildings, hangars, and other structures, except to accommodate the construction of the terminal building and associated facilities, are not eligible for reimbursement. Removal and disposal of asbestos and other hazardous materials associated with demolition or relocation of existing structures is not eligible for reimbursement. Removal, disposal, and/or relocation of septic systems are eligible for reimbursement if needed to accommodate the construction of the terminal and associated facilities. Removal or abatement of hazardous materials such as asbestos as part of a terminal building renovation project is ineligible for reimbursement. Eligible work is subject to the limitations of the maximum grant amount.

12. Hazardous wastes or materials: Removal and disposal of asbestos and other hazardous materials, removal and disposal of fuel storage tanks and systems, etc. are not eligible for reimbursement.
13. Fuel Systems: Purchasing, installing, renovating and repairing fuel systems including computer equipment, pumps, fire protection equipment, etc. are not eligible for reimbursement. Relocation of an existing system is not eligible for reimbursement except when the system must be moved to allow for the construction of the new terminal building. Removal and disposal of contaminated soils, fuel storage tanks, fuel handling equipment, etc. are not eligible for reimbursement. Eligibility for reimbursement will be subject to approval by the Aviation Division and the availability of funds. Work deemed eligible by the Aviation Division is subject to the limitations of the maximum grant amount.
14. Private Facilities: Renovating, modifying, repairing, or any other type work on facilities not owned by the Airport Sponsor or the construction of new facilities for any individual, partnership, corporation or company is not eligible for reimbursement. Private facilities include buildings, structures, pavement, etc. on land leased or rented from the Airport Sponsor. Terminal facilities constructed using state funds shall be opened to the public and will not be dedicated for the exclusive use of any individual, partnership, corporation or company other than the Airport Sponsor. The terminal building shall not be physically connected to any building or structure owned by an individual, partnership, corporation or company. This includes covered walkways, atriums, etc.
15. Project Signs: Temporary signs conveying construction project information are not eligible for reimbursement.
16. Fees and Payments: Building permit fees and utility connection fees where the Airport Sponsor/Owner is also the permitting authority/utility owner are not eligible for reimbursement. Attorney fees, court costs, and other legal costs incurred by the Airport Sponsor/Owner, other than for approved land acquisition, are not eligible for reimbursement. Advertising for bids in newspapers and other publications associated with the terminal construction is eligible for reimbursement. Payments to a utility not owned by the Airport Sponsor/Owner for terminal building utility connections are eligible for reimbursement. Eligible fees and payments are subject to the limitations of the maximum grant amount.
17. Land Acquisition: Acquiring land needed for the construction of the terminal building, vehicle parking lot, access roads and other associated items may be eligible for reimbursement when approved by TxDOT Aviation Division. Approved land acquisition will be reimbursed at 50 percent of eligible costs by TxDOT Aviation Division and is subject to the limitations of the maximum grant amount.
18. Force Account Work and Donated Labor, Equipment and Materials: Work done by the Sponsor's employees and/or donated labor by other parties is not eligible for reimbursement. Donated equipment and materials are not eligible for reimbursement. Purchased construction materials installed by force account/donated labor and rented/leased construction equipment used by force account/donated labor may be eligible for reimbursement provided the Aviation Division has granted prior approval.

TxDOT Assistance

Contact TxDOT Aviation Division at 1-800-687-4568 or (512) 416-4500.

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APPENDIX 2

Typical Aircraft

Table 4
SELECTED AIRCRAFT CHARACTERISTICS FOR AIRPORT PLANNING

AIRCRAFT	ARC
Adam A500	A-I
Adam A700	A-I
Air Tractor 301	A-I
Air Tractor 401B	A-I
Air Tractor 402A/B	A-I
Air Tractor 502A/B	A-I
Air Tractor 602	A-I
Air Tractor 802/802A	A-I
Airbus Corporate Jetliner	B-III
Apex Alpha 120T	A-I
Apex Alpha 160A	A-I
Apex DR 400/120 Dauphin 2+2	A-I
Apex DR 400/135CDI	A-I
Apex DR 400/135CDI	A-I
Apex DR 400/1408 Dauphin	A-I
Apex DR 400/160 Major	A-I
Apex DR 400/180 Regent	A-I
Apex DR 400/180R Remorqueur	A-I
Apex DR 400/200R	A-I
Apex DR 400/500 President	A-I
ATR 42	B-III
ATR 72	B-III
Avocet Jet	A-I
Avro Business Jet	B-III
Ayres 400 Turbo Thrush	A-I
Ayres 510 Turbo Thrush	A-I
Ayres 660 Turbo Thrush	A-I
Beechcraft 1900C/D Beechliner	B-II
Beechcraft 2000A Starship	C-II
Beechcraft 60 Twin Duke	B-I
Beechcraft 65 Queen Air	B-II
Beechcraft 76 Duchess	A-I
Beechcraft 77 Skipper	A-I
Beechcraft 99 Airliner	B-I
Beechcraft A23 Musketeer	A-I
Beechcraft A95/B95/E95 Travel Air	A-I
Beechcraft B200, C90A/B, 350 King Air	B-II
Beechcraft B24 Sierra	A-I
Beechcraft B55/E55 Baron	A-I
Beechcraft BE33 Debonair	A-I
Beechcraft BE35/BE36 Bonanza	A-I

Table 4, Con't
SELECTED AIRCRAFT CHARACTERISTICS FOR AIRPORT PLANNING

Beechcraft E50 Twin Bonanza	A-I
Beechcraft Beechjet 400	B-I
Beechcraft Super King Air BE-300LW	C-II
Bellanca Viking 17-30A	A-I
Beriev Be-12P-200	C-III
Beriev Be-200	B-III
Beriev Be-32K	B-II
Boeing Business Jet	C-III
Boeing Business Jet 2	D-III
Boeing Business Jet 3	C-III
Bombardier Canadair CRJ200	D-II
Bombardier Canadair CRJ700	C-II
Bombardier Canadair CRJ900	D-III
Bombardier Challenger 300	UNK
Bombardier Challenger 600	C-II
Bombardier Challenger 601	C-II
Bombardier Challenger 604	C-II
Bombardier Challenger 605	UNK
Bombardier Challenger 610	UNK
Bombardier Challenger 800	D-II
Bombardier Challenger 850	UNK
Bombardier Challenger 850 Corporate Shuttle	UNK
Bombardier Challenger 870 Corporate Shuttle	UNK
Bombardier Challenger 890 Corporate Shuttle	UNK
Bombardier Global 5000	UNK
Bombardier Global Express XRS	C-III
Bombardier Q200	B-III
Bombardier Q300	B-III
Bombardier Q400	C-III
Bombardier Shorts SD3-30	B-II
Bombardier Shorts SD3-60 300	B-II
British Aerospace Jetstream 31	B-II
British Aerospace Jetstream 32EP	B-II
British Aerospace Jetstream 41	B-II
Cessna 140	A-I
Cessna 150 Patroller/Aerobat	A-I
Cessna 152	A-I
Cessna 165 Airmaster	A-I
Cessna 170	A-I
Cessna 172 Skyhawk	A-I
Cessna 175 Skylark	A-I

Table 4, Con't
SELECTED AIRCRAFT CHARACTERISTICS FOR AIRPORT PLANNING

Cessna 177 Cardinal	A-I
Cessna 180/185 Skywagon	A-I
Cessna 182 Skylane	A-I
Cessna 188 AGwagon	A-I
Cessna 190	A-I
Cessna 195	A-I
Cessna 205 Super Skywagon	A-I
Cessna 206 Stationair/Super Skylane	A-I
Cessna 206B Super Cargo Master	A-II
Cessna 207 Skywagon/Stationair 7 & 8	A-I
Cessna 208 Caravan	A-II
Cessna 208B Grand Caravan	A-II
Cessna 210 Centurion	A-I
Cessna 303	A-I
Cessna 305 Birddog	A-I
Cessna 310	A-I
Cessna 335/336 Skymaster/O-2	A-I
Cessna 340	A-I
Cessna 401 Businessliner	B-I
Cessna 402 Businessliner	B-I
Cessna 404 Titan II	B-I
Cessna 406 Caravan II	A-II
Cessna 411	B-I
Cessna 414 Chancellor	B-I
Cessna 421 Golden Eagle	B-I
Cessna 425 Conquest I	B-I
Cessna 441 Conquest II	B-II
Cessna 500 Citation I	B-I
Cessna 501 Citation ISP	B-I
Cessna 510 Citation Mustang	A-I
Cessna 525 Citation Jet, CJ1	B-I
Cessna 525A Citation Jet, CJ2	B-II
Cessna 525B Citation Jet, CJ3	B-II
Cessna 550 Citation II, Citation Bravo	B-II
Cessna 551 Citation IISP	B-II
Cessna 560 Citation V, Ultra, Encore	B-II
Cessna 650 Citation III, VI, VII	C-II
Cessna 680 Citation Sovereign	C-II
Cessna 750 Citation X	C-II
Cessna Citation 560XL Excel	B-II
Cessna S550 Citation SII	B-II

Table 4, Con't
SELECTED AIRCRAFT CHARACTERISTICS FOR AIRPORT PLANNING

Cirrus SR20	A-I
Cirrus SR22	A-I
Citabria Adventure 7GCAA	A-I
Citabria Aurora 7ECA	A-I
Citabria Explorer 7GCBC	A-I
De Havilland Twin Otter	A-I
Diamond D-Jet	A-I
Eads C-212-400	A-I
Eads CN-235-300	A-I
Eads TB10 Tobago GT	A-I
Eads TB20 Trinidad	A-I
Eads TB200 Tobago GT	A-I
Eads TB21 Trinidad GT Turbo	A-I
Eads TB9 Tampico GT	A-I
Eclipse 500	A-I
Embraer 120ER/RT Brasilia	B-II
Embraer 121 Xingu	B-I
Embraer ERJ 135	C-II
Embraer ERJ 140	C-II
Embraer ERJ 145	C-II
Embraer ERJ 170	UNK
Embraer ERJ 190	UNK
Embraer ERJ195	UNK
Embraer Legacy 600	C-II
Embraer Legacy Executive ERJ 135BJ	B-II
Embraer Legacy Shuttle	C-II
Embraer Legacy Shuttle ERJ 135LR	B-II
Embraer Light Jet	UNK
Embraer Lineage 1000	B-III
Embraer Phenom 100	A-I
Embraer Phenom 300	UNK
Embraer Very Light Jet	A-I
Embraer-110 Bandeirante	B-II
Epic Jet	A-I
Eviation EV-20 Vantage Jet	A-I
Excel Sport Jet	A-I
Fairchild Aerospace Envoy 3	UNK
Fairchild Aerospace Merlin 4C	UNK
Fairchild C	UNK
Fairchild Dornier 228-212	A-II
Fairchild Dornier 328-110	A-II

Table 4, Con't
SELECTED AIRCRAFT CHARACTERISTICS FOR AIRPORT PLANNING

Fairchild Dornier 328-300	A-II
Fairchild Dornier 328-310	A-II
Fairchild Expediter 23	UNK
Fairchild Merlin 23	UNK
Fairchild Merlin III	UNK
Fairchild Merlin IV	UNK
Fairchild Metro 23	UNK
Fairchild Metro Executive	UNK
Fairchild Metro III	UNK
Falcon 20, 50	B-II
Falcon 200	B-II
Falcon 2000	B-II
Falcon 2000DX	B-II
Falcon 2000EX	B-II
Falcon 50EX	B-II
Falcon 7X	B-III
Falcon 900B	B-II
Falcon 900C	B-II
Falcon 900DX	B-II
Falcon 900EX	C-II
Fokker 50/50 High Performance	UNK
Fokker 60 Utility	UNK
Fokker F-27-500	B-III
Fokker F-28-3000	B-II
Fokker F-28-4000	C-III
Grob 115E/EG	A-I
Grob G 120A	A-I
Grob G 180Jet	B-I
Grob G140TP	A-I
Grob Ranger G 160	A-I
Gulfstream G100	C-II
Gulfstream G150	C-II
Gulfstream G200	C-II
Gulfstream G300	D-II
Gulfstream G350	D-II
Gulfstream G400	D-II
Gulfstream G450	D-II
Gulfstream G500	C-III
Gulfstream G550	C-III
Gulfstream II	C-II
Gulstream III	C-II

Table 4, Con't
SELECTED AIRCRAFT CHARACTERISTICS FOR AIRPORT PLANNING

Gulfstream IV	C-II
Gulstream IV-SP	D-II
Gulfstream V	C-III
Hawker 4000	B-II
Hawker 400XP (Beechjet)	B-I
Hawker 800XP	B-II
Hawker Premier 1A	B-I
Hawker 125-400	C-I
Hawker 125-600	C-I
Hawker 125-800	B-I
Hawker 125-1000	C-II
Hondajet	A-I
Ibis Ae 270	A-I
Israel Aircraft Industries Astra SP, SPX	C-II
Israel Aircraft Industries Galaxy	C-II
Israel Jet Commander 1121	C-I
Israel Jet Westwind 1123/1124	C-I
Learjet 23	C-I
Learjet 24	C-I
Learjet 25	C-I
Learjet 28	B-I
Learjet 29	B-I
Learjet 31	C-I
Learjet 35	C-I
Learjet 36	C-I
Learjet 40	C-I
Learjet 40XR	C-I
Learjet 45	C-I
Learjet 45XR	C-I
Learjet 55	C-I
Learjet 60	D-I
Learjet 60SE	D-I
Learjet 60XR	D-I
Liberty XL2	A-I
Maule M-7-235B	A-I
Maule M-7-260	A-I
Maule MT-7-235	A-I
Maule MT-7-260	A-I
Maule MT-7-420	A-I
Maule MX-7-180A	A-I
Maule MX-7-180B	A-I

Table 4, Con't
SELECTED AIRCRAFT CHARACTERISTICS FOR AIRPORT PLANNING

Maule MXT-7-180A	A-I
Maverick SmartJet, SoloJet, CruiserJet	A-I
Mitsubishi Diamond MU-300	B-I
Mitsubishi MU-2	B-I
Mooney Acclaim	A-I
Mooney Allegro	A-I
Mooney Bravo	A-I
Mooney Bravo DX/GX	A-I
Mooney Eagle	A-I
Mooney Encore	A-I
Mooney Ovation	A-I
Mooney Ovation, Ovation 2 DX/GX	A-I
Pacific Cresco	A-I
Pacific CT-4E Airtrainer	A-I
Pacific PAC 750XL	A-I
Piaggio P180 Avanti II	B-I
Piaggio PD-808	B-I
Pilatus PC-12/47	A-II
Pilatus PC-6/B2-H2	A-II
Piper PA-20 Pacer	A-I
Piper PA-22 Tri-Pacer	A-I
Piper PA-23 Apache, Aztec	A-I
Piper PA-24 Comanche	A-I
Piper PA-25 Pawnee	A-I
Piper PA-28 Cherokee	A-I
Piper PA-30 Twin Comanche	A-I
Piper PA-31 Navajo	B-I
Piper PA-31T Cheyenne	B-I
Piper PA-32 Cherokee Six	A-I
Piper PA-32R Lance and Saratoga	A-I
Piper PA-34 Seneca	A-I
Piper PA-36 Pawnee Brave	A-I
Piper PA-38-112 Tomahawk	A-I
Piper PA-39 Twin Comanche	A-I
Piper PA-40 Arpaho	A-I
Piper PA-42 Cheyenne III	B-I
Piper PA-44-180 Seminole	A-I
Piper PA-46 Malibu, Malibu Mirage	A-I
Piper PA-46TP Meridian	A-I
Piper PA-48 Enforcer	A-I
PiperJet	A-I

Table 4, Con't
SELECTED AIRCRAFT CHARACTERISTICS FOR AIRPORT PLANNING

Raytheon Beech 1900C	B-II
Raytheon Beech 1900D	B-II
Rockwell Aero Commander 360	B-I
Rockwell Aero Commander 500	B-I
Rockwell Aero Commander 500A	B-I
Rockwell Aero Commander 500B	B-I
Rockwell Aero Commander 500S	B-I
Rockwell Aero Commander 520	B-I
Rockwell Aero Commander 560/560A560E	B-I
Rockwell Aero Commander 680 Super	B-I
Rockwell Aero Commander 680E	B-I
Rockwell Aero Commander 680F	B-I
Rockwell Aero Commander 680FL Grand	B-I
Rockwell Aero Commander 680PF	B-I
Rockwell Aero Commander 680T/680V Turbo	B-I
Rockwell Aero Commander 680W Turbo II	B-I
Rockwell Aero Commander 690A	B-I
Rockwell Aero Commander 720 AltiCruiser	B-I
Rockwell Commander 115	B-I
Rockwell Commander 115TC	B-I
Rockwell Shrike Commander 500U	B-I
Saab 2000	B-II
Saab 340	B-II
Sabreliner 40	B-I
Sabreliner 60	C-I
Sabreliner 65	C-II
Sabreliner 75	C-I
Sabreliner 80	C-II
Scout 8GCBC	A-I
Spectrum 33	A-I
Sukhoi Su-26	A-I
Sukhoi Su-29	A-I
Sukhoi Su-31	A-I
Super Decathalon 8KCAB	A-I
Swearingen SJ30-2	A-I
TBM 700C2	A-I
Vulcanair AP68TP-300 Spartacus	A-I
Vulcanair AP68TP-600 Viator	A-I
Vulcanair P68 Observer2	A-I
Vulcanair P68C	A-I
Vulcanair P68C-TC/Observer	A-I
Vulcanair SF600A Canguro	A-I
Vulcanair VF600W Mission	A-I

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APPENDIX 3

Routine Airport Maintenance Program Guidelines

Routine Airport Maintenance Program (RAMP) Grants

- State funding is a $50,000 match per airport for each fiscal year. The State fiscal year begins September 1st. The local government match is 50% of actual costs plus any excess of $100,000 total costs.

- The program includes "lower cost" airside and landside airport improvements. These items can be more than just maintenance and may be new or additional items of work. Examples are: construction of airport entrance roads; pavement of airport public parking lots; installation of security fencing, replacement of rotating beacon, etc. The general rule is that if the expenditure is a good investment of state dollars and a needed item which will improve the facility, it is eligible. TxDOT will make determination of the eligibility of specific items. **Keep in mind that airside improvements are of first priority before requesting assistance with landside maintenance and improvements.**

- Local governments are allowed to issue their own contracts for scope of services, or TxDOT local districts can perform services within their capabilities. TxDOT will not participate in contracts for any ineligible scope items or for costs that are unreasonable for the type of service. Local government force account work is NOT ELIGIBLE, but purchase of materials for construction with sponsor labor is eligible.

- **A Grant must be executed each state fiscal year, prior to work being performed, and before July 31st of the grant fiscal year.** To initiate the grant the City or County should contact Aviation Division with a description of the project for which the grant is being requested and the estimated cost of the project, if available. The contact may be in the form of a written letter, electronic mail, facsimile, by telephone, or personal contact with staff.

- **Work as described on the Scope of Services of the grant shall be completed during the State fiscal year (September 1st – August 31st)**

Call the Aviation Division at 1-800-687-4568 (68-PILOT) for more information or go to Aviation on the TxDOT Web Site: http://www.txdot.gov/services/aviation

ELIGIBLE WORK ITEMS UNDER RAMP GRANTS

Airside Maintenance
Pavement crack sealing
Pavement Slurry Seal/Fog Seal/Rejuvenator
Pavement markings
Limited pavement failure repairs
Drainage maintenance
Sweeping
Herbicide – fire ant control – mesquite tree eradication
Replacement bulbs/lamps for airside lighting fixtures and approach aids
Beacon, lighting, approach aids – repair and maintenance
Parts replacement for AWOS not covered under warranty
After Airside Maintenance Has Been Addressed
Seal coats/chip seal/crack seal for non-airside pavement, repair/maintenance of airport public auto parking lots
Hangar/terminal building painting and repairs -sponsor owned facilities only
Security camera systems
Game proof or security fencing and gates, electric gate openers
Access roads for AWOS installations
Navigational aids purchase and installation
NADIN interface monthly charge
Airport entrance signs & landscaping
Repairs to airport owned fuel systems, including replacement of tanks
Professional Services for preparation of Storm Water Pollution Prevention, Spill Prevention Control &
Small Capital Improvement Projects
New public auto parking areas - engineering/design costs included
New hangar access roads - engineering/design costs included
Entrance roads - engineering/design costs included
Expansion of apron areas or new apron areas - engineering/design costs included
Pilot lounge/small general aviation terminal buildings
Drainage improvements - engineering/design costs included
Extension of runway lighting systems- engineering/design costs included
Beacon/tower replacements
Water wells, lines/sewer lines &septic systems - compliance with EPA and TCEQ responsibility of Sponsor
Preparation of FAA form 7460-1 "Notice of Proposed Construction or Alteration" for RAMP projects
Ineligible Work Items Under Ramp Grants
Mowing - may be done by TxDOT or TxDOT contract forces but the cost is 100% Sponsor responsibility
Purchase of Capital Outlay Equipment except as allowed above
Operating Expenditures
Consumables - unless listed above
Force Account work by sponsor
Work performed or purchases made prior to the grant being fully executed

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APPENDIX 4

FAA AC 150/5300-13 Design Criteria

Table 5
AIRCRAFT APPROACH CATEGORIES A AND B – RUNWAYS VISUAL AND NOT LOWER THAN ¾ - STATUTE MILE

	Airplane Design Group				
	I[1]	**I**	**II**	**III**	**IV**
Length	Refer to AC 150/5300-13, Paragraph 301				
Width	60’	60’	75’	100’	150’
Shoulder Width	10’	10’	10’	20’	25’
Blast Pad Width	80’	80’	95’	140’	200’
Blast Pad Length	60’	100’	150’	200’	200’
Safety Area Width (RSA)	120’	120’	150’	300’	500’
Safety Area Length Prior to Landing Threshold [2, 3]	240’	240’	300’	600’	600’
Safety Area Length Beyond R/W End [2, 3]	240’	240’	300’	600’	1,000’
Object Free Area Width (ROFA)	250’	400’	500’	800’	800’
Object Free Area Length Beyond R/W End [4]	240’	240’	300’	600’	1,000’
Obstacle Free Zone width and Length	Refer to AC 150/5300-13, Paragraph 306				
Runway Centerline to:					
Parallel R/W Centerline	Refer to AC 150/5300-13, Paragraphs 207 and 208				
Hold Line	Refer to AC 150/5340-1				
Taxiway/Taxilane Centerline [5]	150’	225’	240’	300’	400’
Aircraft Parking Area	125’	200’	250’	400’	500’
Helicopter Touchdown Pad	Refer to AC 150/5390-2				

Source: FAA Advisory Circular 150/5300-13 Change 10, Airport Design.

[1] Standards pertaining to facilities serving small airplanes (<12,500 lbs.) exclusively.

[2] The Runway Safety Area (RSA) length begins at each runway end when a stopway is not provided. When a stopway is provided, the length begins at the stopway end.

[3] The standard RSA length beyond the runway end may be reduced to the standard RSA length prior to landing threshold if a standard Engineered Materials Arresting System (EMAS) is provided. To qualify for this reduction, the EMAS installation must provide the ability to stop critical aircraft exiting the end of the runway at 70 knots, and the runway must provide either instrument or visual vertical guidance for approaches in the opposite direction. See AC 150/5220-22.

[4] The Runway Object Free Area length beyond the end of the runway never exceeds the standard RSA length beyond the runway end as provided by note 3 above.

[5] The taxiway/taxilane centerline separation standards are sea level. At higher elevations, an increase to these separation Distances may be required to keep taxiing and holding airplanes clear of the OFZ (refer to paragraph 206).

Table 6
AIRCRAFT APPROACH CATEGORIES A AND B – RUNWAYS LOWER THAN ¾ - STATUTE MILE

	Airplane Design Group				
	I[1]	**I**	**II**	**III**	**IV**
Length	Refer to AC 150/5300-13, Paragraph 301				
Width	75’	100’	100’	100’	150’
Shoulder Width	10’	10’	10’	20’	25’
Blast Pad Width	95’	120’	120’	140’	200’
Blast Pad Length	60’	100’	150’	200’	200’
Safety Area Width (RSA)	300’	300’	300’	400’	500’
Safety Area Length Prior to Landing Threshold [2, 3]	600’	600’	600’	600’	600’
Safety Area Length Beyond R/W End [2]	600’	600’	600’	800’	1,000’
Object Free Area Width (ROFA)	800’	800’	800’	800’	800’
Object Free Area Length Beyond R/W End [4]	600’	600’	600’	800’	1,000’
Obstacle Free Zone Width and Length	Refer to AC 150/5300-13, Paragraph 306				
Runway Centerline to:					
Parallel R/W Centerline	Refer to AC 150/5300-13, Paragraphs 207 and 208				
Hold Line	Refer to AC 150/5340-1				
Taxiway/Taxilane Centerline [5, 6]	200’	250’	300’	350’	400’
Aircraft Parking Area	400’	400’	400’	400’	500’
Helicopter Touchdown Pad	Refer to AC 150/5390-2				

Source: FAA Advisory Circular 150/5300-13 Change 10, Airport Design.

[1] Standards pertaining to facilities serving small airplanes (<12,500 lbs.) exclusively.

[2] The Runway Safety Area (RSA) length begins at each runway end when a stopway is not provided. When a stopway is provided, the length begins at the stopway end.

[3] The standard RSA length beyond the runway end may be reduced to the standard RSA length prior to landing threshold if a standard Engineered Materials Arresting System (EMAS) is provided. To qualify for this reduction, the EMAS installation must provide the ability to stop critical aircraft exiting the end of the runway at 70 knots, and the runway must provide either instrument or visual vertical guidance for approaches in the opposite direction. See AC 150/5220-22.

[4] The Runway Object Free Area length beyond the end of the runway never exceeds the standard RSA length beyond the runway end as provided by note 3 above.

[5] The taxiway/taxilane centerline separation standards are sea level. At higher elevations, an increase to these separation Distances may be required to keep taxiing and holding airplanes clear of the OFZ (refer to paragraph 206).

[6] For approaches with visibility less than ½-statute miles, runway centerline to taxiway/taxilane centerline separation Increases to 400 feet.

Table 7
AIRCRAFT APPROACH CATEGORIES C AND D – RUNWAYS VISUAL & NOT LOWER THAN ¾ - STATUTE MILE

	Airplane Design Group					
	I	**II**	**III**	**IV**	**V**	**VI**
Length	Refer to AC 150/5300-13, Paragraph 301					
Width	100’	100’	100’ [1]	150’	150’	200’
Shoulder Width [2]	10’	10’	20’ [1]	25’	35’	40’
Blast Pad Width	120’	120’	140’ [1]	200’	220’	280’
Blast Pad Length	100’	150’	200’	200’	400’	400’
Safety Area Width (RSA) [3]	500’	500’	500’	500’	500’	500’
Safety Area Length Prior to Landing Threshold [4, 5]	600’	600’	600’	600’	600’	600’
Safety Area Length Beyond R/W End [4, 5]	1,000’	1,000’	1,000’	1,000’	1,000’	1,000’
Object Free Area Width (ROFA)	800’	800’	800’	800’	800’	800’
Object Free Area Length Beyond R/W End [6]	1,000’	1,000’	1,000’	1,000’	1,000’	1,000’
Obstacle Free Zone Width and Length	Refer to AC 150/5300-13, Paragraph 306					
Runway Centerline to:						
Parallel R/W Centerline	Refer to AC 150/5300-13, Paragraphs 207 and 208					
Hold Line	Refer to AC 150/5340-1					
Taxiway/Taxilane Centerline [7]	300’	300’	400’	400’	[8]	500’
Aircraft Parking Area	400’	400’	500’	500’	500’	500’
Helicopter Touchdown Pad	Refer to AC 150/5390-2					

Source: FAA Advisory Circular 150/5300-13 Change 10, Airport Design.

[1] For ADG III serving airplanes with maximum certificated takeoff weight greater than 150,000 pounds, the standard runway width is 150 feet, the shoulder width is 25 feet, and the runway blast pad width is 200 feet.

[2] Design Groups V and VI normally require stabilized or paved shoulder surfaces.

[3] For ARC C-I and C-II, a runway safety area width of 400 feet is permissible. For runways designed after 2/28/83 to serve Aircraft Approach Category D, the RSA width increases 20 feet for each 1,000 feet of airport elevation above MSL. Refer to paragraph 305.

[4] The RSA length begins at each runway end when a stopway is not provided. When a stopway is provided, the length begins at the stopway end.

[5] The standard RSA length beyond the runway end may be reduced to the standard RSA length prior to landing threshold if a standard Engineered Materials Arresting System (EMAS) is provided. To qualify for this reduction, the EMAS installation must provide the ability to stop critical aircraft exiting the end of the runway at 70 knots, and the runway must provide either instrument or visual vertical guidance for approaches in the opposite direction. See AC 150/5220-22.

[6] The runway OFA length beyond the end of the runway never exceeds the standard RSA length beyond the runway end as provided by note 5 above.

[7] The taxiway/taxilane centerline separation standards are for sea level. At higher elevations, an increase to these separation distances may be required to keep taxiing and holding airplanes clear of the OFZ (refer to paragraph 206).

[8] For Airplane Design Group V, the standard runway centerline to parallel taxiway centerline separation distance is 400 feet for airports at or below an elevation of 1,345 feet; 450 feet for airports between elevations of 1,345 and 6,560 feet; and 500 feet for airports above an elevation of 6,560 feet.

Table 8
AIRCRAFT APPROACH CATEGORIES C AND D – RUNWAYS LOWER THAN ¾ - STATUTE MILE

	Airplane Design Group					
	I	**II**	**III**	**IV**	**V**	**VI**
Length	Refer to AC 150/5300-13, Paragraph 301					
Width	100’	100’	100’ [1]	150’	150’	200’
Shoulder Width [2]	10’	10’	20’ [1]	25’	35’	40’
Blast Pad Width	120’	120’	140’ [1]	200’	220’	280’
Blast Pad Length	100’	150’	200’	200’	400’	400’
Safety Area Width (RSA) [3]	500’	500’	500’	500’	500’	500’
Safety Area Length Prior to Landing Threshold [4, 5]	600’	600’	600’	600’	600’	600’
Safety Area Length Beyond R/W End [4, 5]	1,000’	1,000’	1,000’	1,000’	1,000’	1,000’
Object Free Area Width (ROFA)	800’	800’	800’	800’	800’	800’
Object Free Area Length Beyond R/W End [6]	1,000’	1,000’	1,000’	1,000’	1,000’	1,000’
Obstacle Free Zone Width and Length	Refer to AC 150/5300-13, Paragraph 306					
Runway Centerline to:						
Parallel R/W Centerline	Refer to AC 150/5300-13, Paragraphs 207 and 208					
Hold Line	Refer to AC 150/5340-1					
Taxiway/Taxilane Centerline [7]	400’	400’	400’	400’	[8, 9]	[10]
Aircraft Parking Area	500’	500’	500’	500’	500’	500’
Helicopter Touchdown Pad						

Source: FAA Advisory Circular 150/5300-13 Change 10, Airport Design.

[1] For ADG III serving airplanes with maximum certificated takeoff weight greater than 150,000 pounds, the standard runway width is 150 feet, the shoulder width is 25 feet, and the runway blast pad width is 200 feet.

[2] Design Groups V and VI normally require stabilized or paved shoulder surfaces.

[3] For ARC C-I and C-II, a runway safety area width of 400 feet is permissible. For runways designed after 2/28/83 to serve Aircraft Approach Category D, the RSA width increases 20 feet for each 1,000 feet of airport elevation above MSL. Refer to paragraph 305.

[4] The RSA length begins at each runway end when a stopway is not provided. When a stopway is provided, the length begins at the stopway end.

[5] The standard RSA length beyond the runway end may be reduced to the standard RSA length prior to landing threshold if a standard Engineered Materials Arresting System (EMAS) is provided. To qualify for this reduction, the EMAS installation must provide the ability to stop critical aircraft exiting the end of the runway at 70 knots, and the runway must provide either instrument or visual vertical guidance for approaches in the opposite direction. See AC 150/5220-22.

[6] The runway OFA length beyond the end of the runway never exceeds the standard RSA length beyond the runway end as provided by note 5 above.

[7] The taxiway/taxilane centerline separation standards are for sea level. At higher elevations, an increase to these separation distances may be required to keep taxiing and holding airplanes clear of the OFZ (refer to paragraph 206).

[8] For Airplane Design Group V, the standard runway centerline to parallel taxiway centerline separation distance is 400 feet for airports at or below an elevation of 1,345 feet; 450 feet for airports between elevations of 1,345 and 6,560 feet; and 500 feet for airports above an elevation of 6,560 feet.

[9] For approaches with visibility less than ½-statute mile, the separation distance increases to 500 feet plus required OFZ elevation adjustment.

[10] For approaches with visibility down to ½-statute mile, the separation distance increases to 500 feet plus elevation adjustment. For approaches with visibility less than ½-statute mile, the separation distance increases to 550 feet plus required OFZ elevation adjustment.

Table 9
TAXIWAYS/TAXILANES

TAXIWAYS/TAXILANES	**I**	**II**	**III**	**IV**	**V**	**VI**
T/W Width	25’	35’	50’ [1]	75’	75’	100’
T/W Edge Safety Margin [2]	5’	7.5’	10’ [3]	15’	15’	20’
T/W Shoulder Width	10’	10’	20’	25’	35’ [4]	40’ [4]
T/W Safety Area Width	49’	79’	118’	171’	214’	262’
T/W Object Free Area Width	89’	131’	186’	259’	320’	386’
T/L Object Free Area Width	79’	115’	162’	225’	276’	334’
Fillet Configurations						
Radius of T/W Turn	75’	75’	100’ [5]	150’	150’	170’
Length of Lead-In to Fillet	50’	50’	150’ [5]	250’	250’	250’
Fillet Radius for Tracking Centerline	60’	55’	55’ [5]	85’	85’	85’
Fillet Radius for Judgmental Oversteering Symmetrical Widening	62.5’	57.5’	68’ [5]	105’	105’	110’
Fillet Radius for Judgmental Oversteering One Side Widening	62.5’	57.5’	60’ [5]	97’	97’	100’
T/W Wingtip Clearance [6]	20’	26’	34’	44’	53’	62’
T/L Wingtip Clearance [7]	15’	18’	22’	27’	31’	36’
T/W Centerline to:						
Parallel T/W-T/L Centerline	69’	105’	152’	215’	267’	324’
Fixed or Movable Object [8, 9]	44.5’	65.5’	93’	129.5’	160’	193’
T/L Centerline to:						
Parallel T/L Centerline	64’	97’	140’	198’	245’	298’
Fixed or Movable Object [8, 9]	39.5’	57.5’	81’	112.5’	138’	167’

Source: FAA Advisory Circular 150/5300-13 Change 10, Airport Design.

[1] For Airplanes in Airplane Design Group III with a wheelbase equal to or greater than 60 feet, the standard T/W width is 60 feet.

[2] The T/W edge safety margin is the minimum acceptable distance between the outside of the airplane wheels and the pavement edge.

[3] For airplanes in Airplane Design Group III with a wheelbase equal to or greater than 60 feet, the T/W edge safety margin is 15 feet.

[4] Airplanes in Airplane Design Groups V and VI normally require stabilized or paved taxiway shoulder surfaces. Consideration should be given to objects near runway/taxiway/taxilane intersections, which can be impacted by exhaust wake from a turning aircraft. The values obtained from the following equations may be used to show that a modification of standards will provide an acceptable level of safety. Refer to paragraph 6 for guidance on modification of standards requirements.
Taxiway safety area width equals the airplane wingspan;
T/W OFA width equals 1.4 times airplane wingspan plus 20 feet; and
T/L OFA width equals 1.2 times airplane wingspan plus 20 feet.

[5] Airplanes in Airplane Design Group III with a wheelbase equal to or greater than 60 feet should use a fillet radius of 50 feet.

[6] Taxiway wingtip clearance equals 0.2 times airplane wingspan plus 10 feet.

[7] Taxilane wingtip clearance equals 0.1 times airplane wingspan plus 10 feet.

[8] This value also applies to the edge of service and maintenance roads.

[9] Consideration of the engine exhaust wake impacted from turning aircraft should be given to objects located near runway/taxiway/taxilane intersections.

Table 10
RUNWAY PROTECTION ZONES

Approach Visibility Minimums [1]	**Facilities Expected to Serve**	**Dimensions**			
		Length	Inner Width	Outer Width	RPZ Acres
Visual and Not Lower than 1-Mile	Small Aircraft Exclusively	1,000	250	450	8.035
	Aircraft Approach Categories A & B	1,000	500	700	13.770
	Aircraft Approach Categories C & D	1,700	500	1,010	29.465
Not Lower Than ¾-Mile	All Aircraft	1,700	1,000	1,510	48.978
Lower Than ¾-Mile	All Aircraft	2,500	1,000	1,750	78.914

Source: FAA Advisory Circular 150/5300-13 Change 10, Airport Design.

The RPZ dimensional standards are for the runway end with the specified approach visibility minimums. The departure RPZ dimensional standards are equal to or less than the approach RPZ dimensional standards. When an RPZ begins other than 200 feet beyond the runway end, separate approach and departure RPZ's should be provided. Refer to Appendix 14 for approach and departure RPZ's.

APPENDIX 5

Sample Development Worksheet and Definitions