CHANGE

AC NO: 150/5335-1A CHG 1

DATE: 10/4/73

ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

SUBJECT: CHANGE 1 TO ADVISORY CIRCULAR 150/5335-1A; AIRPORT DESIGN STANDARDS - AIRPORTS SERVED BY AIR CARRIERS - TAXIWAYS

1. PURPOSE. This change transmits revised pages to the subject advisory circular.

2. EXPLANATION OF CHANGE.

   a. Operational experience with the DC-10 and L-1011 has shown that these two airplanes will operate effectively on taxiways constructed to Design Group II standards. Appropriate figures have been revised accordingly.

   b. Additional material was included in Appendix 1 to further clarify and explain the rationale used to develop the standards.

   c. Figure 4 was revised to reflect each airplane's dimensions as they are listed in the manufacturer's manual. Figures 4 and 5 were revised to include information on airplane operational characteristics.

   d. Clarification of the application of the standards was also provided in areas that have proved to be problems in the past.

3. HOW TO OBTAIN ADDITIONAL COPIES OF THIS PUBLICATION. Change 1 to Advisory Circular 150/5335-1A, Airport Design Standards - Airports Served by Air Carriers - Taxiways, as well as the basic document, may be obtained free of charge from the Department of Transportation, Distribution Unit, TAD-484.3, Washington, D.C. 20590.

Initiated by: AAS-560

4. PAGE CONTROL CHART.

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Clyde W. Pace Jr.

CLYDE W. PACE, JR.
Director, Airports Service

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APPENDIX 1

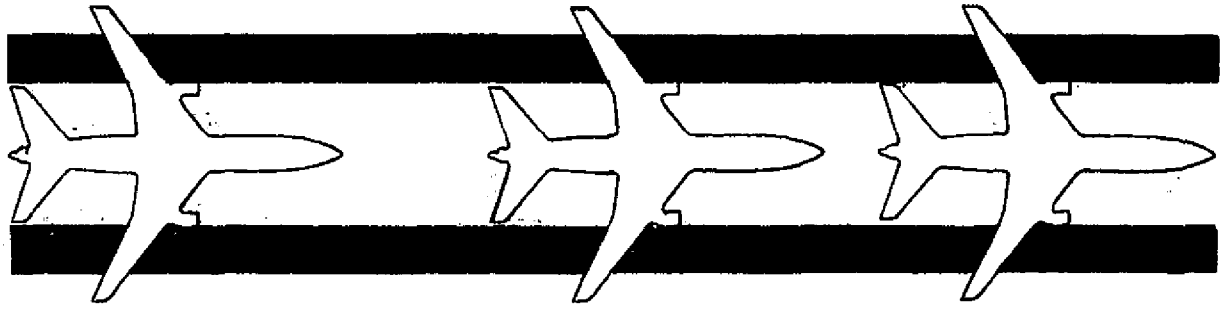
c. The taxiway system essentially is composed of through taxiways and intersections. It includes entrance and exit taxiways, bypass, crossover or transverse taxiways, apron taxiways, and terminal taxilanes, and parallel and dual parallel taxiways. Each segment is discussed in ensuing paragraphs.

4. DIMENSIONAL DESIGN CRITERIA.

a. Figure 3, page 6, presents the dimensional data required for taxiway system design. Select the dimensional standards for the particular design feature from the appropriate column. These clearance and separation distances are, in fact, minimums. They should not be used merely because they accommodate any given airplane since they do not in all cases provide for sufficient space to satisfy the higher speeds desired at high density airports (over 300,000 operations annually). They should be used only when it is not economically feasible to use a greater distance. Consider the potential growth of the airport when establishing these dimensions.

b. To determine the airplane/taxiway design group, see Figure 4, page 7, or Figure 5, page 8. Figure 5, page 8, presents the relationship of the airplane dimensions to the airplane/taxiway design groups. Knowing the largest airplanes to be accommodated (the design airplanes) and their wingspan, undercarriage width and wheelbase, use this flow chart (trace) and determine the airplane/taxiway design group. Enter the flow diagram in the upper left corner and proceed down and to the right as required stopping at the box in which the wingspan of the critical airplane is contained. Continue down and to the right as required to the box in which the undercarriage dimension of the critical airplane is contained. Continue down and to the right to the box containing the critical airplane's wheelbase dimension. Follow downward to the resulting airplane/taxiway design group.

c. For convenience, most of today's air carrier airplanes are listed in Figure 4, page 7, with their critical dimensions included which influence taxiway design. The use of this table results in the determination of the proper airplane/taxiway design group to be used in the design of the taxiway system.



	DESIGN ITEM	SYMBOL	DIMENSIONAL CRITERIA (FEET) AIRPLANE TAXIWAY DESIGN GROUP 1/			
			I	II	III	IV
1.	Taxiway Structural Pavement Width on Tangents	W_T	50	75	100	125
2.	Taxiway Structural Pavement Width on Turns	W_C	65	90	115	140
3.	Taxiway Shoulder Width	--	20	25	35	40
4.	Safety Area Width	--	110	165	220	310
5.	Taxiway and Apron Taxiway Obstacle Free Area Width	--	210	285	365	470
6.	Terminal Taxilane Obstacle Free Area Width	--	160	225	295	390
7.	Separation Distance from Taxiway C_L to Taxiway C_L	S_T	200	300	300	400
8.	Separation Distance from Taxiway C_L to Runway C_L 2/	S_R	400	400	600	1000
9.	Radius of Taxiway C_L Turns	R	100	150	150	200

1/ Determine Airplane/Taxiway Design Group from Figure 4 or 5.
2/ Where CAT II operations are anticipated, use at least 600 feet.

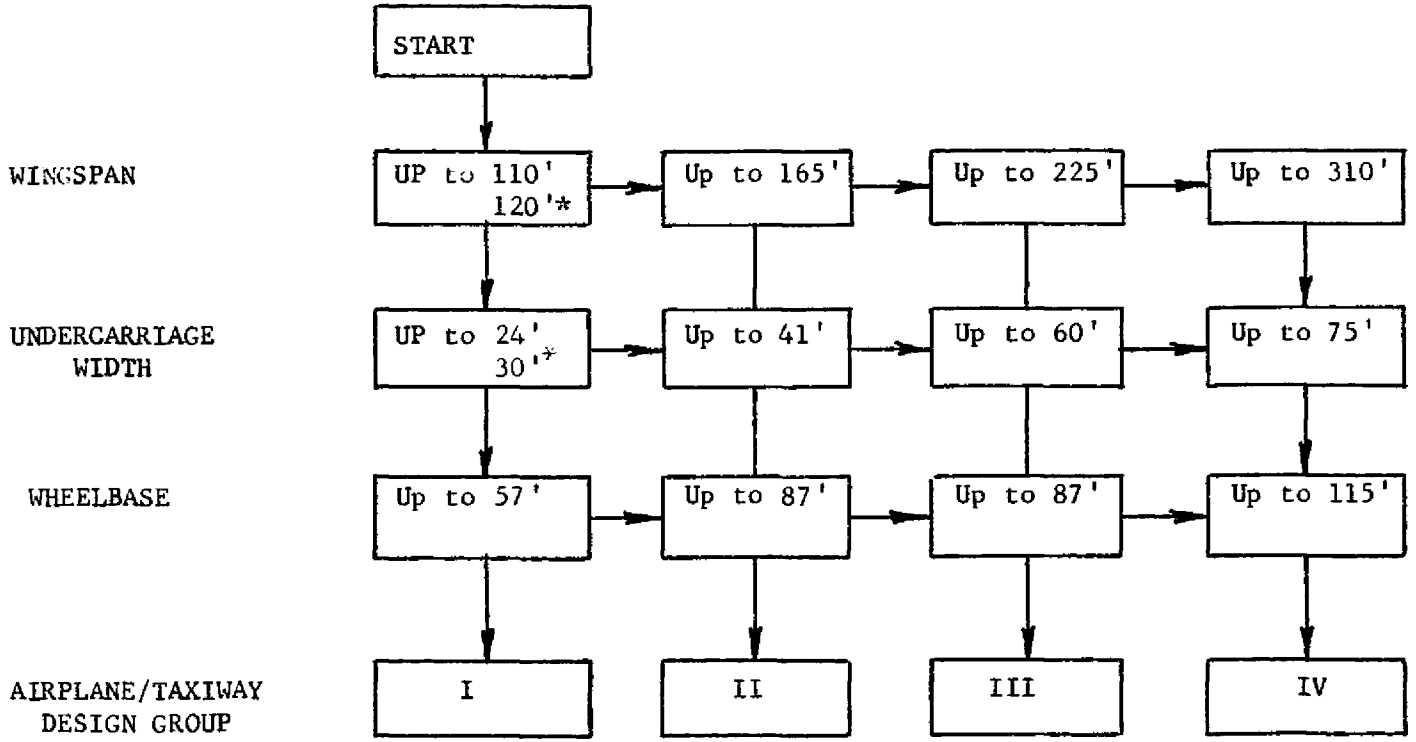
FIGURE 3. TAXIWAY DIMENSIONAL CRITERIA

AIRPLANE MODEL	WINGSPAN (ft.)	UNDER-CARRIAGE WIDTH (ft.)	WHEEL-BASE (ft.)	NOSE GEAR WIDTH 1/ (ft.)	CRITICAL WHEEL TRACK WIDTH ON TURN 2/ (ft.)	T/W DESIGN GROUP
B-727-100	108	23	53	3	27	I
B-737-100	93	21	34	2	22	I
B-737-200	93	21	37	2	22	I
BAC-1-11	94	17	41	2	20	I
CV-580	105	28	26	2	28	I
DC-9-10	89	20	44	2	23	I
DC-9-30	93	20	53	2	25	I
F-27	95	26	28	1	26	I
SE-210	113	20	39	2	21	I
DC-9-40	93	20	56	2	26	I
B-727-200	108	23	63	3	30	II
DC-7	128	39	40	1	39	II
DC-8-50	142	25	58	3	30	II
B-707-100	131	26	52	3	28	II
B-707-300	146	26	59	3	30	II
DC-8-63	148	25	78	3	35	II
DC-10-30	161	41	72	3	41	II
L-1011	155	40	70	3	40	II
B-747	196	41	84	4	45	III
L-500	223	32	73	9	40	III
Future	310	75	115	10	75	IV

1/ Rounded to the nearest whole number.

2/ This number is either the undercarriage width or the distance from the inside main gear track to the nosewheel track whichever number is larger for a 30° nosewheel turning angle.

FIGURE 4. TYPICAL AIRPLANES - PHYSICAL CHARACTERISTICS AND AIRPLANE/TAXIWAY DESIGN GROUP



*Turboprop and piston airplanes only.

FIGURE 5. FLOW CHART AIRPLANE/TAXIWAY DESIGN GROUPS

5. PARALLEL TAXIWAY. A fundamental airport having scheduled certificated air carrier service includes the runway; an apron; a full length parallel taxiway connected to each end of the runway; and a connecting transverse taxiway between the runway, parallel taxiway, and the apron. Figure 1 page 1, illustrates a fundamental airport and a complex airport.

   a. A full parallel taxiway is considered a basic prerequisite for air carrier operations and provides for minimal accepted efficiency.

   b. Separation distance from the runway should be at least the minimum specified in Figure 3, page 6, for the airplane/taxiway design group.

   c. Care should be exercised in designing the parallel taxiway centerline profile so as to obviate excessive longitudinal grades for future crossover or transverse taxiways. (See AC 150/5325-2).

6. TAXIWAY INTERSECTIONS. An airplane may negotiate a turn by tracking nose-wheel on centerline, maintaining cockpit over centerline, or by judgmental oversteering. The latter method is most common and from a design standpoint results in the least amount of pavement considering the recommended clearance of outside wheel to pavement edge.

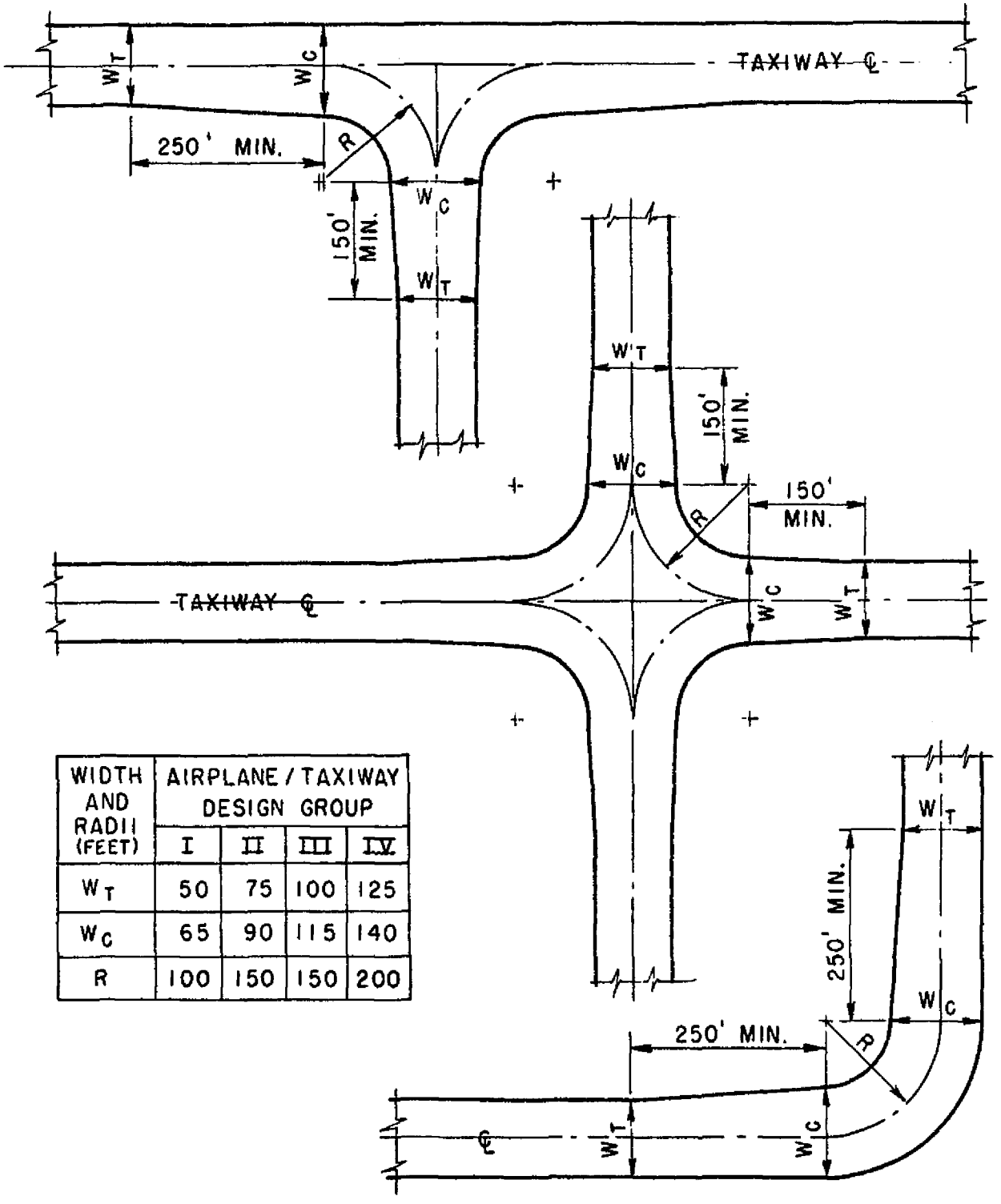
   a. The basic design of the three most common types of taxiway/taxiway intersections are shown in Figure 6, page 10. These intersection designs may also be used for taxiway/apron intersections. Note that Figure 6 shows the minimum paving area required for efficient aircraft maneuverability. These minimums should not be compromised. However, adjustment of these shapes as required to achieve more effective construction procedures may be desirable and should be considered on the basis of cost. It may be cheaper to square the "venturi" areas or, in some cases, to enlarge the fillet radii rather than to adhere to the shapes illustrated.

   b. Minimum centerline radii are the same as given in Figure 3, page 6, for radius of taxiway centerline on curves.

   c. Note that where widening is accomplished on only one side, the leadin or "venturi" is longer on that side than in the symmetrical case. A "venturi" of at least 250 feet is desired for widening on only one side; whereas, 150 feet is the minimum desired for the symmetrical case.

   d. The intersection design in Figure 6, page 10, are construed as applicable to the taxiway/taxiway intersection portion of bypass taxiways, entrances, or exits, but not to the taxiway/runway intersection portion. Runway/taxiway intersections are discussed and detailed in subsequent paragraphs.

   e. The sequence, spacing, and layout of pavement lanes and joints for taxiway fillets and the intersection area should be determinined on a case-by-case basis in accordance with local construction practice, experience, and job conditions.



WIDTH AND RADII (FEET)	AIRPLANE / TAXIWAY DESIGN GROUP			
	I	II	III	IV
W_T	50	75	100	125
W_C	65	90	115	140
R	100	150	150	200

FIGURE 6. TAXIWAY INTERSECTION DETAILS

d. Visibility from the air traffic control tower should be such that there is clear line-of-sight to the centerline of all apron taxiways. This is also desirable for terminal taxilanes, but the requirement can be satisfied where adequate control of the airplane exists through other means.

14. TAXIWAY SAFETY AREA AND SHOULDERS.

a. In the design and construction of taxiways, the adjacent terrain or embankment should, for a certain minimum distance, be graded to within specified tolerances. This taxiway safety area provides an obstacle free area intended only for minimizing the probability of serious damage to airplanes using these areas accidentally or in an emergency. Under normal conditions, it should be capable of supporting ready access by fire, crash, and snow removal equipment over its entire area.

b. Details of gradient limitations and recommendations are contained in AC 150/5325-2.

c. There are no requirements for grading, shaping, or in any way preparing the area beyond the taxiway safety area other than providing for drainage and eliminating terrain penetrations through the obstacle identification plane described under the definition of "obstacle" in paragraph 2, page 2.

d. On certain jet airplanes, the engines extend beyond or overhang the edges of the taxiway pavement which may create detrimental conditions of ingestion and blast erosion. Precaution must, therefore, be taken to reduce this possibility by providing shoulders with a stabilized or paved surface. The type of surface will depend on local conditions and the contemplated method and cost of maintenance. While a natural surface (e.g., turf) may suffice in certain cases, a low cost paved surface may be required on others. Refer to AC 150/5320-6 and AC 150/5325-6 for additional information on this subject.

15. ADAPTATION TO EXISTING AIRPORTS. Many of the airports in existence were constructed in the 1940's, modified in the 1950's, and expanded in the 1960's. Taxiway systems were enlarged in some instances to meet minimum requirements for the B-707's and DC-8's. The recommendations contained in this advisory circular may be adapted to existing facilities to equip them for the newer and larger airplanes.

a. Although centerline radius of curves, for example, on an existing airport taxiway may be less than recommended minimum for the particular airplane/taxiway design group, the fillets can usually be enlarged to accommodate the new airplanes. Widening of a short straight-away section of taxiway pavement before the beginning of the curve (P.C.) and beyond the end of the curve (P.T.), in addition to the widening on the curve, can be accomplished as required.

b. To increase the capacity of an existing airport, additional exits may be provided in accordance with design recommendations contained herein. Existing exits can be widened and bypass taxiways may be constructed as warranted.

c. Existing airports are often so constricted that expansion to meet the recommended standards of design established in this advisory circular is impossible or not economically feasible. The taxiway/runway separation and clearance from taxiway to parked airplanes on the apron generally dictate the limitations of "lateral" expansions of the airport. In these cases, the requirement for expanding taxiway facilities to meet current and future traffic demands must be weighed with the airport capability, safety considerations, and traffic control to determine the extent of adaptation of design standards warranted.

d. Taxiway shoulders are often required for existing taxiways where the full strength pavement width is less than recommended in Figure 3, page 6. In these cases, it is recommended that consideration be given to providing sufficient design strength and thickness to permit limited occasional traffic use.

16. OTHER CONSIDERATIONS.

a. Gradients. Recommended design standards for taxiway longitudinal and transverse slopes are contained in AC 150/5325-2.

b. Paving. Recommended pavement design criteria are contained in AC 150/5320-6.

c. Marking. The standards and practices for proper taxiway marking are contained in AC 150/5340-1 and AC 150/5340-20.

d. Lighting. Criteria to be applied in the design of a taxiway lighting system are contained in AC 150/5340-15 and AC 150/5340-19.

e. Navigational Aids. Compatibility of future airport development with air traffic control and navigation facilities may be found in AC 150/5300-2.

f. Signing. Criteria to be applied in the design of a taxiway guidance system are contained in AC 150/5340-18.

APPENDIX 1. EXPLANATION OF RATIONALE

1. INTRODUCTION. The airport designer is often faced with the problem of defending the dimensional criteria established in advisory circulars. For ready reference and for ease in application, the criteria for taxiway design in this advisory circular is furnished without background or rationale. The purpose of this appendix is to provide the reasoning behind the selection of the various widths, clearances, and separations with discussion of their development.

2. BACKGROUND AND RATIONALE. Taxiway system requirements can be achieved only after recognition of clearances, pavement width, curve radii, separations, movement and type of airplanes. Additionally, as the taxiway system is the transitory facility which supports total airport capacity, a taxiing speed of at least 20 m.p.h. must be attained; and this capability must be built into the system design.

   a. Clearances. The common denominators for development of clearance criteria for taxiing airplanes are their wingspans and wingtip clearances. The pilot of a modern jet cannot see his wingtips, so the amount of wingtip clearance to be provided in design standards must account for this deficiency. Thus, ample wingtip clearance combined with the control exercised over airplanes in relation to their maneuvering area provides for an acceptable design to account for inadvertent deviations from intended path, any necessary evasive movement, and for practical operational techniques.

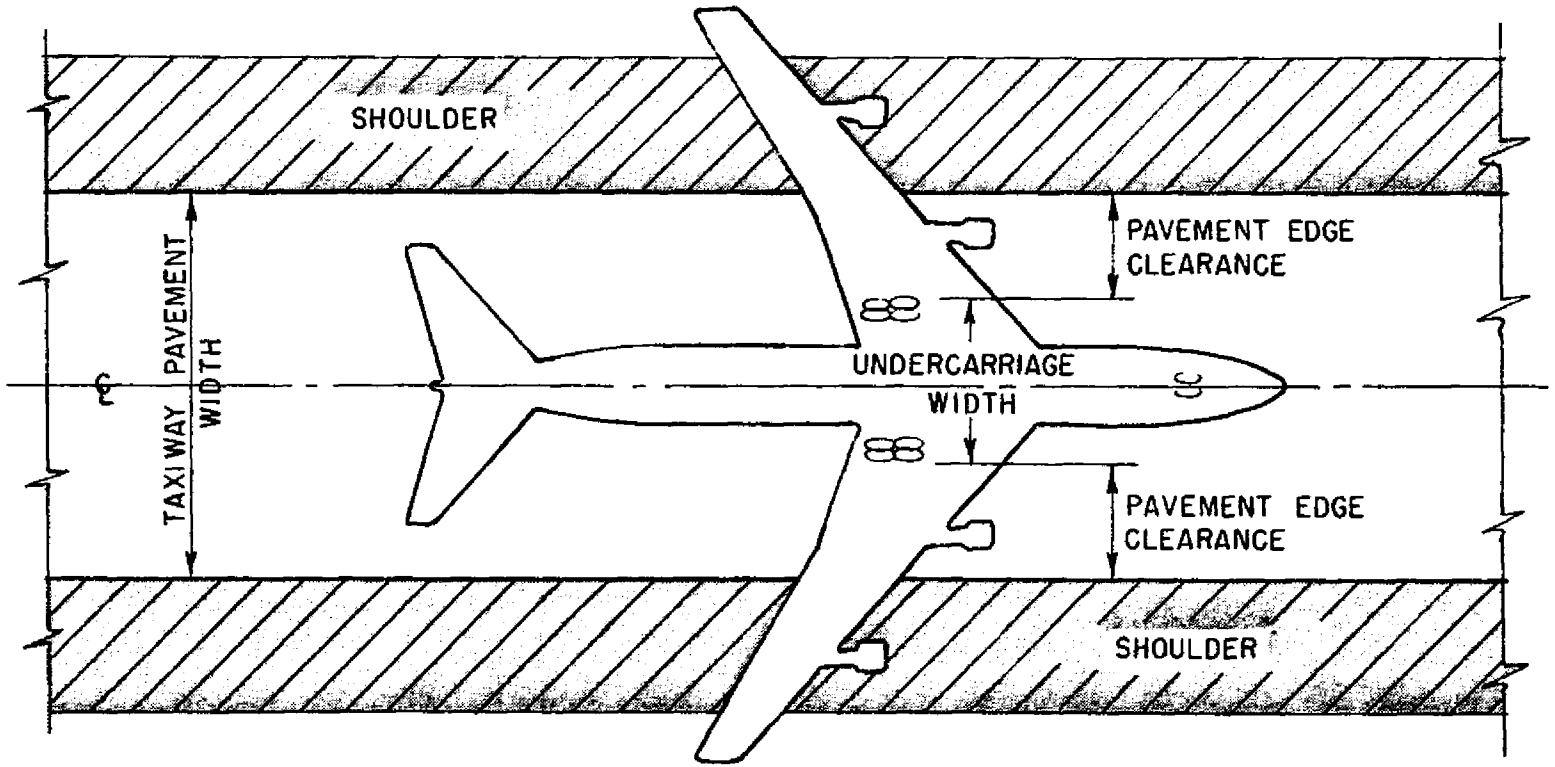
      (1) For the passage of two taxiing airplanes, each being on the centerline of separate parallel taxiways, a minimum wingtip clearance is established. These dimensions are shown in Figure 1, page 2 of Appendix 1, for various airplane groups, and illustrated in Figure 2, page 3 of Appendix 1.

      (2) Somewhat less wingtip clearance is considered necessary between a taxiing airplane and a stationary object than between two moving objects. Accordingly, wingtip clearances 10 feet less than in (1) above are recommended from a parked airplane or obstacle. This again allows for an ample margin in the event of deviation from taxiway centerline to the edge of pavement. (See Figure 3, page 4 of Appendix 1.)

Airplane Type	Typical Airplanes	Outside of Tire to Pavement Edge		Wingtip to Other Airplane or Obstacle		
		Minimum Clearance on Tangent	Minimum Clearance on Turn	Minimum Clearance on Terminal Taxilane	Recommended Clearance on Apron Taxiway and Taxiway	Recommended Clearance on Dual 1/ Parallel Taxiway
Twin Engine Turboprop	CV-580 F-27 FH-227 YS-11	10'	15'	20'	40'	50'
Two & Three Engine Turbojet	B-727-100 B-737 BAC-1-11 DC-9	13'	18'	25'	50'	60'
Three & Four Engine Turbojet	B-707 B-720 CV-880 DC-8 B-727-200 DC-10 L-1011	17'	22'	30'	60'	70'
High Capacity Turbojet	B-747 L-500	20'	25'	35'	70'	80'
Next Generation Airplanes		25'	30'	40'	80'	90'

1/ The separation distance between parallel taxiways is usually dependent upon the radius of the taxiway centerline on turns rather than the clearance distances given in this column.

FIGURE 1. TAXIWAY CLEARANCES



NOTE: UNDERCARRIAGE WIDTH AS USED IN THIS AC MEANS THE DISTANCE BETWEEN OUTSIDES OF TIRES.

FIGURE 5. PAVEMENT EDGE CLEARANCE ON TANGENT

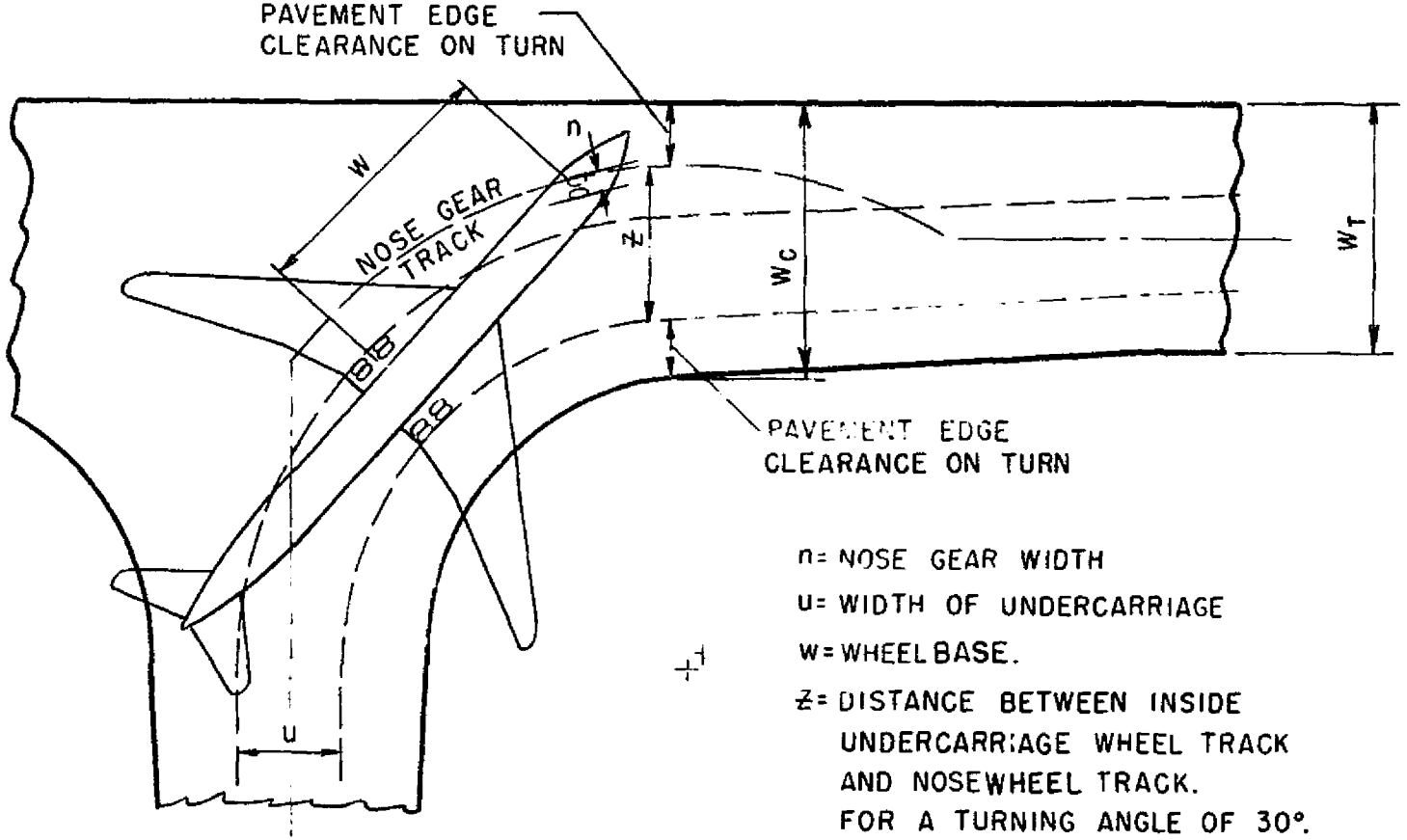


FIGURE 6. PAVEMENT EDGE CLEARANCE ON TURN

SPEED	RADIUS OF CURVE
10 m.p.h.	50 feet
50 m.p.h.	200 feet
30 m.p.h.	450 feet
40 m.p.h.	800 feet
50 m.p.h.	1250 feet
60 m.p.h.	1800 feet

(2) An airplane may negotiate a turn by tracking nosewheel on centerline, maintaining cockpit over centerline, or by judgmental oversteering. The latter method is most common and from a design standpoint results in the least amount of pavement considering the recommended clearance of outside wheel to pavement edge and maximum acceptable effective nose gear steering angle of 30 degrees. Figure 6, Appendix 1, shows:

(a) The track of a typical long bodied airplane negotiating a turn using the judgmental oversteering method and a 30 degree effective nose gear steering angle.

(b) The clearance from the outside edge of the main gear to the pavement edge.

(c) The clearance from the nose gear outside edge to the pavement edge.

(d) The relationship between nose gear width, undercarriage width, wheelbase length, and the distance between the inside main gear tracks and the nosewheel track. The pavement width for a taxiway turn is simply calculated by adding this distance or the width of the undercarriage, whichever is greater, to the required clearances for the outside of tires to the pavement edges.

(e) The maneuver shown in Figure 6, Appendix 1, requires a radius of taxiway centerline on turn of at least 1.73 times the airplane wheelbase.

d. Separations. The separation distances between various airport areas are related to the operational procedures and physical characteristics of the airplanes intended to be accommodated.

(1) Separation distances are specified from the centerlines of taxiways, taxilanes, or runways rather than from the edges of pavements. This permits longevity in airport layout. Single pavements can be widened at some future date and still remain within specified separation criteria.

(2) Both ground and flight safety operational considerations form the basis for determining the minimum recommended separation distance between runway and taxiway centerlines. Consideration is given to the following items:

(a) Airplane size and configuration.
(b) Airplane positioning on runway and taxiway.
(c) Airplane intended path.
(d) Wingtip clearance.
(e) Speed of moving airplanes.
(f) Design configuration of connecting taxiways.
(g) Turning radius recommended for normal operations.
(h) Taxiway fillets.
(i) Exit taxiway location.
(j) Blast.
(k) Holding between runway and taxiway, if needed.
(l) Runway occupancy time.
(m) Airport capacity.
(n) Deceleration rates.
(o) Volume and type of operations of large airplanes.
(p) Accident locations due to run-off.

3. AIRPLANE/TAXIWAY DESIGN GROUPS. If all of the basic considerations given in paragraph 2 of this Appendix were applied, there would result as many widths and separation distances as there are different size airplanes in the air carrier fleet. This would obsolete the airport each time a new and/or larger airplane is introduced.

a. For the purpose of taxiway design and that of providing longevity in airport design, and in anticipation of the next generation airplanes, four major design groups are established with primary consideration given to wingspan, undercarriage width, and wheelbase. Figure 5, page 7 of this Appendix, depicts undercarriage width.

b. Figure 5, page 8, presents the relationship between the airplane dimensional characteristics which influence taxiway design and the airplane/taxiway design group. This figure is also used to select the airplane/taxiway design group. (See subparagraph 4b, page 5, for instructions to read flow chart.)

c. For convenience, most of today's air carrier airplanes are listed in Figure 4, page 7, with their critical dimensions that influence taxiway design. The use of this table results in the determination of the proper airplane/taxiway design group to be used in the design of the taxiway system.

4. DETERMINATION OF EXIT TAXIWAY LOCATIONS.

a. The locations of exit taxiways depend upon the performance of the airplanes which include:

(1) touchdown speed,

APPENDIX 2. BIBLIOGRAPHY

1. The following items may be obtained from the Superintendent of Documents, United States Government Printing Office, Washington, D.C. 20402. (No c.o.d. orders are accepted. Enclose with your request a check or money order made payable to the Superintendent of Documents.)

   a. Federal Aviation Regulations Volume X, $7.00.

   b. AC 150/5320-5, Airport Drainage, $1.00.

   c. AC 150/5370-1, Standard Specifications for Construction of Airports, $3.50.

2. The latest issuance of the following publications may be obtained from the Department of Transportation, Distribution Unit, TAD-484.3, Washington, D.C. 20590. Advisory Circular 00-2 updated triannually, contains the listing of all current issuances of these circulars and changes thereto.

   a. AC 00-2, Federal Register Advisory Circular Checklist and Status of Regulations.

   b. AC 150/5300-2, Airport Design Standards - Site Requirements for Terminal Navigational Aids.

   c. AC 150/5320-6, Airport Paving.

   d. AC 150/5325-2, Airport Design Standards - Surface Gradient and Line-of-Sight.

   e. AC 150/5325-5, Aircraft Data.

   f. AC 150/5325-6, Effects and Treatment of Jet Blast.

   g. AC 150/5335-3, Airport Design Standards - Airports Served by Air Carriers - Bridges and Tunnels on Airports.

   h. AC 150/5340-1, Marking of Paved Areas on Airports.

   i. AC 150/5340-15, Taxiway Edge Lighting System.

   j. AC 150/5340-18, Taxiway Guidance Sign System.

   k. AC 150/5340-19, Taxiway Centerline Lighting System.

   l. AC 150/5340-20, Installation Details and Maintenance Standards for Reflective Markers for Airport Runway and Taxiway Centerlines.

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CHANGE

AC NO: 150/5335-1A CHG 2

DATE: 12/29/76

ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

SUBJECT: CHANGE 2 TO AIRPORT DESIGN STANDARDS - AIRPORTS SERVED BY AIR CARRIERS- TAXIWAYS

1. PURPOSE. This change transmits revised pages to the subject advisory circular.

2. EXPLANATION OF CHANGES.

   a. In formulating the U.S. Position for the International Civil Aviation Organization's Eighth Air Navigation Conference, the ad hoc government/industry working group made the following observations:

      (1) B-747 airplanes can and do operate safely on 75-foot-wide taxiways.

      (2) Industry's current forecast on the size of future aircraft was reduced considerably from their previous forecasts.

   b. The U.S. Position at the conference reflected these observations, even though they differed from the information contained in AC 150/5335-1A. The modifications proposed in this change reduces the differences between the advisory circular and U.S. position.

3. HOW TO OBTAIN ADDITIONAL COPIES OF THIS CHANGE. Obtain additional copies of AC 150/5335-1A CHG 2, Change 2 to Airport Design Standards - Airports Served by Air Carriers - Taxiways, free of charge, from the Department of Transportation, Publications Section, TAD-443.1, Washington, D.C. 20590.

Initiated by: AAP-560

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Appendix 2		Appendix 2	
1 & 2	10/4/73	1 & 2	12/29/76

Joseph A. Foster

JOSEPH A. FOSTER
Assistant Administrator
Office of Airports Programs

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b. To determine the airplane/taxiway design group, see Figure 4, page 7, or Figure 5, page 8. Figure 5, page 8, presents the relationship of the airplane dimensions to the airplane/taxiway design groups. Knowing the largest airplanes to be accommodated (the design airplanes) and their wingspan, undercarriage width and wheelbase, use this flow chart (trace) and determine the airplane/taxiway design group. Enter the flow diagram in the upper left corner and proceed down and to the right as required stopping at the box in which the wingspan of the critical airplane is contained. Continue down and to the right as required to the box in which the undercarriage dimension of the critical airplane is contained. Continue down and to the right to the box containing the critical airplane's wheelbase dimension. Follow downward to the resulting airplane/taxiway design group.

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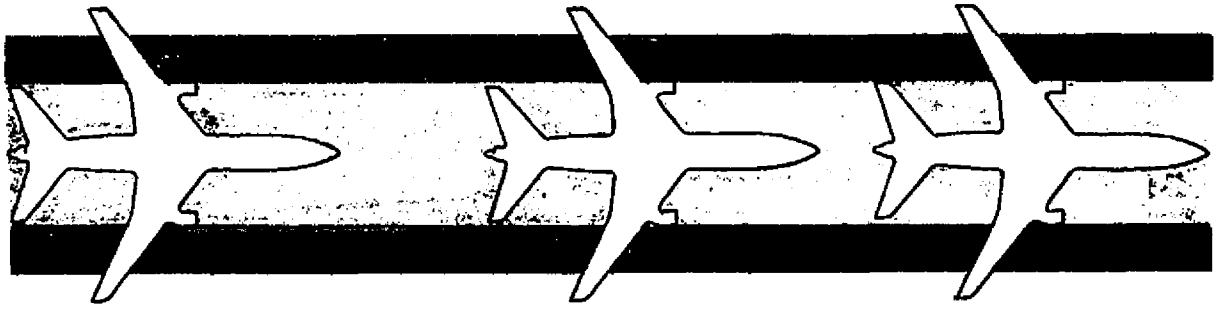

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		I	II	III	IV
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2. Taxiway Structural Pavement Width on Turns	W_C	65	90	90	120
3. Taxiway Shoulder Width	--	20	25	35 3/	40 3/
4. Safety Area Width	--	110	165	200	240
5. Taxiway and Apron Taxiway Obstacle Free Area Width	--	210	285	340	400
6. Terminal Taxilane Obstacle Free Area Width	--	160	225	270	320
7. Separation Distance from Taxiway C_L to Taxiway C_L	S_T	200	300	300	360
8. Separation Distance from Taxiway C_L to Runway C_L 2/	S_R	400	400	600	1000
9. Radius of Taxiway C_L Turns	R	100	150	150	180

1/ Determine Airplane/Taxiway Design Group from Figure 4 or 5.
2/ Where CAT II operations are anticipated, use at least 600 feet.
3/ For Design Groups III and IV, the shoulder surface should be stabilized or paved.

FIGURE 3. TAXIWAY DIMENSIONAL CRITERIA

AIRPLANE MODEL	WINGSPAN (ft.)	UNDER-CARRIAGE WIDTH (ft.)	WHEEL-BASE (ft.)	NOSE GEAR WIDTH 1/ (ft.)	CRITICAL WHEEL TRACK WIDTH ON TURN 2/ (ft.)	T/W DESIGN GROUP
B-727-100	108	23	53	3	27	I
B-737-100	93	21	34	2	22	I
B-737-200	93	21	37	2	22	I
BAC-1-11	94	17	41	2	20	I
CV-580	105	28	26	2	28	I
DC-9-10	89	20	44	2	23	I
DC-9-30	93	20	53	2	25	I
F-27	95	26	28	1	26	I
SE-210	113	20	39	2	21	I
DC-9-40	93	20	56	2	26	I
B-727-200	108	23	63	3	30	II
DC-7	128	39	40	1	39	II
DC-8-50	142	25	58	3	30	II
B-707-100	131	26	52	3	28	II
B-707-300	146	26	59	3	30	II
DC-8-63	148	25	78	3	35	II
DC-10-30	161	41	72	3	41	II
L-1011	155	40	70	3	40	II
B-747	196	41	84	4	45	III
L-500	223	32	73	9	40	III
Future	240	50	104	6	56	IV

1/ Rounded to the nearest whole number.

2/ This number is either the undercarriage width or the distance from the inside main gear track to the nosewheel track whichever number is larger for a 30° nosewheel turning angle.

FIGURE 4. TYPICAL AIRPLANES - PHYSICAL CHARACTERISTICS AND AIRPLANE/TAXIWAY DESIGN GROUP

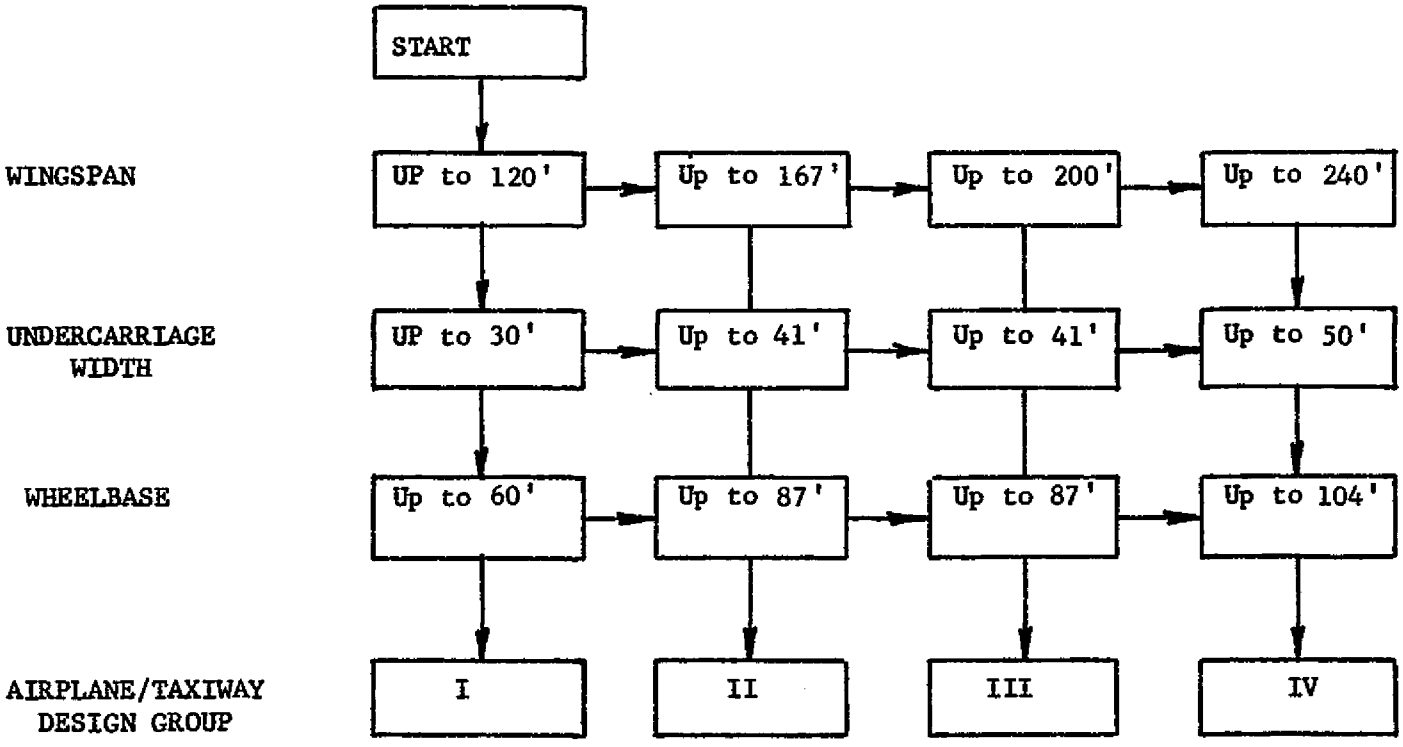


FIGURE 5. FLOW CHART AIRPLANE/TAXIWAY DESIGN GROUPS

5. PARALLEL TAXIWAY. A fundamental airport having scheduled certificated air carrier service includes the runway; an apron; a full length parallel taxiway connected to each end of the runway; and a connecting transverse taxiway between the runway, parallel taxiway, and the apron. Figure 1 page 1, illustrates a fundamental airport and a complex airport.

   a. A full parallel taxiway is considered a basic prerequisite for air carrier operations and provides for minimal accepted efficiency.

   b. Separation distance from the runway should be at least the minimum specified in Figure 3, page 6, for the airplane/taxiway design group.

   c. Care should be exercised in designing the parallel taxiway centerline profile so as to obviate excessive longitudinal grades for future crossover or transverse taxiways. (See AC 150/5325-2).

6. TAXIWAY INTERSECTIONS. An airplane may negotiate a turn by tracking nosewheel on centerline, maintaining cockpit over centerline, or by judgmental oversteering. The latter method is most common and from a design standpoint results in the least amount of pavement considering the recommended clearance of outside wheel to pavement edge.

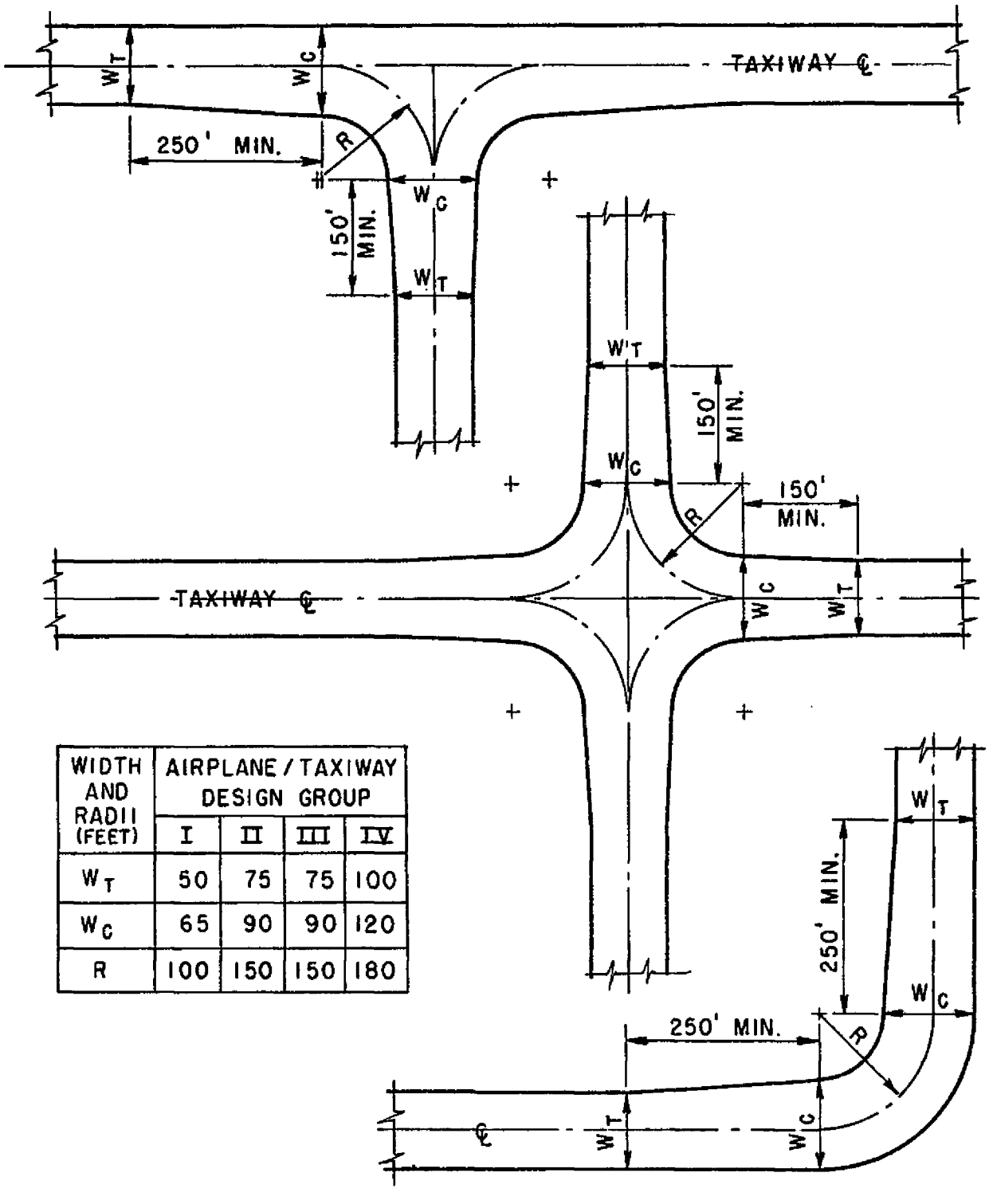
   a. The basic design of the three most common types of taxiway/taxiway intersections are shown in Figure 6, page 10. These intersection designs may also be used for taxiway/apron intersections. Note that Figure 6 shows the minimum paving area required for efficient aircraft maneuverability. These minimums should not be compromised. However, adjustment of these shapes as required to achieve more effective construction procedures may be desirable and should be considered on the basis of cost. It may be cheaper to square the "venturi" areas or, in some cases, to enlarge the fillet radii rather than to adhere to the shapes illustrated.

   b. Minimum centerline radii are the same as given in Figure 3, page 6, for radius of taxiway centerline on curves.

   c. Note that where widening is accomplished on only one side, the leadin or "venturi" is longer on that side than in the symmetrical case. A "venturi" of at least 250 feet is desired for widening on only one side; whereas, 150 feet is the minimum desired for the symmetrical case.

   d. The intersection design in Figure 6, page 10, are construed as applicable to the taxiway/taxiway intersection portion of bypass taxiways, entrances, or exits, but not to the taxiway/runway intersection portion. Runway/taxiway intersections are discussed and detailed in subsequent paragraphs.

   e. The sequence, spacing, and layout of pavement lanes and joints for taxiway fillets and the intersection area should be determinined on a case-by-case basis in accordance with local construction practice, experience, and job conditions.



WIDTH AND RADII (FEET)	AIRPLANE / TAXIWAY DESIGN GROUP			
	I	II	III	IV
W_T	50	75	75	100
W_C	65	90	90	120
R	100	150	150	180

FIGURE 6. TAXIWAY INTERSECTION DETAILS

APPENDIX 1. EXPLANATION OF RATIONALE

1. INTRODUCTION. The airport designer is often faced with the problem of defending the dimensional criteria established in advisory circulars. For ready reference and for ease in application, the criteria for taxiway design in this advisory circular is furnished without background or rationale. The purpose of this appendix is to provide the reasoning behind the selection of the various widths, clearances, and separations with discussion of their development.

2. BACKGROUND AND RATIONALE. Taxiway system requirements can be achieved only after recognition of clearances, pavement width, curve radii, separations, movement and type of airplanes. Additionally, as the taxiway system is the transitory facility which supports total airport capacity, a taxiing speed of at least 20 m.p.h. must be attained; and this capability must be built into the system design.

   a. Clearances. The common denominators for development of clearance criteria for taxiing airplanes are their wingspans and wingtip clearances. The pilot of a modern jet cannot see his wingtips, so the amount of wingtip clearance to be provided in design standards must account for this deficiency. Thus, ample wingtip clearance combined with the control exercised over airplanes in relation to their maneuvering area provides for an acceptable design to account for inadvertent deviations from intended path, any necessary evasive movement, and for practical operational techniques.

      (1) For the passage of two taxiing airplanes, each being on the centerline of separate parallel taxiways, a minimum wingtip clearance is established. These dimensions are shown in Figure 1, page 2 of Appendix 1, for various airplane groups, and illustrated in Figure 2, page 3 of Appendix 1.

      (2) Somewhat less wingtip clearance is considered necessary between a taxiing airplane and a stationary object than between two moving objects. Accordingly, wingtip clearances 10 feet less than in (1) above are recommended from a parked airplane or obstacle. This again allows for an ample margin in the event of deviation from taxiway centerline to the edge of pavement. (See Figure 3, page 4 of Appendix 1.)

Airplane Type	Typical Airplanes	Outside of Tire to Pavement Edge		Wingtip to Other Airplane or Obstacle		
		Minimum Clearance on Tangent	Minimum Clearance on Turn	Minimum Clearance on Terminal Taxilane	Recommended Clearance on Apron Taxiway and Taxiway	Recommended Clearance on Dual 1/ Parallel Taxiway
Twin Engine Turboprop	CV-580 F-27 FH-227 YS-11	10'	15'	20'	40'	50'
Two & Three Engine Turbojet	B-727-100 B-737 BAC-1-11 DC-9	13'	18'	25'	50'	60'
Three & Four Engine Turbojet	B-707 B-720 CV-880 DC-8 B-727-200 DC-10 L-1011	17'	22'	30'	60'	70'
High Capacity Turbojet	B-747	17'	22'	35'	70'	80'
Next Generation Airplanes		25'	30'	40'	80'	90'

1/ The separation distance between parallel taxiways is usually dependent upon the radius of the taxiway centerline on turns rather than the clearance distances given in this column.

FIGURE 1. TAXIWAY CLEARANCES

APPENDIX 2. BIBLIOGRAPHY

1. Advisory Circular (AC) 00-2, Advisory Circular Checklist and Status of Federal Aviation Regulations, updated triannually contains the listing of all current issuances of advisory circulars and changes thereto. It explains the circular numbering system and gives instructions for ordering advisory circulars that are for sale as well as those distributed free of charge. AC 00-2 also gives instructions for ordering the Federal Aviation Regulations (FAR).

   a. The following free advisory circulars may be obtained from the Department of Transportation, Publications Section, TAD-443.1, Washington, D.C. 20590:

      (1) Advisory Circular 00-2, Federal Register, Advisory Circular Checklist and Status of Federal Aviation Regulations.

      (2) AC 150/5300-2, Airport Design Standards - Site Requirements for Terminal Navigational Facilities.

      (3) AC 150/5320-6, Airport Pavement Design and Evaluation.

      (4) AC 150/5325-2, Airport Design Standards - Air Carrier Airports - Surface Gradient and Line-of-Sight.

      (5) AC 150/5325-5, Aircraft Data.

      (6) AC 150/5325-6, Airport Design Standards - Effects and Treatment of Jet Blast.

      (7) AC 150/5335-3, Airport Design Standards - Airports Served by Air Carriers - Bridges and Tunnels on Airports.

      (8) AC 150/5335-4, Airport Design Standards - Airports Served by Air Carriers - Runway Geometrics.

      (9) AC 150/5340-1, Marking of Paved Areas on Airports.

      (10) AC 150/5340-18, Taxiway Guidance Sign System.

      (11) AC 150/5340-19, Taxiway Centerline Lighting System.

      (12) AC 150/5340-20, Installation Details and Maintenance Standards for Reflective Markers for Airport Runway and Taxiway Centerlines.

      (13) AC 150/5340-24, Runway and Taxiway Edge Lighting System.

b. The following Federal Aviation Regulations and advisory circulars may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402:

(1) FAR Part 77, Objects Affecting Navigable Airspace.

(2) FAR Part 152, Airport Aid Program.

(3) FAR Part 153, Acquistiion of U.S. Land for Public Airports.

(4) FAR Part 157, Notice of Construction, Alteration, Activation, and Deactivation of Airports.

(5) AC 150/5320-5, Airport Drainage.

(6) AC 150/5370-10, Standards for Specifying Construction of Airports.

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