

DEPARTMENT OF COMMERCE
Civil Aeronautics Administration
Washington 25, D.C.

December 24, 1952

ALL MEMBERS OF AIRPORTS ADVISORY
COMMITTEE

After returning from the Miami Meeting of the Airports Advisory Committee, I was called by Mr. Louis Inwood and advised that he would like to have a change made in the recommendation which he made relative to airport runway marking. The recommendation now to read as follows:

That it is recommended to the Administrator of Civil Aeronautics by the Airports Advisory Committee that he accept the position on runway marking as was adopted by I.C.A.O. and that the existing TSO N-10 be revised in conformity with the position adopted by I.C.A.O. in October, 1952.

Enclosed herewith to be used in consideration of this matter is a copy of the I.C.A.O. position which was adopted and a copy of the proposed CAA revision of the TSO N-10, as well as pertinent drawings. It will be noted that the basic elements of the I.C.A.O. position and the proposed TSO are similar. Also enclosed is a copy of Mr. Inwood's confirming letter.

It will be appreciated if you will advise me at your earliest convenience of your position in regard to the recommendation as now written. In the event you have any comments or recommendations in regard to the matter, please submit same with your reply.

Sincerely yours,

Paul Morris

Paul Morris
Executive Secretary
Airports Advisory Committee

Encls.

copy

[attach 12/24/52]

AIRPORT OPERATORS COUNCIL
1625 "K" Street, N. W.
Washington 6, D. C.

December 22, 1952

Mr. Paul Morris
Office of Airports
Civil Aeronautics Administration
Washington 25, D. C.

Dear Paul:

Confirming our telephone conversation of December 17, 1952, it is my understanding that the CAA position on runway marking will be in conformity with the ICAO standards adopted in October, 1952.

The AOC "Operations" Committee's position, supported by AOC, has recommended that any technical standard order of CAA on this subject shall be discretionary and not mandatory. It is our position, in harmony with the ICAO standards, that runways should be marked as follows:

The center of the runway should be marked with a broken line 120 feet long, with an 80 foot long void, then a 120 foot solid line for the full length of the runway. The line could range in width from 1 to 3 feet. The runway designation numbers would be required, as would the designation "L, R, or C". The runway designation numbers would be located at the ends of the runway, out of the way of jet blasts. The Committee believes that a 3 foot marking should be applied to the runway. This should be a transverse marking at the half-way point of the runway, and at the one-quarter and three-quarter points of the runway. The one-half way point would have a solid marking across the runway from 1 to 3 feet wide, and at the one-quarter and three-quarter points, the line would be broken. No recommendation was made as to the distances between the marks, between the one-quarter and the three-quarter way point. All markings should be on a voluntary basis and if an airport operator wanted to improve on the recommended marking, he could do so.

Very truly yours,

/s/ Louis R. Inwood

Louis R. Inwood
President

LRI/mh

[attach 12/24/52]

PROPOSED TECHNICAL STANDARD ORDER

August 1952

SUBJECT: CIVIL AERONAUTICS ADMINISTRATION RUNWAY MARKING

INTRODUCTION

In order to improve existing runway marking by incorporating the latest developments in this field of visual guidance, the Civil Aeronautics Administration has formulated the following requirements for marking runways on civil airports. Recent experience with very low minimum approaches and landings, using modern electronic landing aids, has demonstrated that certain new supplemental runway marking elements can provide additional guidance to the pilot, thereby increasing safety for such operations.

The revised system recognizes that the amount of runway marking required on a runway depends upon the operational minimums, electronic aids, and other factors associated with that runway. Accordingly, this system is divided into three groups of markings to accommodate the three classes of operational minimums, taking into consideration economy of installation and maintenance.

A. RUNWAY MARKING SYSTEMS AND MINIMUM REQUIRED ELEMENTS

The three patterns of runway marking and the minimum number of elements to be installed for each type of runway marking are as follows (see attached drawing):

1. VFR Runway Marking

Marking on runways used under VFR shall be:

- a. Centerline, and
- b. Runway direction number (and letters if required).

2. Basic Instrument Runway Marking

Marking on runways, other than All-Weather, used under instrument approach conditions shall be:

- a. VFR runway marking, plus
- b. Threshold

Note: Where desired in the above systems, additional elements of the All-Weather runway marking below may be added.

3. All-Weather Runway Marking

Marking on runways implemented with ILS, PAR and associated facilities and intended for use under lowest operational minimums shall be:

- a. Basic instrument runway marking plus
- b. Landing zone markers, plus
- c. Side stripes

B. DETAILS OF RUNWAY MARKING ELEMENTS (See Attached Drawing)

1. Centerline

The centerline shall be broken with 120-foot dashes and 80-foot blank spaces. The width shall be 1 to 3 feet with a requirement that the Basic Instrument and All-Weather runway marking use the maximum width of 3 feet.

2. Runway Direction Numbers (and Letters)

Numbers and letters - Each runway end shall be designated by numbers assigned and suffixed by letters where required. Numbers and letters assigned shall be determined from the approach direction.

The number assigned shall be the whole number nearest one-tenth the magnetic azimuth of the centerline of the runway measured clockwise from magnetic north.

The letter or letters, where required, to differentiate between parallel runways shall be as follows, in the order shown from left to right:

- a. For two parallel runways "L" "R"
- b. For three parallel runways "L" "C" "R"

Intersection of runway ends - Where runway ends have a common intersection, preference in locating the marking shall be given the most important runway.

3. Threshold

The threshold, with outer dimensions of 150 x 130 feet, shall consist of 8 blocks, each 12 feet wide and 150 feet long. The blocks shall be separated by spaces 3 feet wide except that the center space shall be 16 feet. The threshold dimensions shall remain constant for all runways of 150 feet or greater width. The threshold of runways less than 150 feet wide shall be scaled to proportion except that the threshold length shall remain at 150 feet.

4. Side Stripes

Side stripes shall be continuous lines 3 feet wide. For runways of 150 feet or greater width, the distance between stripes measured at the inside edge shall be constant at 140 feet. Runways less than 150 feet wide shall have side stripes with the maximum available distance between inside edges. The runways 150 feet wide or less, having adequate visual contrast of the runway edge, may not require side striping.

5. Landing Zone Markers

The primary landing zone on each end of the All-Weather runway shall be a standard length of 2,000 feet divided into four 500-foot sections. Landing zone markers, 75 feet long and 6 feet wide, shall be placed at each 500-foot section. The first set of the markers nearest the runway end consists of two sets of four markers (8 blocks), the second set consists of two sets of three markers (6 blocks), the third set consists of two sets of two markers (4 blocks), and the last set consists of two sets of one marker (2 blocks). The inner edge of each set of landing zone markers shall be 50 feet apart, 25 feet on each side of the runway centerline.

C. TAXIWAY MARKING

Taxiways shall be marked in accordance with current practice as shown on TSO-N10 except as noted below under 2. Holding Point Marker.

1. Longitudinal Stripes

Each taxiway shall be marked by a single stripe along the centerline.

- a. At taxiway intersections with runway ends, taxiway stripes shall terminate 10 feet from the nearest edge of the runway symbols.
- b. At other intersections with runways, taxiway stripes shall terminate at the nearest edge of the runway stripe.
- c. At taxiway intersections the stripes shall intersect.

2. Holding Point Marker

Taxiway intersections and points of junction of taxiways and

runways shall be indicated by a holding point marker placed across the taxiway at right angles to the taxiway stripe. The nearest end of the taxiway holding point marker shall be not less than 200* feet from the nearest edge of the intersected runway or taxiway measured on a line perpendicular to the intersected centerline.

* Increased from 100 feet to 200 feet to provide greater clearance for very large aircraft.

D. PAINTING REQUIREMENTS

1. Runway markings shall be white except that where the background contrast is not sufficient, marking elements may be edged with black (6" minimum width or more as required).
2. Taxiway marking shall be yellow.

SOURCE OF PUBLICATIONS

Copies of this Technical Standard Order and other Technical Standard Orders may be obtained from the Civil Aeronautics Administration, Washington 25, D. C.

2.1.2 Runway day markings

2.1.2.1 Paved runways. Delete text of 2.1.2.1 and Figures 8-15 inclusive and substitute the following:

Recommendation - General. All runway markings should be of a conspicuous colour and preferably white.

2.1.2.1.1 Runway designation markings

2.1.2.1.1.1 Application

2.1.2.1.1.1.1 Assignment of numbers. All runways shall be numbered with a two-digit number at each end. The number assigned shall be that whole number nearest to one-tenth of the magnetic azimuth of the centre line of the runway, measured clock-wise from magnetic North when viewed from the direction of approach.

2.1.2.1.1.1.2 Assignment of letters. A differentiating letter or letters shall be included in the runway designation of all parallel runways at an aerodrome. The letter or letters assigned shall be as follows, in the order shown from left to right when viewed from the direction of approach.

For two parallel runways: "L" "R"

For three parallel runways: "L" "C" "R"

For four parallel runways: "L" "LC" "RC" "R"

For five parallel runways: "L" "LC" "C" "RC" "R"

2.1.2.1.1.2 Location. The markings shall be placed at the most appropriate position near the end of the runway, in such a manner that the runway is effectively identified and shall conform to the arrangement shown in Figure 8.

2.1.2.1.1.3 Characteristics. The numbers and letters shall be of the form and proportions shown in Figure 9. The dimensions shall be not less than those shown in Figure 9.

2.1.2.1.2 Runway centre line markings

2.1.2.1.2.1 Application

2.1.2.1.2.1.1 Runway centre line markings shall be provided on all instrument runways.

2.1.2.1.2.1.2 Recommendation - Runway centre line markings should be provided on all runways.

2.1.2.1.2.2 Characteristics

2.1.2.1.2.2.1 Runway centre line markings shall consist of a broken line of stripes of uniform length, uniformly spaced and extending along the whole length of the runway between the two runway designation markings except when interrupted in compliance with 2.1.2.1.7.

2.1.2.1.2.2.2 Recommendation - Runway centre line markings should be of the form and dimensions given in Figure 10.

Note. - On instrument runways widths of up to 3 metres (10 feet) have been used successfully.

2.1.2.1.3 Runway threshold markings

2.1.2.1.3.1 Application

2.1.2.1.3.1.1 Runway threshold markings shall be provided on all instrument runways for use in conditions of poor daylight visibility.

2.1.2.1.3.1.2 Recommendation - Runway threshold markings should be provided on all other runways on which, in the opinion of the Competent Authority, their provision is desirable.

Note. - Experience has shown that these markings are also of value when aircraft landing lights are used at night in certain meteorological conditions.

2.1.2.1.3.2 Location. Recommendation - Runway threshold markings, where provided, should be placed at both ends of the runway.

Note. - It has been found advisable to locate these markings on the runway approximately 6 metres (20 feet) from the ends of the runway in cases where aerodrome ground traffic frequently crosses the end of the runway.

2.1.2.1.3.3 Characteristics. Recommendation - Runway threshold markings should consist of a series of longitudinal stripes of uniform dimensions disposed symmetrically about the centre line of the runway and extending laterally to within 3 metres (10 feet) of the edge of the runway or to a distance of 27 metres (90 feet) on either side of the runway centre line, whichever results in the smaller lateral distance. The width of the stripes and the spacing between stripes should all be equal except that a double spacing should be used to separate the two stripes nearest the centre line of the runway. The stripes should be at least 30 metres (100 feet) long and approximately 2 metres (7 feet) wide with spacings of approximately 2 metres (7 feet) between them. (See Figure 11).

2.1.2.1.3.4 Recommendation - Displaced threshold markings. When a runway threshold is displaced from the normal position near the end of a runway, markings should be provided to indicate the displaced threshold in accordance with the following table:

	Permanently displaced	Temporarily displaced
Runways on which, in accordance with 2.1.2.1.3.1 the Competent Authority has determined that threshold markings will be provided	Markings as specified in 2.1.2.1.3.3	Markings conforming to Figure 12.
Other runways	Markings conforming to Figure 12	

2.1.2.1.3.4.1 Recommendation - When a runway threshold is displaced the markings of the normal runway threshold, if any, should be obscured.

2.1.2.1.4 Touchdown zone markings

2.1.2.1.4.1 Application. Recommendation - Touchdown zone markings should be provided on all instrument runways for use in conditions of poor daylight visibility and on all other runways on which, in the opinion of the Competent Authority, their provision is desirable.

Note.- Experience has shown that these markings are also of value when aircraft landing lights are used at night in certain meteorological conditions.

2.1.2.1.4.1.1 Location. Recommendation - Touchdown zone markings, where provided, should consist of longitudinal stripes placed symmetrically on each side of the runway centre line and be displayed at both ends of the runway at intervals of approximately 150 metres (500 feet) over the first 600 metres (2000 feet) of the runway from the runway threshold.

Note.- Figure 13 indicates a dimensioned system of touchdown zone markings that has been found satisfactory in practice.

2.1.2.1.5 Side stripe markings

2.1.2.1.5.1 Application. Recommendation - Side stripe markings should be provided on all instrument runways for use in conditions of poor daylight visibility and on all other runways on which, in the opinion of the Competent Authority their provision is desirable.

Note.- A system of side stripe markings conforming to the following characteristics has been found to give good operational guidance:

- a) General configuration: two lines extending the whole length of the runway parallel to and equidistant from the centre line of the runway;
- b) Characteristics of line: a continuous solid line or a line consisting of closely spaced continuous longitudinal stripes to provide an effect equivalent to that of a solid line;

c) Dimensions: lines at least 0.9 metre (3 feet) wide with their outer edges approximately on the edge of the runway except when the runway is wider than 45 metres (150 feet) when they have a spacing of 42 metres (140 feet) between their inner edges. (See Figure 14).

2.1.2.1.7 Interruption of runway markings. At intersections of runways or of runways and taxiways, the markings of the most important runway or taxiway shall be displayed and the markings of the other runways or taxiways shall be interrupted.

Note. - The following is the order of precedence:

- 1) Instrument runways with precision aids;
- 2) Other instrument runways;
- 3) Other runways;
- 4) Taxiways.

2.1.3 Stopway day markings

2.1.3.1 Recommendation - When the extent of a stopway is not clearly indicated by its appearance or surface compared with that of the surrounding ground simple day markers should be provided for this purpose.

2.1.4 Taxiway day markings. Renumber existing 2.1.3 as 2.1.4.. Amend references to Figures 14 and 15 as 15 and 16 respectively.

On Figures 14 and 15, pages 51 and 52 of Annex 14 add a second arrow ending at the runway centre line on one side and at the extension of the left edge of the broken stripe on the other with the caption "Not less than 60 metres (200 feet) as shown on new Figures 15 and 18 (page IV-47 of Final Report).

2.2 Lighting Aids

2.2.1 *Approach lighting and lead-in lighting

Delete the introductory sentence, the definition of "approach portal" the whole of the note and 2.2.1.1 and substitute the following.

Note. - An approach lighting system is a system of lights designed for approaches by day or night in meteorological conditions inferior to those for which a lead-in lighting system is provided. It also includes elements to provide guidance for circling approaches at night.

A lead-in lighting system is designed with the intention of affording guidance to pilots approaching to land at night when a clearly distinguishable and unambiguous indication of horizontal ground plane is available. It is also designed with the intention of providing guidance for circling approaches at night in the meteorological conditions in which such a manoeuvre is permitted.

(Horizontal ground plane may be given by such means as runway and threshold lighting and other lighting in the vicinity of the aerodrome.)

* See reservation by the French Delegation, page VII-1.

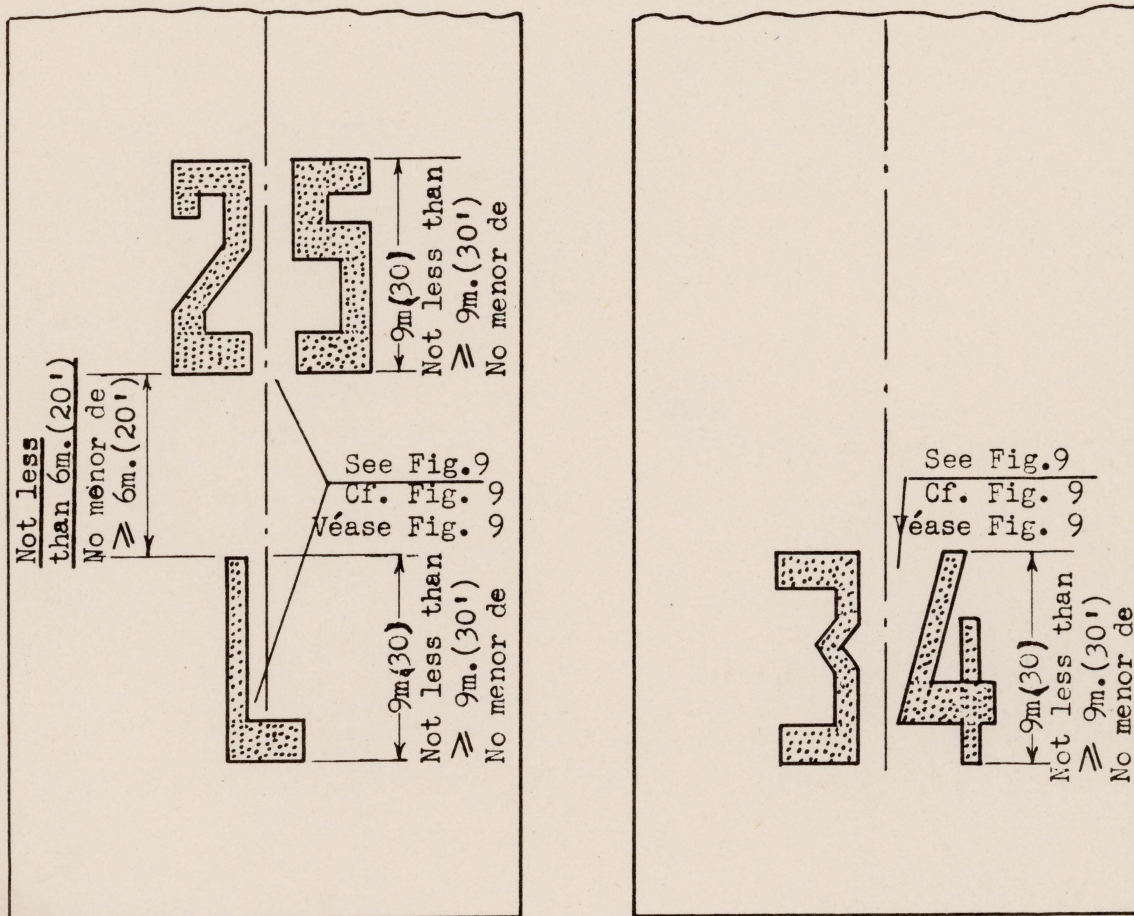


Figure 8 Runway Designation Markings
 Figure 8 Marques d'identification de piste
 Figura 8 Señales designadoras de pistas

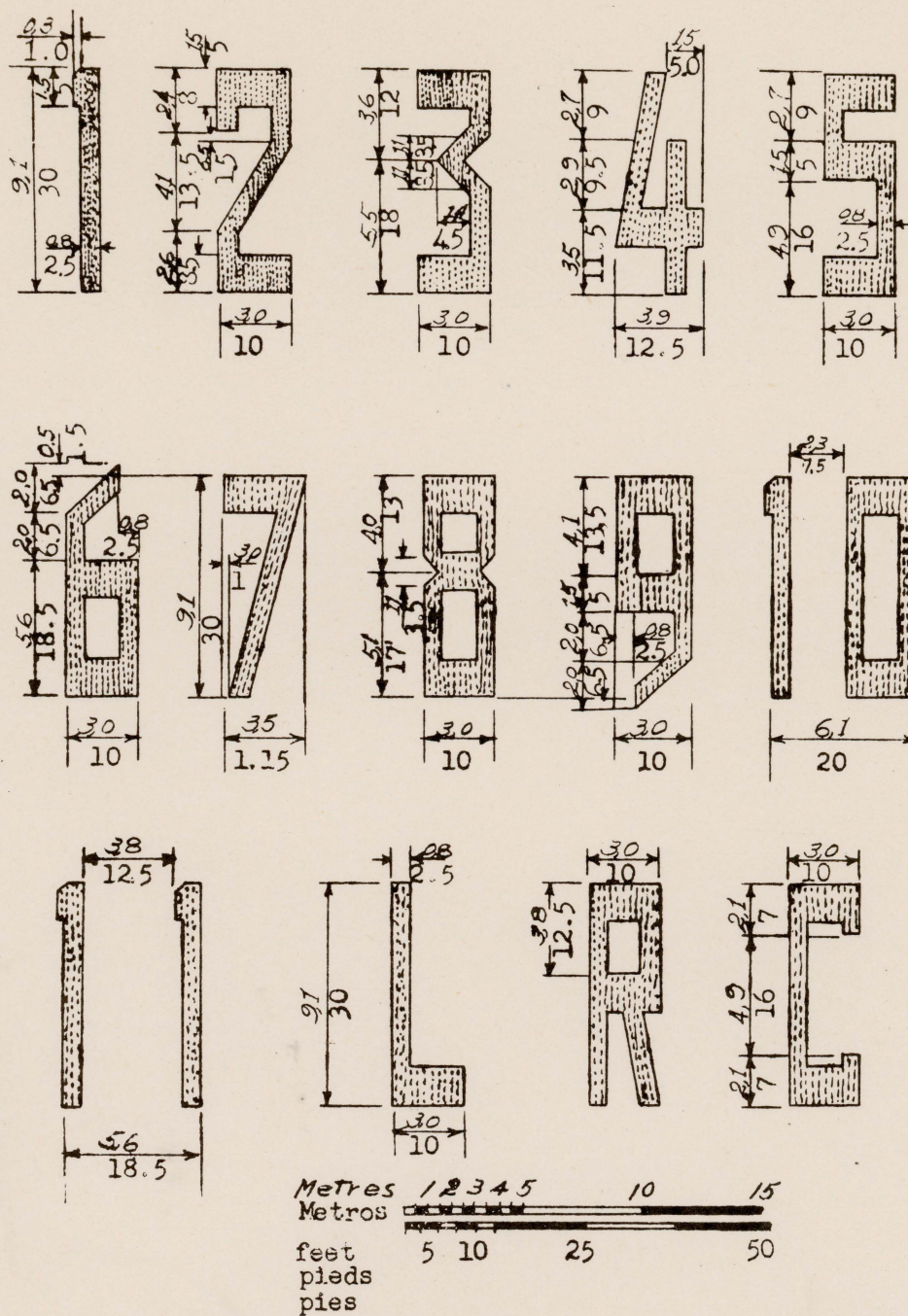


Figure 9 - Form and Proportions of Numbers and Letters for Runway Designation Markings

Figure 9 - Forme et proportions des lettres et chiffres des marques d'identification de piste

Figura 9 - Forma y proporciones de los números y letras para la designación de pistas

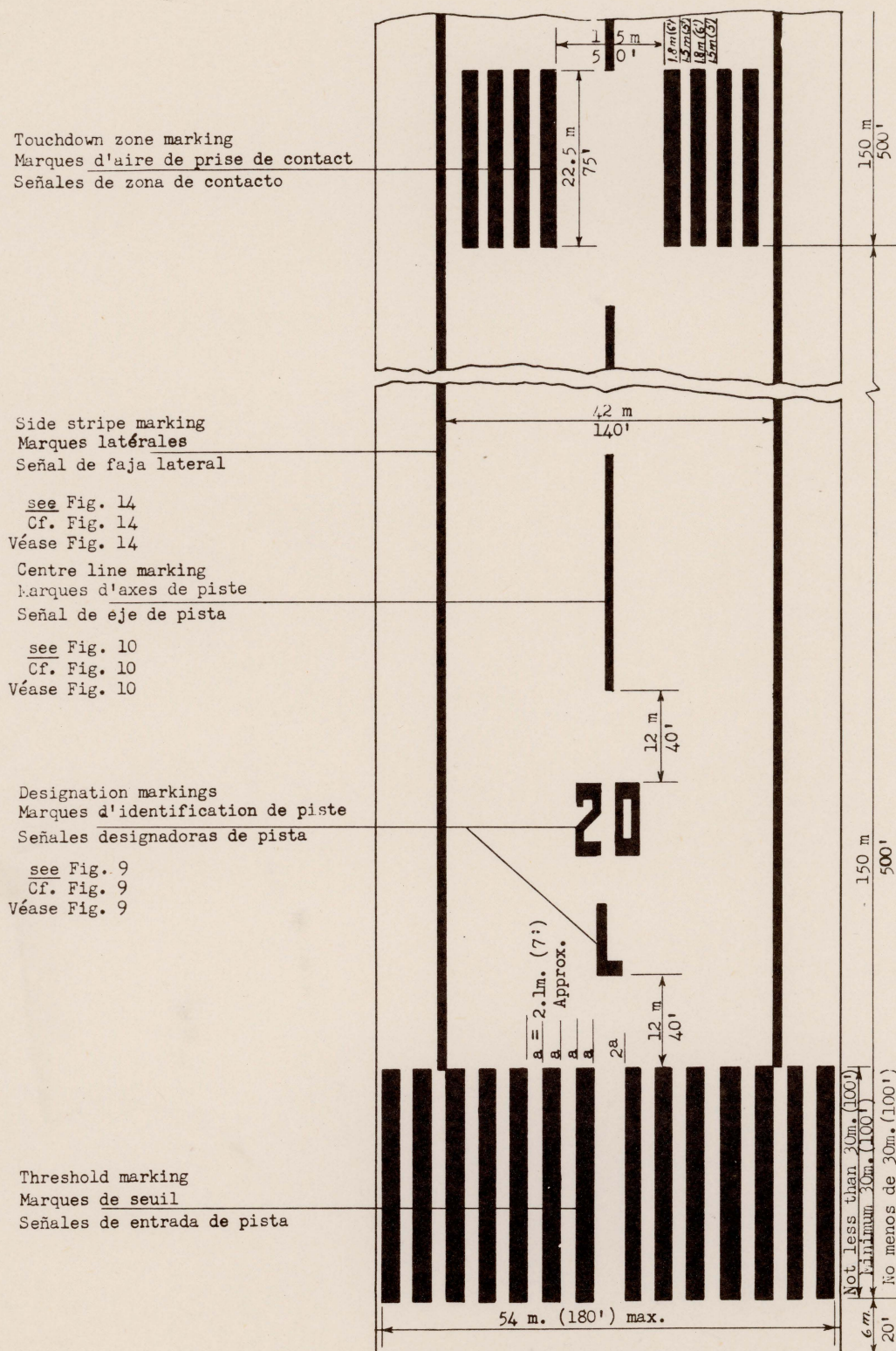
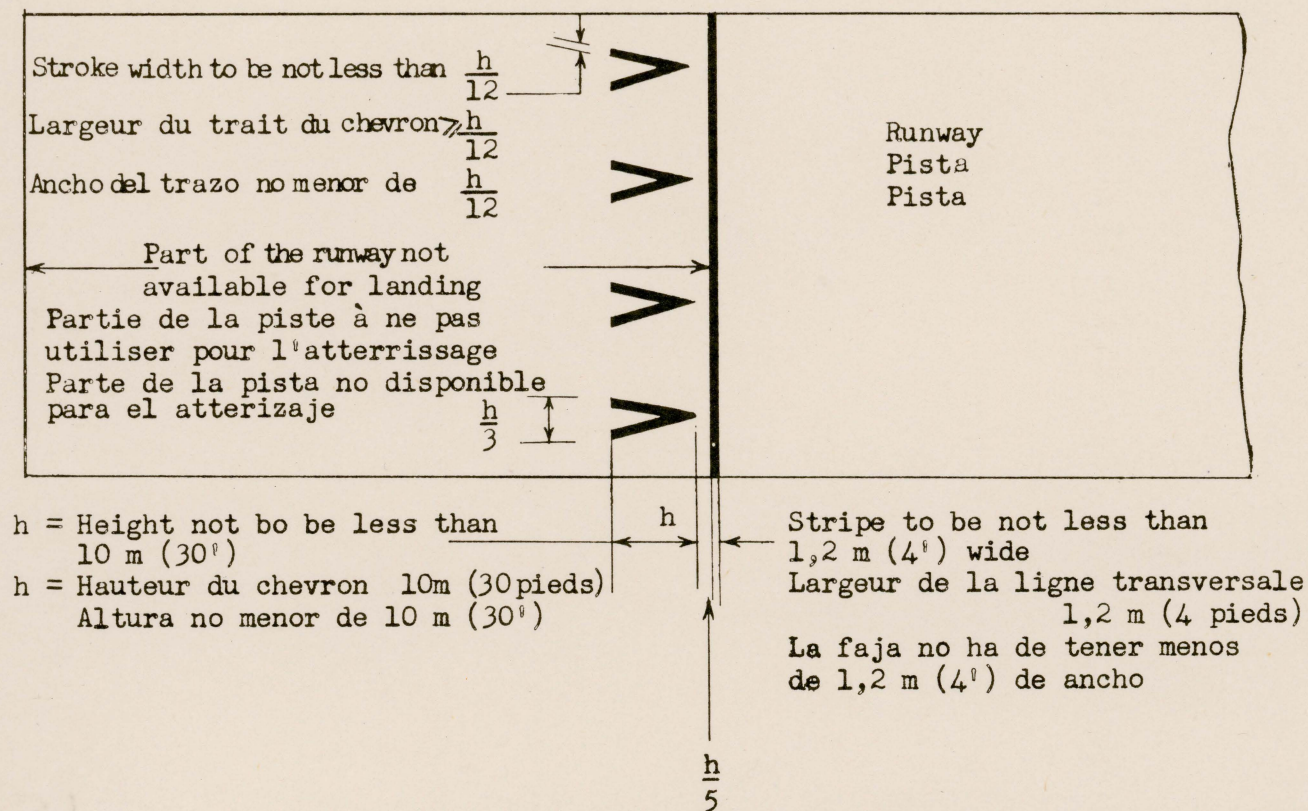


Figure 11 Runway Day Markings
Balisage diurne de piste
Figura 11 Señalamiento diurno de pista

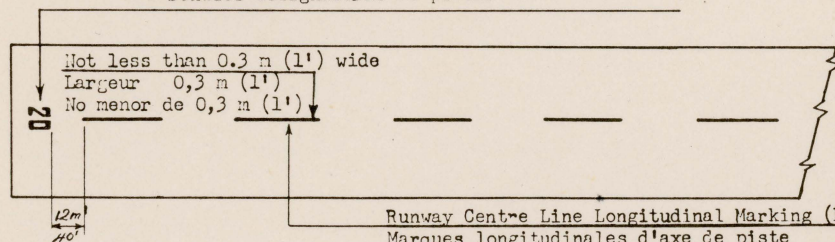


Displaced runway threshold marking
 Marques de seuil de piste décalée
 Señal de entrada de pista desplazada

Figure 12
 Figura 12

All Runways Toutes pistes Todas la pistas

Runway Designation Marking (Fig.9) Marques d'identification de piste
Señales designadoras de pistas

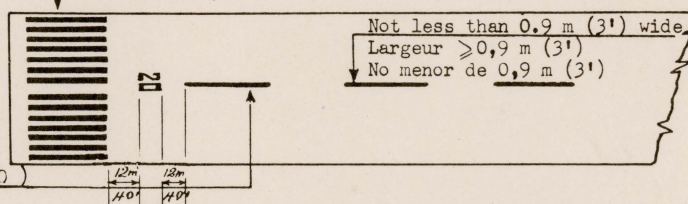


Runway Centre Line Longitudinal Marking (Fig.10)

Marques longitudinales d'axe de piste
Señales longitudinales de eje de pista

Instrument Runway Pistes aux instruments
Pista de instrumentos

Runway Threshold Marking (Fig.11) Marques de seuil de piste
Señales de entrada de pista

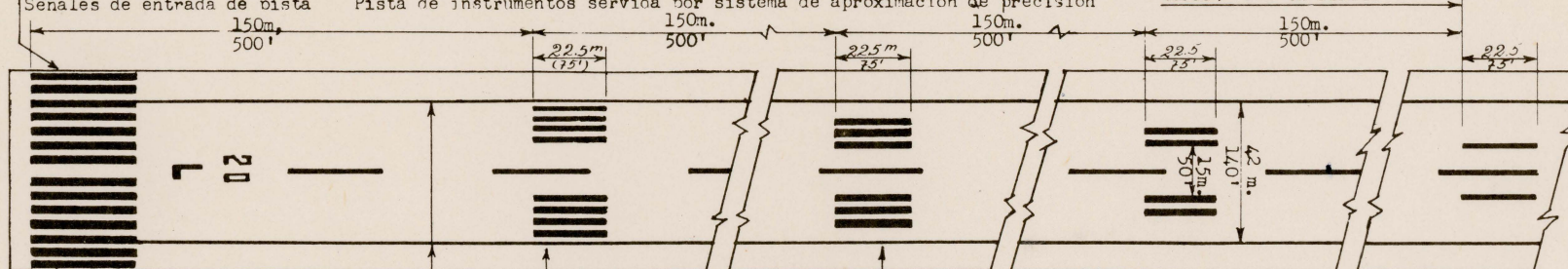


Runway Threshold Marking (Fig.11) INSTRUMENT RUNWAY SERVED BY PRECISION APPROACH SYSTEM

Marques de seuil de piste
Señales de entrada de pista

Piste aux instruments équipée d'un dispositif d'approche de précision
Pista de instrumentos servida por sistema de aproximación de precisión

600 m (2000') desde la entrada
600 m (2000') du seuil
600 m (2000') from threshold



Runway Touchdown Zone Marking

Marques d'aire de prise de contact
Señales indicadoras de zona de contacto

Runway Side Stripe Marking (stripes 0.9 m (3') wide) (Fig. 14)

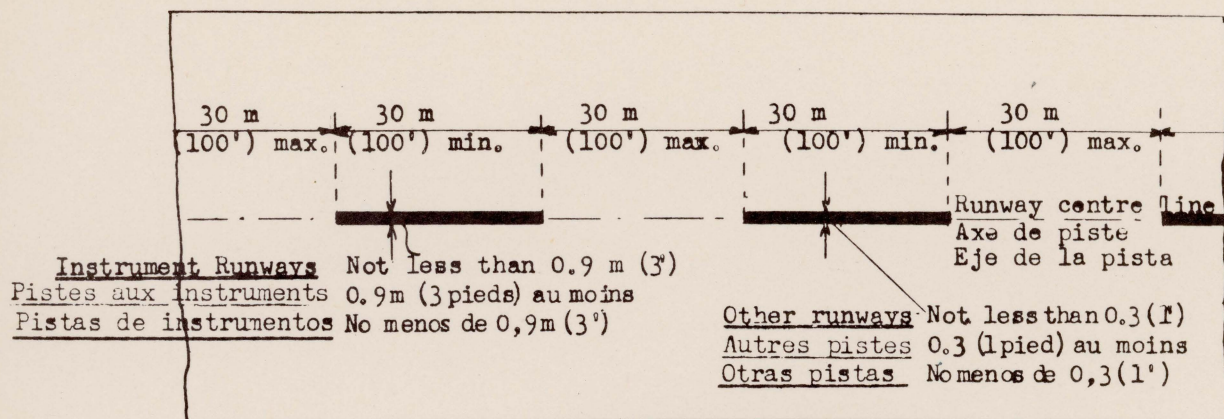
Marques latérales de piste (largeur 0,9 m (3'))

Señalamiento de fajas laterales de pista (fajas de 0,9m(3') de ancho)

Figure 13 Runway Day Markings

Balisage diurne de piste

Figura 13 Señales diurnas de pista



Runway Centre Line Markings
Marques d'axe de piste
Señales del eje de la pista

Figure 10
Figura 10

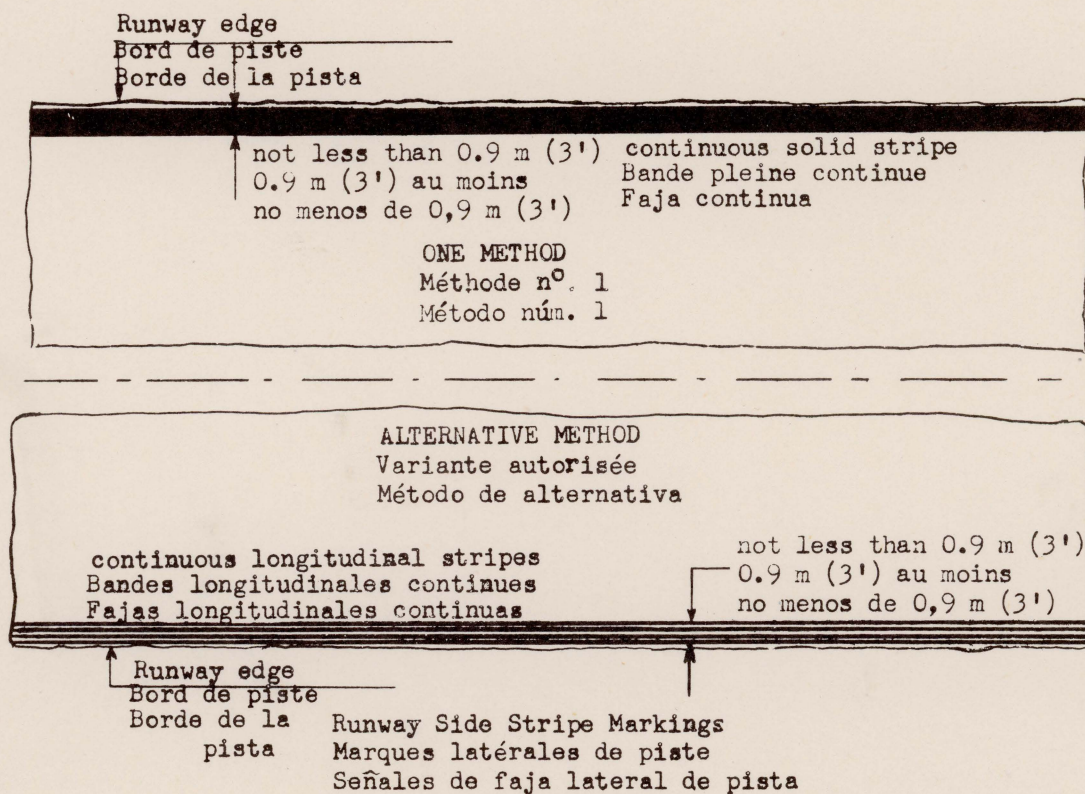


Figure 14
Figura 14

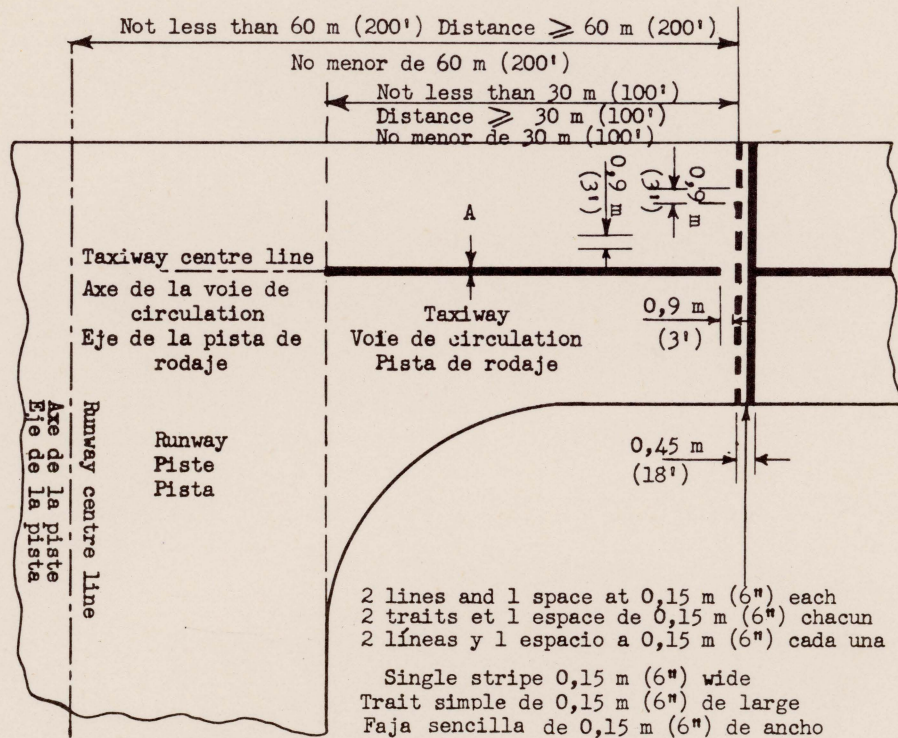


Figure 15 - Figura 15

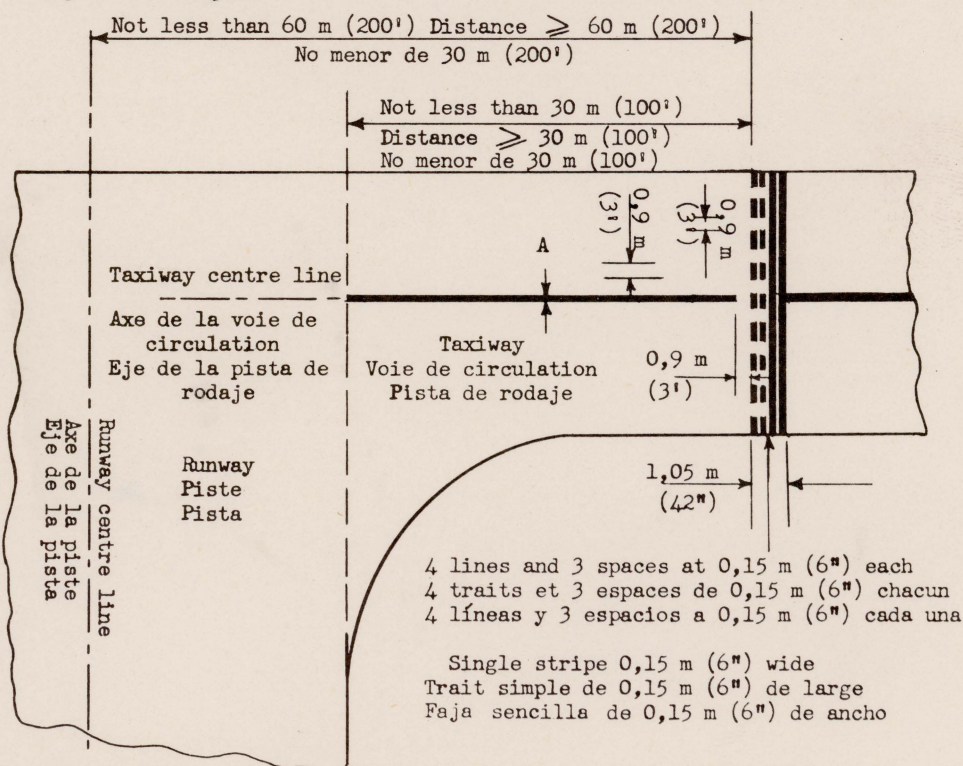


Figure 16 Taxi longitudinal and holding position markings

Figure 16 Marques longitudinales et marques de point d'attente de voie de circulation

Figura 16 Señales longitudinales y de punto de espera en rodaje