

DEPARTMENT OF COMMERCE

BUREAU OF AIR COMMERCE

C I V I L A I R R E G U L A T I O N S

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Department of Commerce
Bureau of Air Commerce

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31. AIRPORT RATING (PHYSICAL FEATURES, EQUIPMENT, AND FACILITIES)

31.0 PROVISION FOR RATING: Pursuant to the provisions of the Air Commerce Act requiring the Secretary of Commerce to provide by regulation for the examination and rating of air navigation facilities available for the use of aircraft of the United States as to their suitability for such use, the following regulations are prescribed for the rating of airports in the United States.

31.1 DEFINITIONS: As used in this Chapter for rating purposes, the following terms have the meanings given.

31.100 Landplane: The term "landplane" means any airplane designed to rise from and alight on the land.

31.101 Seaplane: The term "seaplane" means any airplane designed to rise from and alight on the water.

31.102 Airship: The term "airship" means any aerostat provided with a propelling system and with means of controlling the direction of motion.

31.103 Airport: The term "airport" means any locality, either of water or land, which is adapted for the landing and taking off of aircraft and which provides facilities for shelter, supply, and repair of aircraft; or a place used regularly for receiving or discharging passengers or cargo by air.

31.104 Landing Field: The term "landing field" means any area of land designed for the take-off and landing of aircraft. It may or may not be part of an airport.

31.105 All-way Type of Landing Field: The term "all-way type of landing field" means a landing field usable in all directions for the landing and taking off of landplanes or seaplanes.

31.106 Landing Strip Type of Landing Field: The term "landing strip type of landing field" means a landing field so constructed as to be usable for the landing and taking off of landplanes or seaplanes in certain directions only.

31.107 Landing Strip: The term "landing strip" means a narrow and comparatively long area, comprising a portion of an airport, usable for the landing and taking off of landplanes or seaplanes.

31.108 Runway: The term "runway" means that portion of an airport which is paved or hard-surfaced and adapted for the landing and taking off of landplanes.

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31.2 RATINGS

31.20 Airports for Landplanes: An airport providing landing facilities for landplanes will receive one of the following five ratings:

- (a) L1 Rating
- (b) L2 Rating
- (c) L3 Rating
- (d) L4 Rating
- (e) L5 Rating

31.21 Airports for Seaplanes: An airport providing landing facilities for seaplanes will receive one of the following four ratings:

- (a) W1 Rating
- (b) W2 Rating
- (c) W3 Rating
- (d) W4 Rating

31.22 Airports for Airships: An airport providing landing facilities for airships will receive one of the following three ratings:

- (a) D1 Rating
- (b) D2 Rating
- (c) D3 Rating

31.23 Combination Airports: An airport providing landing facilities for more than one of the three types of aircraft specified in CAR 31.20 through CAR 31.22, will receive a rating under each such classification into which it falls.

31.5 MINIMUM REQUIREMENTS: The requirements herein are the minimum for airport ratings as to physical features, equipment, and facilities. In the event that an airport is qualified for combination ratings as provided for in CAR 31.23, no duplication of facilities is required.

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31.4 MINIMUM REQUIREMENTS FOR LANDPLANE AIRPORTS

31.40 L1 Rating

31.400 Landing Area

31.4000 Size and Design

31.40000 Number of Runways - Whether the landing field is of the all-way type or of the landing strip type, if not completely hard-surfaced, it shall be equipped with at least three hard-surfaced runways for use for both landing and taking-off.

31.40001 Dimensions - If the landing field is of the all-way type, the average distance across it in all directions and the average length of three runways, or, if the landing field is of the landing strip type, the average length of at least three landing strips and of the runways installed thereon, shall be at least:

- (a) 4500 feet at sea level, except that the combined length of the three runways or landing strips shall be not less than 13,500 feet, nor shall any one of the three runways or landing strips be less than 3000 feet in length, or
- (b) A distance greater than 4500 feet by the percentage increase applicable in the case of an elevation corresponding with that of the airport or landing field in question, as shown by Diagram A, except that the combined length of the three runways or landing strips shall be not less than three times such distance, nor shall any one of the three runways or landing strips be shorter than a distance greater than 3000 feet by the same percentage increase. The width of all landing strips shall be at least 500 feet and that of all runways at least 150 feet, irrespective of the elevation of the airport or landing field.

31.40002

Arrangement of Runways - If the landing field is of the all-way type, the runways meeting the requirements of CAR 31.40001 shall be laid out upon it in different directions, with the longest aligned in general direction with the prevailing wind direction and no two converging at an angle of less than thirty degrees. If the landing field is of the landing strip type, all runways used for both landing and taking-off shall be laid out upon different landing strips and shall be so arranged that the longest is aligned in general direction with the prevailing wind direction, that all the wind directions within thirty degrees of the directions in which all such runways are aligned have a total frequency of at least ninety percent, and that no two converge at an angle of less than thirty degrees. The right angle distance from the center line of any runway, at any point thereon, to the nearest edge of the landing field, shall be not less than 250 feet. If any runway is paralleled by another and flying operations are permitted on both at the same time, the distance between their edges shall be at least 500 feet at all points. The wind direction frequencies at the airport shall be determined by a wind rose constructed in accordance with approved practices of the U. S. Weather Bureau and based on observations taken over a period of not less than ten years.

31.4001

Grades - The maximum grade of the usable landing area, longitudinally and transversely, shall be one and one-half percent, except that when a landing strip or a runway slopes in one direction across its entire width, the resulting grade shall not exceed one percent. The contour, both longitudinally and transversely, shall describe an easy gradient curve of long radius, showing no irregularity of grade of more than one-half percent in any 100 feet. No runway shall have a concave surface.

31.4002

Drainage - The drainage of all non-hard-surfaced areas shall be such as to keep them dry and firm enough for safe operation of landplanes under all normal weather conditions, while that of all hard-surfaced areas shall be such as to permit safe landplane operation under all weather conditions, providing immediate run-off of storm water. If an artificial drainage system is used, all mechanical devices shall be constructed and installed in such a way as not to jeopardize the safety of flying operations.

31.4003

Surfaces

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31.40030

Non-hard-surfaced Areas - The surfaces of all non-hard-surfaced areas of the landing field shall be:

- (a) Such as to prevent skidding of landplanes in landing.
- (b) Smooth enough to permit driving in a light-weight automobile at 50 miles per hour, without discomfort to the occupants, over any part thereof other than an area temporarily closed to aircraft use (see CAR 32.4011).
- (c) Substantially dustless and without loose particles.
- (d) Seeded or soddied in such a way as to ensure adequate soil erosion control.
- (e) Such as to meet the grade and drainage requirements of CAR 31.4001 and CAR 31.4002.

31.40031

Hard-surfaced Areas

31.400310

Runways - The surfaces of all runways shall be:

- (a) Such as to prevent skidding of landplanes in landing.
- (b) Smooth enough to permit driving in a light-weight automobile at 80 miles per hour, without discomfort to the occupants, over any part thereof other than an area temporarily closed to aircraft use (see CAR 32.4011).
- (c) Firm enough to withstand the impact loads to which ordinarily subject.
- (d) Such as to meet accepted standard practices of runway construction.
- (e) Such as to meet the grade and drainage requirements of CAR 31.4001 and CAR 31.4002.
- (f) Flush with the adjacent surfaces of the landing area.

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- 31.400311 Other Areas - The surface of all other hard-surfaced areas shall be smooth and substantially dustless under all weather conditions, and shall meet the drainage requirements of CAR 31.4002.
- 31.4004 Obstructions - All landing area surfaces available for aircraft use shall be completely clear of all objects, natural or man-made, including, but without limitation, any boundary cone, wind tee, floodlight mounting, airport building, or other airport appurtenance.
- 31.401 Approaches
- 31.4010 Zoned Areas - The airport's approaches shall consist of the airspace above a zoned area two miles in width, completely encircling the landing field¹. Such area shall be divided into zones of two types, hereinafter termed "approach zones" and "turning zones". Each approach zone shall be a trapezoidal portion of the zoned area 500 feet in width at the boundary of the field and broadening to a width of 2500 feet two miles distant, the center line of which shall be a continuation of the center line of a runway². There shall be one such approach zone at each end of each runway¹. Turning zones shall consist of all portions of the zoned area not contained within approach zones¹.
- 31.4011 Freedom from Obstructions
- 31.40110 Approach Zones - The airspace above approach zones shall be completely clear of all obstructions. For purposes of this requirement, an obstruction shall be any structure, natural feature, or other object, including any airport building, boundary cone, floodlight mounting, or other airport appurtenance, the height of which is more than one-twentieth its distance from the nearest boundary of a landing field less than 5000 feet above sea-level, or more than one-twentyfifth its distance from the nearest boundary of a landing field having a higher elevation.

-
1. See Diagram B.
 2. See Diagram C.

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31.40111

Turning Zones - The airspace above turning zones shall be completely clear of all obstructions, except that airport buildings, boundary cones, floodlight mountings, and other airport appurtenances may be of such a height and so located as to constitute obstructions within any turning zone other than one adjacent to an approach zone for a runway used for instrument-landing. For purposes of this requirement, an obstruction shall be any structure, natural feature, or other object, including any airport building, boundary cone, floodlight mounting, or other airport appurtenance, the height of which is more than one-seventh its distance from the nearest boundary of a landing field less than 5000 feet above sea-level, or more than one-twelfth its distance from the nearest boundary of a landing field having a higher elevation.

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31.402 Marking

31.4020 Boundary Markers¹ The outline of the entire landing area shall be marked by means of painted boundary and range cones located at each angle thereof, and in straight lines between them not more than 330 feet apart. Boundary cones shall be used except where markers are located at the ends of runways, in which case they shall be range cones and shall be arranged in groups in such a way as to differentiate one runway from another and indicate runway direction. The units within each such group shall be spaced not more than 50 feet apart, and the groups themselves shall be separated by at least one boundary marker cone. Each group of range cones shall be arranged in a line normal to the axis of the runway marked by such group. The size and construction of all cones shall be as indicated by Drawing A.P. No. 11, and their colors shall be chrome yellow and black. The chief difference between boundary and range cones shall be their markings or color pattern, which shall be as indicated by Drawing A.P. No. 11.

31.4021 Obstruction Marking²- All man-made structures, or objects, including, but without limitation, towers, masts, smokestacks, tanks, buildings, power lines, fences, and airport appurtenances, shall be marked as obstructions:

- (a) If they are obstructions within the meaning of the term as used in CAR 31.4011; or
- (b) If they are located within one mile of the landing area and are either 100 feet in height or over 100 feet higher above sea level than the surface of the landing field.

Such obstructions shall be marked as follows:

- (a) Small obstructions such as fence posts shall be painted a solid white or chrome yellow.
- (b) Obstructions of the narrow type³ shall be marked by horizontal bands or stripes of chrome yellow, alternated with black or white, terminating at

1. For requirements as to the lighting of boundary and range markers see CAR 31.40321.
2. For requirements as to obstruction lighting, see CAR 31.40322.
3. Including any obstruction not of the extended type.

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the top and bottom with yellow stripes. The width of the black or white stripes shall be one-half that of the yellow stripes, which shall be one-seventh the height of any obstruction less than 250 feet in height or 30 to 40 feet in the case of a higher obstruction.

- (c) Obstructions of the extended type¹ shall be marked on the top surface by a checkerboard pattern in the same colors, the checkerboard blocks to be not less than 10 feet square.

In addition, any part of the landing area unsafe for aircraft use shall be marked by red flags at least 2 feet square, so located as to designate the boundaries of the unsafe area.

31.4022

Identification Marker²- The airport shall be equipped with at least one identification marker, consisting of a sign painted, or constructed in any other manner, upon a flat or nearly flat roof of a prominent airport building, or painted upon a base set in the ground constructed of crushed stone, concrete, or other material not displaceable under airplane traffic. Chrome yellow or white shall be used for all characters, and in the case of a marker painted upon a roof, dark black for the background. The marker shall spell out the name of the airport and that of the principal political subdivision served by the airport, and indicate the true north direction by means of an arrow and a letter "N". Such marker shall be clearly legible from an altitude of 5000 feet under daytime conditions of ordinary visibility.

31.4022

Runway Marking³- All dark colored runways shall be marked with paint of a contrasting color in such a way as to assist pilots of incoming aircraft in determining the location of runway edges at night and during conditions of low visibility.

-
1. Including any obstruction having a top surface more than 900 square feet in area.
 2. For requirements as to the lighting of the identification marker, see CAR 31.403290.
 3. For requirements as to runway lighting, see CAR 31.40324.

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(Outline No. 4)

31.4030 DEFINITIONS

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31.403 Lighting

31.4030 Definitions - As used in this Chapter, the following terms have the meanings given.

31.40300 Colors¹

31.403000 "Aviation Red" - The term "aviation red"² means any color for which:

 y is not greater than 0.335, and

 z is not greater than 0.002 (See Fig. 1)

31.403001 "Aviation Yellow" - The term "aviation yellow"³ means any color for which:

 y is not less than 0.402

 y is not greater than 0.460, and

 z is not^x greater than 0.007 (See Fig. 1)

1. These fundamental definitions of aviation colors are expressed in terms of the "standard observer" and coordinate system adopted by the International Commission of Illumination (I.C.I.) at Cambridge, England in 1931, and published in the Journal of the Optical Society, Vol. 23, p.359, October, 1933.

2. "Aviation Red" is a color having a dominant wave length of not less than 0.610 micron. This is in accordance with the definition adopted by the I.C.I. in Karlsruhe, Germany in 1935. It permits a color very slightly more orange than is permitted by the requirement for position lights in Aeronautics Bulletin 7F Section 16(c). The pale limit is very close to the color of the usual neon lamps with colorless glass tubing.

3. "Aviation Yellow" is a color having a dominant wave length of not more than 0.594 micron nor less than 0.584. This is in accordance with the definition adopted by the I.C.I. in 1935.

31.403002 "Aviation Green" - The term "aviation green" ¹ means any color for which:

x is not greater than $.440 - .320 y$

x is not greater than $y - 0.170$, and

y is not less than $0.330 - 0.170 x$. (See Fig. 1)

31.403003 "Aviation White" - The term "aviation white" ² means any color for which:

x is not less than 0.350

x is not greater than 0.540

$y - y_0$ is not numerically greater than 0.01 , y_0 being the y coordinate of the Planckian radiator for which $x_0 = x$ (See Fig. 1)

31.40301 Photometric Terms

31.403010 "Axial Candlepower" - The term "axial candlepower" means the maximum candlepower of a vertical candlepower distribution taken in a plane through the center of the horizontal candlepower distribution.

31.403011 "Axis" - The term "axis", as applied to a beam, means the direction of maximum candlepower in the vertical plane through the center of the horizontal distribution.

1. "Aviation Green" is a color having a dominant wave length of not more than 0.535 micron and of not less than 0.494 micron with respect to the equal-energy stimulus (See Fig. 1) as the heterogeneous stimulus (center of dominant wave length projection). The second equation of the fundamental definition, which excludes undesirably pale (white) colors, is roughly equivalent to a requirement that the purity shall be 42% or more. It is consistent with the definitions adopted by the I.C.I. in 1935 but does not allow greens as yellowish as are allowed by the I.C.I. definition.

2. "Aviation White" is a color intermediate between that of a kerosene flame and noon sunlight.

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31.403012

"Integrated Horizontal Intensity" - The term "integrated horizontal intensity" means the integral, or summation, of the area under the curve showing the horizontal candlepower distribution taken between the angles on either side of the axis of the beam at which the candlepower first drops to 10% of the specified axial candlepower, this candlepower distribution curve being drawn in rectangular coordinates. The unit area is that represented by a rectangle the height of which corresponds to 1 candle and the width of which corresponds to 1°. The area may be determined by an integrator, or from the sum of the ordinates at intervals of not more than .2° multiplied by the angular interval.

31.403013

"Beam Spread" - The term "beam spread" means the maximum angle in the horizontal plane within which the candlepower of the unit is in every direction in excess of 10% of the axial candlepower of the unit.

31.403014

"Vertical Divergence" - The term "vertical divergence" means the maximum angle measured from the axis, in the vertical plane through the axis, within which the candlepower is in excess of 10% of the axial candlepower.

31.403015

"Photometric Distance" - The term "photometric distance" means the distance from the center of the aperture of the reflector or lens of the unit to the center of the test plate or aperture of the light-sensitive element used for measuring the candlepower of the unit. The photometric distance shall not be less than the value given by the formula:

$$D = R d / r, \text{ in which:}$$

D= photometric distance

R= maximum radius of the aperture of the unit

d= maximum length of optical path from the source to the aperture of the reflector or lens

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r = minimum radius of the envelope of the projected source¹ as seen from the point to which d is measured

d/r = the cotangent of the minimum half angle subtended by the source from any part of the optical system.

31.403016

"Test Lamp" - The term "test lamp" means a properly seasoned lamp of one of the types for which a unit is designed to be used.

1. Each coil of a filament must be considered a separate source unless the optical system is designed to spread the beam transversely to the coil.

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(Outline No. 5)

31.4031 MEASUREMENTS

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31.4031 Measurements - In determining compliance with lighting requirements, candlepower, color, and the distribution of candlepower horizontally and vertically shall be measured as follows:

31.4031C Candlepower - The photometer used in measuring candlepower may be either ocular or photoelectric but shall have a reproducible precision of not less than plus or minus 3%. The photometer shall be calibrated for light of spectral composition similar to that of the light being measured. If a photoelectric instrument is used, it shall be calibrated at three or more representative illumination levels. If an ocular photometer is used, the observations shall be made with a comparison source giving a satisfactory color-match with the test light. The comparison source may be calibrated by using a standard lamp of known color-temperature in combination with a standard filter the transmission of which is known for light of that color temperature, or by color-matching and standardizing the comparison lamp with a standard lamp of known candlepower and color-temperature and then introducing a comparison filter having a known transmission. Whenever it is necessary to read values with an incomplete color match, several observers shall be used to avoid errors due to the personal characteristics of the observers.

The measurements shall be corrected to the normal average initial lumens of the lamp. If reflectors, lenses, or cover glasses having selective transmission are used (green or red), this correction shall be based on measurements made at typical angles, with the lamp operated at its normal average initial lumen output in order to avoid errors due to differences in transmission, corresponding to differences in efficiency of the lamp. The normal average initial lumens of the lamp will be assigned by the National Bureau of Standards. If an out-door range is used, correction shall be made for the atmospheric transmission and for stray light.

31.4031E Color - Colors shall be tested by means of an ocular photometer, the comparison field of which has been color-matched with either a primary-standard filter-illuminant combination, or a working-standard filter-illuminant combination. Comparison and test fields of the photometer shall be matched for brightness during the color matching with the standard, and the testing of the test source. In cases of doubtful compliance with these specifications, the opinions of three observers shall be obtained, of which the agreement of two shall be final.

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31.40312 Candlepower Distribution

31.403120 Horizontal - Horizontal distribution curves for rotating airport beacons, for the high intensity flashes of intermediate airport beacons, and for ceiling projectors shall be prepared for illumination measurements taken at angular intervals of not more than 0.2 degrees, throughout the sector within which the candlepower exceeds 10% of the axial candlepower.

Horizontal candlepower distribution curves for landing area floodlights shall be prepared from illumination measurements taken in sufficient directions to permit the plotting of a well determined smooth curve throughout the sector within which the candlepower exceeds 10% of the maximum candlepower for the unit.

The horizontal candlepower distribution of auxiliary airport code beacons, boundary light units, obstruction light units, and any other units having distribution essentially independent of the horizontal angle, shall be checked for uniformity; and the angular width and minimum candlepower of any shadow sectors shall be determined.

31.403121 Vertical - Vertical candlepower distribution curves for rotating airport airport beacons, for the high intensity flashes of intermediate airport beacons, and for ceiling projectors shall be prepared from illumination measurements taken at angular intervals of not more than 0.2 degrees, up to 3 degrees above the axis of the beam, and at angular intervals of not more than 1 degree above that angle, throughout the sector within which the candlepower exceeds 10% of the axial candlepower.

Vertical candlepower distribution curves for landing-area floodlights shall be prepared from illumination measurements taken in sufficient directions to permit the plotting of a well determined smooth curve throughout the sector within which the candlepower exceeds 10 percent of the maximum candlepower for the unit.

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Vertical candlepower distribution curves for auxiliary airport code beacons, boundary light units, obstruction light units, and contact lights, shall be prepared from illumination measurements taken at angular intervals not exceeding 2 degrees throughout the sector from 5 degrees below the horizontal to 15 degrees above the horizontal, and at angular intervals not exceeding 10 degrees throughout the sector from 20 degrees to 70 degrees above the horizontal. If necessary, additional readings shall be taken in the sector of maximum candlepower to establish the angle and intensity of that maximum.

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(Outline No. 6)

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31.4032 Minimum Requirements - The minimum requirements with respect to the lights and lighting of the airport shall be as follows.

31.40320 Beacons - The airport shall be equipped with a rotating beacon of either the "Rotating Airport Beacon" or "Intermediate Airport Beacon" type, together with an "Airport Code Beacon."

31.403200 Rotating Airport Beacon - If the rotating beacon is of the "Rotating Airport Beacon" type it shall meet the following requirements.

31.4032000 Flash Characteristics - The beacon shall give a principal clear flash and a principal green flash alternately, and may also show a fixed light or subordinate flashes between the principal flashes. The interval from one principal flash to the next principal flash of the same color shall be 10.0 seconds and the interval between the principal clear flash and the subsequent principal green flash shall be either 2.5 seconds or 5.0 seconds. The clear flash shall be aviation white and the green flash aviation green, as defined in CAR 31.40300.

The interval between flashes shall be understood to mean the time from the maximum of one flash to the maximum of the next flash and shall be determined by finding the period of one complete rotation of the beacon and computing the interval between the flashes from the period and the angle between the beams. The period shall be found by taking the mean elapsed time per rotation for 5 groups of not less than 5 successive rotations. A tolerance of plus or minus 5% is allowed on the final mean flash interval but the means of the separate groups must not deviate more than 1% plus or minus from the mean of all the rotations timed. In case the design, construction, or operation of the beacon is such that the inspector is unable to obtain a satisfactory measure of the actual angles between the beams, the interval between successive flashes may be directly determined by taking the mean of not less than 20 independent intervals times with a high-grade stop watch.

31.4032001 Candlepower - The axial candlepower of the "clear" or "white" flash shall be not less than 1,000,000 candles, and the integrated horizontal intensity¹ for this beam shall not be less than 2,500,000 candle-degrees. The axial candlepower of the green flash shall not be less than 200,000 candles and

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1. Determined as prescribed in CAR 31.40301.
 2. As defined in CAR 31.40301E.

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the integrated horizontal intensity for this beam shall not be less than 500,000 candle-degrees.

- 31.4032002 Focusing - The optical system of the beacon shall be adjustable so as to make possible the tilting of both the beam axes through an angle of at least 3° above the horizontal. Means for focusing the beacon shall be provided and shall be such that the focusing can be done in daylight.
- 31.4032003 Lamps - Two lamps of the necessary voltage shall be furnished. Each lamp shall have an established average rated life of not less than 500 hours and shall be provided with a bi-post or mogul prefocus base.
- 31.4032004 Surfaces - The exposed surfaces of cover glasses and lenses shall be smooth to prevent the collection of dirt, snow and ice, and to facilitate cleaning. The glass shall be suitable for the purpose intended in all respects.
- 31.4032005 Lamp Changer - The beacon shall be provided with a lamp changer of reliable design and construction, providing at least one stand-by lamp. The construction shall be sufficiently sturdy and accurate to insure holding the service lamp in its proper focal position and bringing the light source of the stand-by lamp(s) into the correct focal position when the service lamp fails. This shall be accomplished without undue shock to the lamp(s). The sockets shall be of the bipost, or prefocus type and shall be so attached that there is no danger of dislocating the focusing adjustment either by the operation of the lamp changer or in the process of renewing lamps. In each position the lamp changer shall be definitely locked to prevent accidental displacement of the lamp in the service position. The design shall be such that the lamp changer is not operated by the failure or cutting off of the power supply, but must without fail bring the stand-by lamp(s) into position within 1.0 second after the burning out of the service lamp. The operation of the lamp changer shall automatically open the circuit through the service lamp socket and close the circuit through the socket which comes into the service position. The design shall be

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such that the lamp changer cannot be operated due to concentration of the sun's rays on any of its parts. No mechanism requiring undue continuous wattage for its operation shall be approved.

31.4032003

Housing - The housing of the beacon shall consist entirely of non-corrosive metal and glass parts. It shall completely protect the lamp(s), automatic lamp changer, stray light shields, and all parts of the optical system except the smooth surfaces of lenses used in place of cover glasses. The housing shall be provided with a door or doors sufficiently large and so located as to facilitate the proper maintenance of the parts inclosed within the housing. The door(s) shall be provided with gaskets, of suitable type, sealing the door openings against the entrance of dirt and moisture.

31.4032007

Base - The base shall house the rotating mechanism, including the bearings, motor gears, and contact devices for conducting the current to the lamp(s). It shall be made entirely of non-corrosive metal. An opening or openings shall be provided of sufficiently large size, and so located, as to facilitate the maintenance of the parts within the base. The opening(s) shall be provided with covers and gaskets of suitable type, sealing the opening(s) against the entrance of dirt and moisture. A terminal block for electrical connections shall be provided in the base. The base shall be provided with a suitable means of attachment to the beacon tower on the three point principle. The rotating mechanism shall conform with the requirements of Specifications No. 148 of the Bureau of Air Commerce.

31.4032008

Tower - The beacon shall be mounted upon a tower, complete with ladder and top platform, conforming with the requirements of Specifications No. 348-A of the Bureau of Air Commerce.

31.4032009

Location - The beacon shall be located not more than $\frac{1}{4}$ mile from the landing area, and so as to be clearly visible therefrom.

31.403201

Intermediate Airport Beacon - If the rotating beacon is of the "Intermediate Airport Beacon" type, it shall meet the following requirements.

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- 31.4032010 Flash Characteristics - The beacon shall give a high-intensity flash, followed by a flash or flashes of lower intensity but of longer duration. In each cycle there shall be at least one green flash and one clear flash. The duration of the cycle shall be either 5 or 10 seconds. The clear flash shall be aviation white, and the green flash aviation green. The duration of the cycle shall be understood to mean the time from the maximum of one high-intensity flash to the maximum of the next high-intensity flash and shall be determined by finding the mean elapsed time per cycle for 3 groups of not less than 5 successive cycles. A tolerance of plus or minus 5% is allowed on the final mean flash interval but the means of the separate groups must not deviate more than 1% plus or minus from the mean of all the cycles timed.
- 31.4032011 Candlepower - If the high-intensity flash is clear, its axial candlepower shall be not less than 1,000,000 candles and the integrated horizontal intensity¹ for this beam shall not be less than 2,500,000 candle-degrees. In this case the green flash shall have a maximum candlepower of not less than 6,000 candles. If the high intensity flash is green, the "clear" flash shall have a maximum candlepower of not less than 30,000 candles. The maximum candlepower of the subordinate clear and green flashes shall be taken as the maximum candlepower shown in the vertical candlepower distribution curve measured in the vertical plane through the mid-point of the flash. The candlepower of the high intensity flashes at any angle shall be not less than the value for that angle shown in Figure 2.
- 31.4032012 Focusing - The optical system of the beacon shall be adjustable so as to make possible the tilting of the principal beam axis through an angle of at least 3° above the horizontal. A consequent change in the vertical angle of the other beam or beams is allowed if not excessive. Means for focusing the beacon shall be provided and shall be such that the focusing can be done in daylight.
- 31.4032013 Lamps - Same as CAR 31.4032003.
- 31.4032014 Surfaces - Same as CAR 31.4032004.
- 31.4032015 Lamp Changer - Same as CAR 31.4032005.
- 31.4032016 Housing - Same as CAR 31.4032006.

1. As defined in CAR 31.403012.

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- 31.4032017 Base - Same as CAR 31.4032007.
- 31.4032018 Tower - Same as CAR 31.4032008.
- 31.4032019 Location - Same as CAR 31.4032009.
- 31.403202 Airport Code Beacon -
- 31.4032020 Flash Characteristics - The beacon shall show a flashing light, flashing the code signal assigned the airport by the Bureau of Air Commerce. All flashes shall be aviation green in color, when seen from any direction. The duration of a "dot" flash¹ shall be not less than .3 second and shall be longer if necessary to allow the candlepower of the beacon to attain at least 75% of its "fixed" light candlepower. The duration of an eclipse between flashes of the same letter (or number) shall be the same as the duration of a "dot" flash. The duration of a "dash" flash shall be three times that of a "dot" flash. The duration of an eclipse between letters (or numbers) shall be the same as that of a "dash" flash. The duration of an eclipse between repetitions of the code signal shall be three times that of a "dash" flash.
- 31.4032021 Candlepower - The candlepower at any angle shall be not less than the value for that angle shown in Figure 3.
- 31.4032022 Focusing - The optical system shall be adjustable so as to make possible the raising and lowering of an axis of maximum candlepower through an angle of at least 5° above the horizontal. This adjustment shall be made by raising or lowering the lamp holder by use of shims which shall be marked to show the inclination of beam.
- 31.4032023 Lamps - Same as CAR 31.4032005.
- 31.4032024 Glassware - The glassware used in the beacon shall be suitable for the purpose intended in all respects.
- 31.4032025 Lamp Charger - The beacon shall be designed to use two independent lamps simultaneously.
- 31.4032026 Housing - Same as CAR 31.4032006.

1. The duration of a flash, or eclipse, is the time elapsing between the making and breaking, or breaking and making, of the lamp circuit.

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- 31.4032027 Base and Flasher Mechanism - The base shall be made entirely of non-corrosive metal, and shall provide a terminal block for electrical connections together with suitable means of attachment to the supporting structure. The flasher mechanism shall be of high commercial quality, permitting quiet operation, and shall have a code cam accurately cut to give the code signal assigned, a contactor of the sealed type, and an effective means of adequately suppressing all interference with radio reception. It shall be driven by an inductor or synchronous motor giving accurate timing and permitting synchronous flashing of the two lamps, and shall be enclosed in a moisture and dust-proof cabinet which may be readily opened for inspection and servicing.
- 31.4032028 Tower - Same as CAR 31.4030008.
- 31.4032029 Location - The airport code beacon shall be located at the airport and shall be so placed as to permit beam visibility from all directions.
- 31.40321 Boundary and Range Lights - Each boundary cone (see CAR 31.4020) shall serve as the mounting for a boundary light, and each range cone (see CAR 31.4020) as the mounting for a range light. Such boundary and range lights shall meet the following requirements.
- 31.403210 The Unit - The light unit, both boundary and range, shall consist of a lamp, a glass globe, a fitting housing a socket, a cone, a connecting cable or conduit, and a splice box. The lamp, socket, fitting, cable, and splice box may be of the series or multiple type.
- 31.403211 Colors - The color of the globe and of the light emitted shall be, in the case of a boundary light, aviation red if the light is used to indicate a dangerous area, and aviation white otherwise, and in the case of a range light, aviation green.
- 31.403212 Candlepower - The candlepower at any angle in the vertical distribution shall be not less than the value for that angle shown in Figure 4.¹

1. In determining compliance with this requirement, measurements may be made either on a distribution photometer or by mounting the optical system of the unit on a goniometer and using any suitable photometer.

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31.403213

Surfaces - The exterior surface of any globe exposed to the weather shall be smooth to prevent the collection of dirt, snow, and ice, and to facilitate cleaning. The glass shall be suitable for the purpose intended in all respects. The design of the globe shall be such that it may be readily removed from the fitting and cleaned.

31.403214

Fittings - The fitting shall be made of non-ferrous or non-corroding metal and shall be weather-proof. It shall house the socket and be so designed as to allow the socket and fitting to be readily separated for convenience in wiring the socket. The socket shall be of the porcelain type and, if used in a series circuit, shall contain a film cutout for reestablishing the circuit when the lamp burns out. The socket shall be rigidly mounted at the proper height to bring the filament of lamps of the type for which the fitting is designed to the correct focal position, without the use of socket extensions. The fitting shall be attached to the metal cap at the top of cone in such a manner that the wiring from the socket terminals through the cap of the cone are not exposed to the weather, and all joints shall be watertight.

31.403215

Splice Box - The splice box used in a series circuit shall be provided with a receptacle which automatically reestablishes the circuit when the plug is removed therefrom, and a spring cover which completely closes and weatherproofs the receptacle housing for series unit fittings. The splice box shall be of non-corrodible metal or have a hot-dipped galvanized finish, the galvanizing being in accordance with Federal Specification W-0-821. It shall be installed close to the ground surface under the cone of the light unit. Standard insulating compound shall be poured into the splice box as required to cover the cable entrances of the box and seal-in the cables.

31.403216

Cable - The connecting cable for series units shall be a two conductor, or two single conductor, 1000 volt, heavy duty, rubber insulated, cable, terminating in a plug at the lower end. The connections at both ends shall be of adequate mechanical strength, and the connection to the plug shall be thoroughly and effectively water-proofed. The plug shall be designed for the maximum open circuit voltage of the regulator. The connecting wire for multiple units shall be #14 lead covered rubber insulated duplex wire, run inside of pipes conduit, as shown in Bureau of Air Commerce drawing #554.

C I V I L A I R R E G U L A T I O N S

31.403217

Mounting - For series circuits, the cones upon which the boundary and range lights are mounted (see CAR 31.4020) shall be of the "turn-over" type, and each shall have an opening closed with a door of sufficient size and so located as to provide convenient access for connecting the cable to the splice box. Cones for multiple circuits may be mounted on pipe conduit as shown in Bureau of Air Commerce drawing 554, or may be of the "turn-over" type required for series circuits. Each unit shall be mounted on a 4-foot circle of crushed stone painted with a mixture of five pounds of white Portland cement to one gallon of skimmed milk, the space underneath the light unit having first been oiled.

31.403218

Circuit - The boundary and range light circuit may be used also for wind tee lights and for obstruction lights installed as required by CAR 31.40322, but no other lights shall be connected therein. Series circuits may include series-to-multiple transformers for wind tee lights and obstruction lights and series-to-series transformers for obstruction light circuits. Such series circuits shall be operated by remote control. Multiple circuits may include branch circuits serving the wind tee and obstruction lights. Such circuits shall be designed to limit the voltage drop to 5% of the terminal voltage.

31.40322

Obstruction Lights - All man-made structures and objects required by CAR 31.4021 to be marked as obstructions, and, in addition, all natural features, including, but without limitation, trees and hills, shall be lighted as obstructions (1) if they project into the approaches, or (2) if they are located within one mile of the landing area and are either over 100 feet in height or over 100 feet higher above sea level than the surface of the landing area. Such obstruction lights shall be "fixed" rather than flashing, and shall meet the following requirements.

31.403220

The Unit - The obstruction light unit shall consist of a lamp, a glass globe, and a fitting housing a socket. The lamp, socket, and fitting may be of the series or multiple type.

31.403221

Color - The color of the glass of the globes shall be such that, when used with lamps, the resulting color is aviation red.¹

1. This requirement is the same as that as to the color of globe for boundary lights used to indicate a dangerous area (see CAR 31.403211)

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- 31.403222 Candlepower - The candlepower at any angle in the vertical distribution shall be not less than the value for that angle, at the mounting height above the ground of the unit in question, as shown in Figure 4.¹ Every obstruction light shall be so constructed and mounted as to be visible as a red light at all angles from 45° below and horizontal to the zenith in all directions of azimuth in which the vertical candlepower distribution is required by CAR 31.403121 to be plotted.
- 31.403223 Fittings - Same as CAR 31.403214, except that instead of being attached to a cone, the fitting shall be provided with a thread to fit a conduit.
- 31.403224 Standby Equipment - Each obstruction light located at the top of an isolated narrow obstruction, or at either end of a row of obstructions, or at any corner or angle in an extended configuration, shall consist of either two independent lamps burning simultaneously, or two lamps connected with a change-over relay arranged so that if one burns out the other is automatically and immediately lighted.
- 31.403225 Location of Lights - If an obstruction is of a nature preventing the mounting of lights directly upon it, the lights shall be mounted on poles adjacent to the obstruction in such a way as to indicate its extent and height. In the case of trees, such obstruction lights shall be mounted at least 5 feet above the plane of the tree-tops.
- 31.403225C Narrow Obstructions - Obstructions of the narrow type, such as radio towers or masts, transmission line towers, spires, and narrow building towers, water towers, smokestacks and flagpoles, need not be obstruction-lighted to show their contour, but shall be obstruction-lighted as follows:

- (a) At least one obstruction light shall be located at the top of the obstruction.
- (b) If the top of the obstruction is more than 70 feet higher than the lowest level at which the structure or feature would still be an obstruction if only so high (see CAR 31.40322)², at least one additional obstruction light shall be located at such level.

1. Measurements may be either on a distribution photometer or by mounting the optical system of the unit on a goniometer and using any suitable photometer.

2. The lowest of the following levels:

- (a) the level at which the object protrudes through an approach or turning space plane;
- (b) the 100 foot level, or (c) the level 100 feet higher above sea-level than the surface of the landing area.

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- (c) If the top and bottom obstruction lights are more than 70 feet apart, additional obstruction lights shall be located at evenly spaced intermediate levels not over 100 feet nor less than 35 feet apart.
- (d) At each of the above levels, except the top when less than 10 feet in maximum diameter, obstruction lights shall be located at two diagonally opposite corners. The lights at the different levels shall be located on staggered diagonals, showing the width of the structure from all directions.

31.4032251 Extended Obstructions - Obstructions of the extended type, such as buildings, gas tanks, bridges, grain elevators, pole lines, and groups of trees, shall be obstruction-lighted to show their contour, as follows:

- (a) Obstruction lights shall be so located as to mark the contour of the top, such lights being not more than 300 feet apart. These lights shall indicate the highest points of the obstruction and shall be so arranged and mounted that sufficient obstruction lights to give an adequate indication of the extent of the obstruction are visible from all directions of approach.
- (b) Same as CAR 31.4032250, (b), (c), and (d).

31.40323 Floodlighting - The airport shall be equipped to floodlight any portion of the landing area usable in landing and taking-off, the exterior of the administration building on the side facing the landing area, and all hanger and administration building aprons.

31.403230 Landing Area

31.4032300 Characteristics

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- 31.40323000 Glare - The design and arrangement of the floodlight units shall be such that pilots are not subjected to glare when landing in any direction.¹
- 31.40323001 Shadows - The installation shall be so designed that airplanes do not cast confusing shadows on the landing area in landing. In addition, if irregularities in the contour of the field would otherwise result in shadow areas, an auxiliary unit or battery shall be used to illuminate the low areas.
- 31.40323002 Intensity of Illumination - For every direction of landing, the landing area floodlight system shall provide an elliptical lighted area having a width of not less than 500 feet, and a length of not less than 60% of the total length of the landing area available up to 5000 feet, throughout which the normal illumination shall be not less than 0.20 foot candles; but in no case shall the area illuminated to this intensity be less than 1800 feet in length. Where runway or directional floodlighting is utilized, the approach end of the runway shall be included in the area illuminated.
- 31.40323003 Vertical Divergence - The upper portion of the floodlight beam shall have a sharp cut-off, so that the intensity of the beam is reduced to 10% of the maximum intensity within 3 degrees.
- 31.40323004 Uniformity - The illumination shall be free from any abrupt changes in intensity attributable to the floodlight system.
- 31.40323001 Lamp Changer - If a single unit depending upon a single incandescent lamp is intended for independent operation it shall be provided with a lamp changer meeting the requirements of CAR 31.4032005.
- 31.40323002 Mounting - The mounting height of the floodlight units shall be such that the top of the beam at the unit is not more than 30 feet above the surface of the field at its nearest point.

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1. Any direct light from any unit of the floodlight system which is visible to a pilot in a direction within 40 degrees of the direction of flight will be considered for this purpose as constituting glare. This requirement, in general, makes it desirable that there should be two or more floodlight installations on separately controlled circuits so that the installation used for any direction of landing will be outside of the 40 degree angle at all times after the plane has entered the illumination sector. In some cases, however, it will be found to be more practicable to use a single installation for all direction of landing, in which case a shadow bar must be provided.

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- 31.4032303 Location - No landing area floodlight unit shall be located in line with any runway or landing strip, or within 100 feet of the center line of any runway or landing strip.
- 31.403231 Building Exterior and Apron - Building exterior and apron floodlighting shall have a minimum intensity of 2 and 0.5 foot candles respectively. The floodlight units shall be so arranged that no direct light is visible from the landing area.
- 31.40324 Contact Lights - The airport shall be equipped with heavy-duty contact lights marking runways designed for instrument-landing (see CAR 31.4066) and with normal-duty contact lights marking all other runways aligned in general direction with wind directions having a frequency of 25% or more, as determined by the wind rose required by CAR 31.400020.
- 31.403240 The Unit - The contact light unit shall be of the flush type, and shall consist of a housing mounting, a lamp socket, and an optical system including a lamp and a cover glass. A transformer may also be contained in the base of the housing, and if the cover glass does not give the mechanical protection specified in CAR 31.403243, a separate guard shall be provided. All joints shall be gasketed and bolted, and the entire housing assembly shall be entirely watertight. The socket shall be porcelain, or other material designed to resist moisture, and shall be rigidly mounted in place. If a reflector is used, it shall have a reflecting surface protected adequately against corrosion and loss of reflectivity.
- 31.403241 Colors - Contact lights shall be aviation yellow where the lights mark the approach end of an instrument-landing runway (see CAR 31.403245), and aviation white otherwise.
- 31.403242 Candlepower - In the case of heavy-duty contact lights, the candlepower at any angle in a vertical plane parallel to the runway and directed towards the approaching aircraft, shall be not less than the value for that angle, as shown in Figure 1. In the case of normal-duty units of all types, the candlepower at any angle in any vertical plane shall be not less than the value for that angle shown in Figure 2.¹

1. In determining compliance with these requirements, measurements may be made either on a distribution photometer or by mounting the optical system of the unit on a goniometer and using any suitable photometer.

C I V I L A I R R E G U L A T I O N S

- 31.4032303 Location - No landing area floodlight unit shall be located in line with any runway or landing strip, or within 100 feet of the center line of any runway or landing strip.
- 31.403231 Building Exterior and Apron - Building exterior and apron floodlighting shall have a minimum intensity of 2 and 0.5 foot candles respectively. The floodlight units shall be so arranged that no direct light is visible from the landing area.
- 31.40324 Contact Lights - The airport shall be equipped with heavy-duty contact lights marking runways designed for instrument-landing (see CAR 31.4060) and with normal-duty contact lights marking all other runways aligned in general direction with wind directions having a frequency of 25% or more, as determined by the wind rose required by CAR 31.400020.
- 31.403240 The Unit - The contact light unit shall be of the flush type, and shall consist of a housing mounting, a lamp socket, and an optical system including a lamp and a cover glass. A transformer may also be contained in the base of the housing, and if the cover glass does not give the mechanical protection specified in CAR 31.403243, a separate guard shall be provided. All joints shall be gasketed and bolted, and the entire housing assembly shall be entirely watertight. The socket shall be porcelain, or other material designed to resist moisture, and shall be rigidly mounted in place. If a reflector is used, it shall have a reflecting surface protected adequately against corrosion and loss of reflectivity.
- 31.403241 Colors - Contact lights shall be aviation yellow where the lights mark the approach end of an instrument-landing runway (see CAR 31.403245), and aviation white otherwise.
- 31.403242 Candlepower - In the case of heavy-duty contact lights, the candlepower at any angle in a vertical plane parallel to the runway and directed towards the approaching aircraft, shall be not less than the value for that angle, as shown in Figure 1. In the case of normal-duty units of all types, the candlepower at any angle in any vertical plane shall be not less than the value for that angle shown in Figure 2.¹

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1. In determining compliance with these requirements, measurements may be made either on a distribution photometer or by mounting the optical system of the unit on a goniometer and using any suitable photometer.

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- 31.403243 Cover Glass - The cover glass shall be designed to resist stresses caused by the temperature variations normally to be met as a result of exposure to the weather, and shall either have sufficient strength to support 60 lbs. per square inch or be reinforced with a metal plate providing such strength. The exterior surface of the cover glass shall be smooth, to facilitate cleaning and to prevent the accumulation of dirt. The cover shall project a maximum of 2 inches above the level of the ground.
- 31.403244 Housing - The housing shall be made of heavy-cast, rust-resisting metal, either non-ferrous, or ferrous protected by hot dipped galvanizing. The design shall provide ample mechanical strength, with reinforcing members where stresses are concentrated, if needed.
- 31.403245 Mounting - Flush contact and marker lights shall be set in blocks of concrete four feet in diameter, or if set in paved areas, shall be grounded securely into the paving.
- 31.403246 Placing of Lights - Contact lights used to mark a runway designed for instrument-landing shall be spaced 100 feet apart in two rows 200 feet apart, one row along each edge of the runway. Contact lights used to mark any other runway shall be spaced 200 feet apart in two rows at least 150 feet apart, one row along each edge of the runway. In either case, each light shall be directly opposite another in the other row.
- 31.40325 Instrument-landing Lighting - In addition to the contact light marking required by CAR 31.40324, any runway designed for instrument-landing shall be marked by the lighting of the approach lane at its approach end by means of red neon tubing units in accordance with Bureau of Air Commerce specifications EA-227, EA-248, and EA-255.
- 31.40326 Course Light - If the rotating beacon is located more than one mile from the landing area, a fixed course light, directed towards the airport shall be installed on the beacon tower.
- 31.403260 Color - The color of the course light shall be aviation white.
- 31.403261 Candlepower - The axial candlepower shall be not less than 200,000 candles, and the integrated horizontal intensity of the beam shall be not less than 1,800,000 candle degrees. The candlepower at any angle in the vertical distribution shall be not less than the value for that angle shown in Figure 6.

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- 31.403262 Surfaces - The exposed surfaces of cover glasses and lenses shall be smooth to prevent the collection of dirt, snow and ice, and to facilitate cleaning. The glass shall be suitable in all respects for the use intended.
- 31.403263 Housing - The housing of the course light shall consist entirely of non-corrosive metal and glass parts. It shall completely protect the lamp, stray-light shields if used, and all parts of the optical system except the smooth surfaces of lenses used in place of cover glasses. The housing shall be provided with a door or doors sufficiently large and so located as to facilitate the proper maintenance of the parts enclosed within the housing. Such door shall be provided with gaskets, of suitable type, sealing the door openings against the entrance of dirt or moisture. Means shall be provided for focussing the course light in daylight.
- 31.40327 Building Interior Lighting - The interiors of all airport buildings shall be artificially lighted in such manner as to provide illumination adequate for their normal use.
- 31.40328 Instrument Lighting
- 31.403280 Wind Tee¹
- 31.4032800 Means of Illumination - The tee shall be illuminated by outlining its strokes either by means of incandescent lamps with green globes or by means of gaseous discharge tubes emitting a green light. If incandescent lamps are used, the spacing shall be 12 inches on centers. If tube lighting is used, the strokes shall be outlined by duplicate tubing circuits connected to independent high-voltage transformers of the sign-lighting type so arranged that the failure of one tube or transformer will not interfere with the operation of the other tube. Both tubes shall be used together normally. The sockets for use with incandescent lamps shall be of the porcelain type. If cold cathode gaseous discharge tube lamps are used the tubes shall not be more than 11 millimeters in inside diameter. The transformers shall have a secondary current rating of not less than 80 milliamperes and a secondary voltage sufficient to give a current of not less than 25 milliamperes through the tube. The tubes shall be mounted and connections insulated in accordance with the standard methods employed in the case of electric tube signs.

1. For other wind tee requirements, see CAR 31.4061.

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- 31.4032801 Color - If incandescent lamps are used, the color of the glass of the globes shall be such that, when used with any lamps for which the globes are designed, the resulting color is aviation green, giving the tee the appearance of a single-stroke green "T" when viewed from above at night. If mounted on a roof, the surface thereof shall be unlighted at night.
- 31.403281 Wind Cone¹ - The wind cone shall be illuminated either by means of four 150 watt lamps in wide angle reflectors, arranged so that the cone is illuminated from above, in all positions it may assume under the influence of the wind, or by means of lights mounted inside the cone, if illumination and visibility are sufficient to correspond to that given by external illumination meeting the above requirements.
- 31.403282 Ceiling Projector²
- 31.4032820 Characteristics - The beam of a ceiling projector shall be aviation white in color. Its axial candlepower shall be not less than 500,000 candles. The beam divergence³ shall be not greater than 1.75°.
- 31.4032821 Cover Glass - The cover-glass shall be colorless and free from irregularities which might materially increase the beam divergence, and shall be so mounted as to shed water. Its design and construction shall be such as to enable it to withstand the heat from the lamp and the cooling effect of rain, sleet, and snow. The exposed surface of the cover-glass or lens shall be smooth to prevent the collection of dirt, snow, and ice, and to facilitate cleaning. Stray-light shields or louvers shall be provided if necessary to give a well-defined beam.
- 31.4032822 Focusing - Means for focusing the projector shall be provided and shall be such that the focusing can be done in daylight. The lamp socket shall be of the bi-post or prefocus type, and shall be so attached that there is no danger of dislocating the focusing adjustment in the process of renewing the lamp.

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1. For other wind cone requirements, see CAR 31.4062.
 2. For other ceiling projector requirements, see CAR 31.4063.
 3. The beam divergence shall be understood to mean the maximum angle measured from the axis, in any plane through the axis of the beam, within which the candlepower is in excess of 10% of the axial candlepower.

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- 31.4032823 Housing - The housing of the projector shall consist entirely of non-ferrous metal and glass parts. It shall completely protect the lamp, socket, reflector, and stray-light shields. The housing shall be provided with a door sufficiently large and so located as to facilitate the proper maintenance of the parts enclosed within the housing. Such door shall be provided with a gasket of suitable type, sealing the door opening against the entrance of dirt and moisture. The housing shall be mounted on either a pedestal or a short base and shall be attached in such a manner that the beam may be tilted at any angle to the horizontal. The housing shall be provided with indices to indicate inclinations of the beam of 0°, 45°, 63°26', and 90°, measured from the horizontal, and provision shall be made for locking the housing at any of these angles.
- 31.40329 Miscellaneous Requirements
- 31.403290 Identification Marker Lighting - The identification marker shall be floodlighted to an intensity of at least 10 foot candles, without abrupt change of lighting intensity over the area occupied by the marker. Such floodlighting shall not be required if the marker sign is outlined with direct light, with visibility corresponding to that produced by 25 watt lamps 15 inches on centers.
- 31.403291 Emergency Power Supply - The usual source of electric power for all airport lights and lighting shall be of sufficient reliability as established by service experience over a period of, if possible, at least two years, to provide reasonable assurance against power failure. In addition, however, the airport shall have available a stand-by power supply of adequate capacity to operate all marker lights, beacons, and landing lights for one direction of landing.
- 31.403292 Remote Control - All airport lights shall be controllable from a master control board located in the airport traffic control room (see CAR 31.405), providing separate control of landing area floodlighting for each direction of landing, of each light or series of lights used to light or mark one runway at a time, and of all other airport lights, by types.
- 31.403293 Automatic Switching - In addition to the control of lights and lighting required by CAR 31.403292, the airport shall be equipped with means of automatically turning off and on all lights required by CAR 32.4001 to burn throughout the night. Such equipment may consist of either a time clock or equipment operated by change in the intensity of natural light. Such light sensitive equipment, if used, shall be adjustable to respond to any selected intensity of illumination corresponding to average daylight conditions occurring from 30 minutes before to 30 minutes after

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either sunset or sunrise at any time of year in the latitude in which the airport is located. The light-sensitive element shall be shielded from any artificial illumination and shall be operated by north light. If a time clock is used, it shall be of the astronomic dial type, electrically wound, and shall meet Bureau of Air Commerce specification #618. The adjusting devices shall be entirely suitable for manipulation by any competent engineer.

31.403294

Wiring Diagram - There shall be an accurate wiring diagram in blueprint or photostat form, framed under glass and prominently posted in the airport traffic control room (see CAR 31.405), showing all lighting, controls, and signal and power circuits (including incoming and outgoing feeder circuits), and indicating all light units, outlets, transformers, oil switches, cutouts, protectors, meters, and the normal and emergency electrical supply sources.

31.403295

Protection

31.4032950

Grounding - All transformers and switch cases, panelboards, cabinets, outlet boxes, pull boxes, conduit, motor frames, generator frames, non-current-carrying parts of airport lighting equipment, and any metal parts of the rest of the electrical system, not carrying current, shall be permanently and effectively grounded in such a way as to meet the requirements of the National Board of Fire Underwriters.

31.4032951

Cutouts - All cutouts used on feeder, main, and branch circuits, shall be of first-grade commercial manufacture and standard for airport lighting service. Circuit breakers of first grade commercial manufacture of the "no-fuse" type may be used in place of fused switches for the control circuits. High-voltage primary cutouts shall be standard for the service intended and shall be subject to approval of, and similar to the type used by, the local electric power company. Fuses for light and power circuits, 600 volts and below, shall also comply with the following Federal Specifications:

Fuses, Cartridge, Enclosed Non-renewable-No. W-F-791
Fuses, Cartridge, Enclosed Renewable (Fusible Links
separately enclosed)-No. W-F-80.

31.403296

Flares - The airport shall be equipped with a supply of ground flares at least 200 percent greater than that necessary to outline and mark one runway. Such flares shall be such as to burn at least twenty minutes with a white light.

31.403297

Lighting of Unsafe Areas - Any part of the landing area unsafe for aircraft use shall be completely outlined by means of aviation red lights or open flame torches. These lights shall not be more than 250 feet apart, and sufficiently closer, if the lines marked are not straight, to give an adequate outline of the area. If electric lights are used, they may be of the blinking type, but shall be so controlled that all lights blink simultaneously.

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31.404 Aircraft Servicing Facilities

31.4040 Fuel - The airport shall be equipped to store and supply sufficient and suitable aircraft fuel, oil, and water.

31.4041 Repairs - The airport shall be equipped with a repair shop for the servicing of aircraft, equipped to make all major and minor repairs of all types of aircraft ordinarily accommodated in other respects, and to check such aircraft in all particulars, including motors and equipment. It shall also provide such coping, painting, and other repair space and equipment as may be necessary in the opinion of the Secretary of Commerce.

31.4042 Storage - The airport shall provide such aircraft storage (hangar) space as may be reasonably necessary in the opinion of the Secretary of Commerce.

31.405 Traffic Control Facilities

31.4050 Control Tower - For use in controlling airway and airport aircraft traffic, the airport shall be equipped with a control tower erected on the roof of an airport building and so located as to provide an unobstructed view of the landing field and all approaches. Such tower shall meet the following minimum requirements with respect to its construction:

- (a) The topmost floor shall provide an uninterrupted and reasonably symmetrical expanse of floor space of at least 250 square feet, extending from tower wall to tower wall in all directions, to be used as the airport traffic control room.
- (b) In the event that the Bureau of Air Commerce uses or desires to use the airport as a base for control of airway traffic, the tower shall also provide a similar room directly beneath and readily accessible from the airport traffic control room, to be used for such purpose.
- (c) All walls of the airport traffic control room shall be equipped with glass windows constructed in such a manner as to eliminate reflection in the eyes of the control tower operators and to permit a clear and undistorted view of the entire landing area and of all approaches thereto.
- (d) The airport traffic control room shall be so designed as to permit the grouping of all equipment in the center thereof, well below eye-level, and to allow control room operators to walk directly to all windows.

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- (e) Both control rooms shall be waterproof, wind-proof, and soundproof, and shall be air conditioned and adequately heated.
- (f) The control tower shall be substantially free from vibration.
- (g) The airport traffic control room shall have, located outside its windows and readily accessible from within, a cat-walk at least two feet wide, equipped with a substantial guard-rail, and extending around the entire circumference of the tower.
- (h) Both control rooms shall be readily accessible from the administration building by means of the same stairway, either inside or outside the tower.
- (i) There shall be sufficient wire and cable outlets to serve present and reasonably-to-be-anticipated telephone, radio, and other electrical needs.
- (j) There shall be toilet facilities and a drinking fountain, or other source of drinking water, located not more than 30 feet from the entrance to the airport traffic control room.

31.4051

Airport Traffic Control Room Equipment - As a minimum, the airport traffic control room shall be equipped with the following:

- (a) A radio transmitter having a fifty-mile range under any weather conditions, designed to transmit voice on a frequency of 278 kilocycles, and meeting all applicable requirements stated in the "Rules and Regulations of the Federal Communications Commission."
- (b) One radio receiving set of the crystal controller type, tuned to the frequency assigned to operators of itinerant aircraft.
- (c) As many other radio receiving sets as there are airlines using the airport, also of the crystal controller type but each tuned to the frequency used by a different airline.

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- (d) Two standby tunable radio receivers for emergency use.
- (e) Either another radio receiving set effective through a frequency range of 200 to 400 kilocycles or a teletypewriter providing United States Weather Bureau teletypewriter service.
- (f) A standard portable traffic control light ("pistol light").
- (g) Adequate telephone and interphone facilities.
- (h) A master control board permitting remote control of the wind tee direction (see CAR 31.4061) and of the airport lighting (see CAR 31.403292).
- (i) A wind direction indicator of the recording type.
- (j) A wind velocity indicator of the recording type.
- (k) A temperature indicator of the recording type.
- (l) A sensitive type altimeter for use in correcting airplane altimeters for barometric pressure.
- (m) Maps and charts for calculating positions of aircraft on flights to and from the airport.
- (n) An electric clock with mechanical carry-over.
- (o) An alarm signal for use in warning of emergencies.
- (p) If practicable, a fire department pull box.
- (q) The wiring diagram of the airport electrical installation required by CAR 31.403293.
- (r) Binoculars of at least eight-power.
- (s) Two pocket or hand flash lights.

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31.406 Meteorological Facilities

31.4060 Instrument-landing Equipment - If used as a terminal or intermediate airline stop, the airport shall be equipped with an instrument-landing approach system for use in connection with one of the runways meeting the requirements of CAR 31.40001 as to dimensions. Such system shall consist of the contact lights required by CAR 31.40324, the approach lane lighting required by CAR 31.40325, and equipment designed to produce the vertical radio beams used with the standard Bureau of Air Commerce installation. The system shall be designed to operate in conjunction with the directional radio beam of a Federal airway, and shall be fully approved by the Bureau of Air Commerce.

31.4061 Wind Tee¹ - The airport shall provide a wind tee meeting the following requirements:

- (a) It shall consist of a body at least 18 feet in length and a head not less than 12 feet in length nor more than two-thirds the length of the body, the whole giving the appearance of the letter "T".
- (b) It shall be constructed of a rigid though light metal.
- (c) The body shall be supported by guy wires and ball bearings on a mounting standard bolted with cast-in foundation bolts to a concrete foundation approximately 18 inches by 18 inches, or to the roof, if so mounted.
- (d) It shall have a counter balance.
- (e) It shall be located, whether on a roof or on the ground, where true wind direction is registered, and shall be off the landing field, and so placed as to be readily visible from an aircraft approaching the airport from any direction.

1. For requirements as to wind tee lighting, see CAR 31.403280.

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- (f) If mounted on the ground, it shall be surrounded with a white four-foot band constructed of crushed stone or similar material, approximately 40 feet in diameter.
- (g) It shall be so constructed as to indicate automatically, unless otherwise controlled, the true direction of winds having a velocity greater than three miles per hour, and as to return automatically to the no-wind landing direction upon decrease of the wind velocity to less than three miles per hour.
- (h) It shall be painted international orange, and, if mounted on a roof, the roof surface shall be of a dark color, while, if mounted on the ground and the surrounding surface is not well covered with grass, a sufficient contrast between the tee and the background shall be provided.

61.4062

Wind Cone¹ - If a wind cone or "sock" is used in addition to the required wind tee, such cone shall be:

- (a) As shown by Department of Commerce Drawings Nos. 548 and 549;

1. For requirements as to wind cone lighting, see CAR 61.403281.

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- (b) Not less than 36 inches in diameter at the throat, 12 inches in diameter at the tail, and 12 feet in length;
- (c) So mounted as to give a true indication of the direction of the wind on the landing field and
- (d) Easily visible from all parts of the landing field and from an aircraft approaching from any direction.

31.4063

Meteorological Equipment - In addition to the meteorological equipment listed in CAR 31.4051 as required equipment of the airport traffic control room, the airport shall provide the following meteorological equipment:

- (a) A Fahrenheit thermometer of standard construction (in addition to the recording thermometer required by CAR 31.4051);
- (b) A barometer of standard construction
- (c) Ceiling indicator equipment of first-grade commercial manufacture, consisting of:
 - (1) A ceiling projector;¹
 - (2) An alidade; and
 - (3) A clinometer.
- (d) An anemometer of standard construction (in addition to the wind velocity indicator required by CAR 31.4051).

31.407

Emergency Facilities

31.4070

Hangar Fire-fighting Equipment -

- (a) Each hangar shall be equipped either with at least one fire-extinguisher of the foam type, together with at least one fire-extinguisher of the carbon-dioxide type, each having a capacity of at least $2\frac{1}{2}$ gallons, or with apparatus of some other type but equivalent performance. In the case of a hangar having more than 2500 square feet of aircraft storage floor space, there shall be at least one additional such extinguisher of the foam type for each 5000 square feet and at least one additional such extinguisher of the carbon dioxide

1. For requirements as to ceiling projector lighting, see CAR 31.403282.

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type for each 5000 square feet additional to 2500 square feet, or apparatus of some other type but equivalent performance.¹ In any case, all extinguishers shall be located within the area used for aircraft storage, at widely separated points, and shall be so placed as to be readily available in case of fire within such area.

- (b) Each hangar shall be equipped with at least one portable mounting, bearing either at least four extinguishers of one-quart or larger size, containing a vaporizing liquid having a carbon tetrachloride base, or at least two two-pound or larger size carbon dioxide extinguishers.
- (c) Each hangar shall have a wall bracket near every work bench, each holding a one-quart or larger size extinguisher containing a vaporizing liquid having a carbon tetrachloride base.
- (d) Any hangar having more than 7500 square feet of aircraft storage floor space, shall be equipped with at least one wheeled foam extinguisher of the engine or equivalent type and of a capacity of at least 40 gallons.
- (e) All fire-fighting equipment shall meet the requirements of the National Board of Fire Underwriters.

1. This means that a hangar not equipped with apparatus of some other type must be equipped with at least two extinguishers of the foam type and one of the carbon dioxide type if it has from 2500 to 5000 square feet of aircraft storage floor space, at least two extinguishers of each type if it has 5000 to 7500 square feet of space, at least three extinguishers of the foam type and two of the carbon dioxide type if it has 7500 to 10,000 square feet, etc.

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31.4071

Fire-fighting Equipment of Other Buildings - The minimum fire-fighting equipment of all airport buildings other than hangars shall consist of "first-aid" portable fire-extinguishers meeting the requirements of the National Board of Fire Underwriters with respect to number and type. In addition, any building space used for doping and painting, motor testing, oil storage, or other purpose involving exposure to the air of a highly inflammable liquid, shall be equipped with automatical operated water sprinklers, room-flooding gas systems, or apparatus of equivalent performance, and shall be separated from all other portions of the building of which it is a part by fire-proof partitions. All fire-fighting equipment shall meet the requirements of the National Board of Fire Underwriters.

31.4072

Field Fire-fighting Equipment - In addition to the "crash truck" and equipment specified in CAR 31.4074, the airport shall have available for instant use on each loading area at least one unit composed of mounting and equipment, additional to that required by CAR 31.4070 for hangar use, but similar except that the mounting shall be fixed rather than portable. Each such unit shall be located just off the loading area, and shall be adequately protected from the elements.

31.4073

First-aid Facilities - The following minimum first-aid facilities and equipment shall be provided:

- (a) A first-aid room, well ventilated and lighted and conveniently located;
- (b) At least one first-aid kit meeting the standards of the Bureau of Air Commerce, together with an adequate supply of picric acid gauze and salve;

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- (c) A motor vehicle, usable as an ambulance, equipped with at least two litters or stretchers, and with at least one first aid kit meeting the standards of the Bureau of Air Commerce.

31.4074

"Crash Truck" - Minimum equipment for use in the event of an aircraft "crash" or "crack-up", shall include a motor vehicle, or trailer and motor vehicle, dual-tired or otherwise constructed for use on soft ground, equipped with the following:

- (a) A portable fire shield designed to allow the user to approach a flaming aircraft in safety;
- (b) At least two fire axes;
- (c) Long-handled, compound, metal-cutting shears, designed to cut into the fuselage of an airplane in such a way as to permit the escape of otherwise imprisoned passengers and crew;
- (d) A light, strong container so located in the crash truck as to be readily accessible for emergency use, containing the following tools and equipment:
- (1) 1 grappling hook with a 60-foot length of 5/16 inch steel cable and tow-hook attached;
 - (2) 1 crow bar;
 - (3) 1 blacksmith's cross-pein sledge hammer;
 - (4) 1 gooseneck wrecking bar approximately 2½ feet in length;
 - (5) 1 cross-cut hand saw;
 - (6) 1 adjustable hacksaw frame;

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- (7) 12 hand-hacksaw blades;
- (8) 1 hatchet;
- (9) 2 pairs of lineman's side-cutting pliers;
- (10) 1 pipe cutter;
- (11) 1 lock-breaker and door-opener;
- (12) 1 pair of hand tinner's snips;
- (13) 1 bolt-clipper;
- (14) 2 wire-cutters;
- (15) 1 hunting knife with 5-inch blade;
- (16) 1 hand flashlight.

(e) The following fire-extinguisher equipment, each unit meeting the requirements of the National Board of Fire Underwriters:

- (1) A water pump having a capacity of at least 500 gallons per minute;
- (2) A water tank having a capacity of at least 250 gallons;
- (3) A foam generator having a capacity of at least 500 gallons per minute together with at least 10 50-pound pails of the powder used in generating foam, or equivalent foam-generating equipment;
- (4) 2 100-foot lengths of $1\frac{1}{2}$ -inch hose useable with either the water or the foam apparatus, together with an adequate nozzle for use therewith;
- (5) At least four 50-pound capacity cylinders of the carbon dioxide type together with 100 feet of $\frac{1}{2}$ -inch hose and a nozzle therefor;
- (6) At least three portable fire-extinguishers, including one each of the foam, carbon dioxide, and vaporizing liquid types.

31.4075

Wrecking Truck - The airport shall be equipped with a wrecking truck, also for use in the event of an aircraft "crash" or crash-up", having suitable crane and winch equipment.

31.4076

"Crash Boat" - If any portion of the landing area is proximate to a body of water of a size and depth warranting use of a power-driven boat in removing occupants of a plane forced down therein, minimum emergency equipment shall include such a power-driven "crash boat", of adequate size and speed. Such boat shall be equipped with the following:

- (a) A suitable searchlight mounted on the forward part;
- (b) As many life preservers as are necessary to provide one each for the number of persons that the boat can carry at one time.
- (c) Two sets of portable floatation gear meeting the United States Army Air Corps Specification No. 40224;
- (d) A chart of the water area;
- (e) A light, strong container so located in the boat as to be readily accessible for emergency use, containing the following tools:
 - (1) 1 chopping axe;
 - (2) 2 grappling hooks;
 - (3) 100 feet of $\frac{1}{2}$ -inch manila rope;
 - (4) 1 crossneck wrecking bar approximately $2\frac{1}{2}$ feet in length;
 - (5) 1 hacksaw frame;
 - (6) 12 hand-hacksaw blades;
 - (7) 1 pair of lineman's side-cutting pliers;
 - (8) 1 bolt clipper;
 - (9) 1 pair hand tinner's snips;
 - (10) 1 hunting knife having a 5-inch blade;
 - (11) 1 hand flashlight;
 - (12) 1 hand fire-extinguisher of the carbon dioxide type having a 15 lb. capacity;

- (13) 2 hand fire-extinguishers of one quart or larger size, containing a vaporizing liquid having a carbon tetrachloride base.

31.408

Buildings - The airport shall be equipped with the following buildings:

- (a) An administration or terminal building of such size and so designed as to provide the facilities required by CAR 31.4092.
- (b) At least one hangar, separate from or combined with the administration building, of such a size and so designed as to provide all facilities required by CAR 31.404 with the exception of the doping, painting, and other space intended to be used for purposes involving exposure to the air of a highly inflammable liquid.
- (c) Such additional buildings as the Secretary of Commerce may consider reasonably necessary for efficient aeronautical operations of the type and to the extent carried on at the time the airport is under consideration for rating.

No airport building shall be located within the landing field, or within 500 feet of the center line of a runway designed for instrument-landing, or so as to constitute an obstruction within any approach zone or any turning zone adjacent to an approach zone for a runway used for instrument-landing. All buildings shall be well lighted and ventilated, and adequately heated.

31.409

Other Facilities

31.4090

Aprons, Taxiways, and Loading Areas - The airport shall have aprons, taxiways, and loading areas sufficient in number and so constructed as to permit efficient servicing, warming-up, loading, and handling of landplanes. Their surfaces shall meet the requirements stated in CAR 31.40311.

31.4091

Road, Parking Lot, and Fence - The airport shall be equipped with the following:

- (a) An all-weather service road completely off the landing field, connecting the highway and the administration building, and permitting easy ingress to and egress from the airport;
- (b) A parking lot, completely off the landing field, convenient to the administration building and of a size sufficient to accommodate the number of vehicles ordinarily requiring such facility; and
- (c) A fence ordinarily adequate to keep human beings and animals from the landing and loading areas, enclosing all areas of the airport useable by aircraft.

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31.4092

Administration Building Facilities - The following facilities shall be provided in the administration building:

- (a) Adequate office space;
- (b) A bulletin board readily available to anyone interested, and having posted on it the following meteorological and other information:
 - (1) The meteorological data specified in CAR 32.4003 (a)
 - (2) Copy of latest issue of Bureau of Air Commerce publication regarding the condition of Department of Commerce intermediate fields and of lights and radio facilities on the Federal airways.
 - (3) Warnings of dangerous conditions locally and at neighboring airports.
 - (4) One copy each of Chapters 31 and 32 of these Regulations.
 - (5) Copy of local flying rules.
 - (6) Notice of any unusual situation which should be brought to the attention of flyers or the flying public;
 - (7) Information as to the location of fire-fighting equipment.
 - (8) Statement of charges in effect at the airport;
 - (9) Information regarding ground transportation facilities, and all other information of interest to the public, to flyers, or to airport or airline personnel.
- (c) A map file readily available to anyone interested, containing:
 - (1) A complete set of airway maps.
 - (2) A magnetic declination map.
 - (3) A large topographic map of the United States.
 - (4) A map of each state.
 - (5) A large-scale local map.

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- (d) A data file readily available to anyone interested, containing:
 - (1) Copies of latest issues of publications of Bureau of Air Commerce district office for the district in which the airport is located.
 - (2) Copies of all effective Department of Commerce "Aeronautics Bulletins" and "Airway Bulletins".

If the airport serves an airline engaged in passenger transportation, the administration building shall also provide the following facilities:

- (a) A waiting room providing seating accommodations, public telephone facilities, and a source of drinking water, sufficient for the number of the public ordinarily desiring such facilities.
- (b) Adequate space for the handling and checking of baggage.
- (c) Adequate space for information and ticket service.
- (d) A public, sanitary rest-room or comfort station, conveniently located.
- (e) Awnings for use in protecting passengers from inclement weather while passing between the administration building and aircraft.
- (f) Portable screens for use in protecting passengers from revolving propellers.

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(Outline No. 7)

31.41 THE L2 RATING

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31.41 The L2 Rating

31.410 Landing Area

31.4100 Size and Design

31.41000 Number of Runways - Whether the landing field is of the all-way type or of the landing strip type, if not completely hard-surfaced, it shall be equipped with at least two hard-surfaced runways for use for both landing and taking-off.

31.41001 Dimensions - If the landing field is of the all-way type, the average distance across it in all directions and the average length of three runways, or, if the landing field is of the landing strip type, the average length of three landing strips and of the runways installed thereon, shall be at least:

(a) 3500 feet at sea level, except that the combined length of the three runways or landing strips shall be not less than 10,500 feet, nor shall any one of the three runways or landing strips be less than 2500 feet in length; or

(b) A distance greater than 3500 feet by the percentage increase applicable in the case of an elevation corresponding with that of the airport in question, as shown by Diagram A, except that the combined length of the three runways or landing strips shall be not less than three times such distance, nor shall any one of the three runways or landing strips be shorter than a distance greater than 2500 feet by the same percentage increase.

The landing field may have only two runways and consist of only two landing strips, and in such case, if the landing field is of the all-way type, the average length of the two runways, or, if the landing field is of the landing strip type, the average length of the two landing strips and of the runways installed thereon, shall be at least:

(a) 4000 feet at sea level, except that the combined length of the two runways or landing strips shall be not less than 8000 feet, nor shall any one of the two runways or landing strips be less than 3000 feet in length; or

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- (b) A distance greater than 4000-feet by the percentage increase applicable in the case of an elevation corresponding with that of the airport in question, as shown by Diagram A, except that the combined length of the two runways or landing strips shall be not less than twice such distance, nor shall any one of the two runways or landing strips be shorter than a distance greater than 3000 feet, by the same percentage increase.

The requirements with respect to width of landing strips and runways shall be the same as those stated in CAR 31.40001.

- 31.41002 Arrangement of Runways - Same as CAR 31.40002, except that the reference to CAR 31.40001 shall be to CAR 31.41001 instead, and except that, in the case of a landing field of the landing strip type, all the wind directions within thirty degrees of the directions in which all runways used for both landing and taking-off are aligned shall have a total frequency of at least eighty percent.
- 31.4101 Grades - Same as CAR 31.4001, except that the maximum grade of the landing area, longitudinally and transversely, shall be 2 percent.
- 31.4102 Drainage - Same as CAR 31.4002.
- 31.4103 Surfaces - Same as CAR 31.4003, except that the references to CAR 31.4001 and CAR 31.4002 shall be to CAR 31.4101 and CAR 31.4102 instead.
- 31.4104 Obstructions - Same as CAR 31.4004.
- 31.411 Approaches - Same as CAR 31.401.
- 31.412 Marking - Same as CAR 31.402.
- 31.413 Lighting
- 31.4130 Definitions - Same as CAR 31.4030.
- 31.4131 Measurements - Same as CAR 31.4031.
- 31.4132 Minimum Requirements - Same as CAR 31.4032, except that CAR 31.4032a and CAR 31.4032b shall be omitted, and except that all references to paragraphs not beginning with 31.403 shall be to corresponding paragraphs of CAR 31.41.

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- 31.414 Aircraft Servicing Facilities
- 31.4140 Fuel - Same as CAR 31.4040
- 31.4141 Repairs - The airport shall be equipped with a repair shop for the servicing of aircraft, equipped to make all minor repairs of all types of aircraft ordinarily accommodated in other respects. It shall also provide such doping, painting, and other repair space and equipment as may be necessary in the opinion of the Secretary of Commerce.
- 31.4142 Storage - Same as CAR 31.4042.
- 31.415 Traffic Control Facilities
- 31.4150 Control Tower - Same as CAR 31.4050, except that the minimum requirements with respect to construction of the control tower shall be as follows:
- A. It shall provide an airport traffic control room of a size permitting control of airport aircraft traffic without great inconvenience to the operator.
 - B. In the event that the Bureau of Air Commerce used or desires to use the airport as a base for control of airway traffic, the tower shall also provide a room adequate for such purpose.
 - C. The airport traffic control room shall be so constructed as to permit a clear view of substantially the entire landing area.
31. 4151 Airport Traffic Control Room Equipment - Same as CAR 31.4051, except that the equipment specified in items O, R, and S shall not be required.
- 31.416 Meteorological Facilities
- 31.4160 Instrument-landing Equipment - If the airport is equipped with an instrument-landing approach system, it shall meet the requirements of CAR 31.4060, except that the reference to CAR 31.40001 shall be to CAR 31.41001 instead.
- 31.4161 Wind Tee - Same as CAR 31.4061.
- 31.4162 Wind Cone - Same as CAR 31.4062.

31.4163
31.419

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- 31.4165 Meteorological Equipment - Same as CAR 31.4063, except that the references to CAR 31.4051 shall be to CAR 31.4151 instead.
- 31.417 Emergency Facilities
- 31.4170 Hangar Fire-fighting Equipment - Same as CAR 31.4070.
- 31.4171 Fire-fighting Equipment of Other Buildings - Same as CAR 31.4071.
- 31.4172 Field Fire-fighting Equipment - Same as CAR 31.4072, except that the reference to CAR 31.4074 shall be to CAR 31.4174 instead.
- 31.4173 First-aid Facilities - Same as CAR 31.4073, except that there need not be a separate first-aid room.
- 31.4174 "Crash Truck" - Same as CAR 31.4074, except that the water pump required as part of the fire-extinguisher equipment may have a capacity of only 100 gallons per minute, and except that the tools specified in CAR 31.4074, D, shall not be required.
- 31.4175 Trenching Truck - No requirements.
- 31.4176 "Crash Boat" - Same as CAR 31.4075, except that the life preservers shall be the only boat equipment specifically required.
- 31.418 Buildings - Same as CAR 31.408, except that the references to CAR 31.4092 and CAR 31.404 shall be to CAR 31.418 and CAR 31.414 instead.
- 31.419 Other Facilities - Same as CAR 31.409, except that the references to CAR 31.40311 and CAR 32.4003, A, shall be to CAR 31.419 and CAR 32.4108 instead.

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31.42 The L3 Rating

31.420 Landing Area

31.4200 Size and Design

31.42000 Number of Runways - It is not necessary that the landing field, whether of the all-way type or the landing strip type, be completely paved or equipped with hard-surfaced runways so long as its entire surface meets the requirements as to drainage applicable in such cases, stated in CAR 31.4202. If this is not the case however, the requirement as to number of runways shall be the same as that stated in CAR 31.41000.

31.42001 Dimensions - If the landing field is of the all-way type and equipped with runways, the average distance across it in all directions and the average length of two runways, or if the landing field is of the landing strip type and equipped with runways, the average length of two landing strips and of the runways installed thereon, shall be at least:

- (a) 2500 feet at sea level; or
- (b) A distance greater than 2500 feet by the percentage increase applicable in the case of an elevation corresponding with that of the airport in question, as shown by Diagram A.

If the landing field is of the all-way type but is not equipped with runways, the average distance across it in all directions, or, if the landing field is of the landing strip type but is not equipped with runways, the average length of two landing strips, shall be at least:

- (a) 3000 feet at sea level; or
- (b) A distance greater than 3000 feet by the percentage increase applicable in the case of an elevation corresponding with that of the airport in question, as shown by Diagram A.

Irrespective of the airport elevation, the width of all landing strips shall be at least 500 feet, that of all runways used at night 150 feet, and that of all other runways 100 feet.

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- 31.42002 Arrangement of Runways - Same as CAR 31.41002, except that if a runway is paralleled by another and flying operations are permitted on both at the same time, the distance between their edges shall be at least 400 feet at all points, and except that, in the case of a landing field of the landing strip type, if there are no runways laid out upon the landing strips, such landing strips shall be so arranged:
- (a) That the longest is aligned in general direction with the prevailing wind direction, and
 - (b) That all the wind directions within thirty degrees of the directions in which all such landing strips are aligned have a total frequency of at least eighty per cent.
- 31.4201 Grades - Same as CAR 31.4101, except that runways may have concave surfaces.
- 31.4202 Drainage - Same as CAR 31.4002, except that if the landing field is not completely hard-surfaced or equipped with satisfactory hard-surfaced runways the drainage of all surfaces shall be such as to keep them dry and firm enough for safe operation of landplanes under all weather conditions, providing immediate run-off of storm water.
- 31.4203 Surfaces - Same as CAR 31.4003, except that the references to CAR 31.4001 and CAR 31.4002 shall be to CAR 31.4201 and CAR 31.4202 instead.
- 31.4204 Obstructions - Same as CAR 31.4004.
- 31.421 Approaches - Same as CAR 31.401, except that if there are no runways, approach zones shall be located wherever they would have to be to meet the requirements of CAR 31.401 if there were runways meeting the requirements of CAR 31.42001 and CAR 31.42002.
- 31.422 Marking - Same as CAR 31.402.
- 31.423 Lighting
- 31.4230 Definitions - Same as CAR 31.4030.
- 31.4231 Measurements - Same as CAR 31.4031.

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- 31.4232 Minimum Requirements - Same as CAR 31.4032, except that all references therein to paragraphs beginning with 31.40, except those beginning with 31.403, shall be to corresponding paragraphs of CAR 31.42, and except as modified by the following paragraphs.
- 31.42320 Beacons - Same as CAR 31.40320, except that the rotating beacon may be located as far as $2\frac{1}{2}$ miles from the landing field, provided that it is visible therefrom, and except that the airport code beacon shall not be required if the rotating beacon is located at the airport proper.
- 31.42321 Floodlighting - Same as CAR 31.40323, except that building exterior floodlighting shall not be required.
- 31.42322 Course Light - No requirements.
- 31.42325 Contact Lights - No requirements, except that any runway used for instrument-landing shall be equipped with contact lights meeting the requirements of CAR 31.40324.
- 31.42324 Miscellaneous Requirements - Same as CAR 31.40329, except that identification marker lighting and automatic switching shall not be required.
- 31.424 Aircraft Servicing Facilities - Same as CAR 31.414.
- 31.425 Traffic Control Facilities - Same as CAR 31.415, except that the only equipment of the airport traffic control room specifically required shall be:
- (a) A radio transmitter meeting the requirements of CAR 31.4051.
 - (b) One radio receiving set of the crystal controller type, tuned to the frequency assigned to operators of itinerant aircraft.
 - (c) As many other radio receiving sets as there are airlines using the airport, also of the crystal controller type but each tuned to the frequency used by a different airline.
 - (d) One standby tuneable radio receiver for emergency use.
 - (e) Either another radio receiving set effective through a frequency range of 200 to 400 kilocycles or a teletypewriter providing United States Weather Bureau teletypewriter service.

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- (f) A standard portable traffic control light ("pistol light").
- (g) A master control board permitting remote control of the airport lighting (see CAR 31.4232).
- (h) A wind direction indicator.
- (i) A wind velocity indicator.
- (j) A sensitive type altimeter for use in correcting airplane altimeters for barometric pressure.
- (k) Maps and charts for calculating positions of aircraft on flights to and from the airport.

- 31.426 Meteorological Facilities
- 31.4260 Instrument-landing Facilities - Same as CAR 31.4160, except that the reference to CAR 31.41001 shall be to CAR 31.42001 instead.
- 31.4261 Wind Tee - Same as CAR 31.4061.
- 31.4262 Wind Cone - Same as CAR 31.4062.
- 31.4263 Meteorological Equipment - Same as CAR 31.4063, except that the references to CAR 31.4051 shall be to CAR 31.425 instead.
- 31.427 Emergency Facilities
- 31.4270 Hangar Fire-fighting Equipment - Same as CAR 31.4070.
- 31.4271 Fire-fighting Equipment of Other Buildings - Same as CAR 31.4071.
- 31.4272 Field Fire-fighting Equipment - Same as CAR 31.4072, except that the reference to CAR 31.4074 shall be to CAR 31.4274 instead.
- 31.4273 First-aid Facilities - Same as CAR 31.4173.

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31.4274

"Crash Truck" - The minimum equipment for use in the event of an aircraft "crash" or "crack-up" shall include a motor vehicle useable as "crash truck", equipped with the following:

- (a) At least two fire axes.
- (b) The following fire-extinguisher equipment, each unit meeting the requirements of the National Board of Fire Underwriters:
 - (1) A water pump having a capacity of at least 100 gallons per minute.
 - (2) A water tank having a capacity of at least 250 gallons.
 - (3) At least 100 feet of hose of adequate size mounted on a hose reel.
 - (4) An adequate nozzle for use with such hose.
 - (5) Either a foam generator having a capacity of at least 500 gallons per minute, together with at least ten 50-pound pails of the powder used in generating foam or equivalent foam-generating equipment, or at least four 50-pound capacity cylinders of the carbon dioxide type.

31.4275

Wrecking Truck - No requirements.

31.4276

"Crash Boat" - Same as CAR 31.4176.

31.428

Buildings - Same as CAR 31.418, except that the reference to CAR 31.4092 shall be to CAR 31.429 instead.

31.429

Other Facilities - Same as CAR 31.409, except that the references to CAR 31.400311 and CAR 32.4003, A, shall be to CAR 31.4203 and CAR 32.4203 instead.

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31.43 THE I4 RATING

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31.43 The I4 Rating

31.430 Landing Area

31.4300 Size and Design

31.43000 Number of Runways - No requirements, except that, if the landing field is of the landing strip type, it shall consist of at least two landing strips.

31.43001 Dimensions - If the landing field is of the all-way type, the distance across it in all directions or, if the landing field is of the landing strip type, the length of at least two landing strips, shall be at least:

(a) 1800 feet at sea-level; or

(b) A distance greater than 1800 feet by the percentage increase applicable in the case of an elevation corresponding with that of the airport in question, as shown by Diagram A.

The width of all landing strips shall be at least 300 feet, irrespective of the elevation of the airport.

31.43002 Arrangement of Runways - If the landing field is of the all-way type, any runways used for both landing and taking-off shall be laid out upon it in different directions, with the longest aligned in general direction with the prevailing wind direction and no two converging at an angle of less than thirty degrees. If the landing field is of the landing strip type, any runways used for both landing and taking-off shall be laid out upon different landing strips. Such runways, or the landing strips if there are no runways installed thereon, shall be so arranged:

(a) That the longest is aligned in general direction with the prevailing wind direction; and

(b) That no two converge at an angle of less than thirty degrees; and

(c) That all the wind directions within thirty degrees of the directions in which all such runways or landing strips are aligned have a total frequency of at least seventy-five percent, as shown by the same wind rose.

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The right angle distance from the center line of any runway, at any point thereon, to the nearest edge of the landing field shall be not less than 100 feet. If any such runway is paralleled by another and flying operations are permitted on both at the same time, the distance between their edges shall be at least 250 feet at all points. The wind direction frequencies at the airport shall be determined by a wind rose constructed in accordance with approval practices of the United States Weather Bureau and based on observations taken over a period of not less than ten years.

- 31.4301 Grades - The maximum grade of the landing field, longitudinally and transversely, shall be $2\frac{1}{2}$ percent, except that where a landing strip or runway slopes in one direction across its entire width, the resulting grade shall not exceed 2 percent. The contour, both longitudinally and transversely, shall describe an easy gradient curve of long radius showing no change of grade of more than 1 percent in any 100 feet.
- 31.4302 Drainage - Same as CAR 31.4002.
- 31.4303 Surfaces
- 31.43030 Non-hard-surfaced Areas - The surfaces of all non-hard-surfaced areas of the landing area shall be:
- (a) Such as to prevent skidding of airplanes in landing;
 - (b) Smooth enough to permit riding in a light-weight automobile at thirty miles per hour, without discomfort to the occupants, over any part thereof other than an area temporarily closed to aircraft use (see CAR 32.4311);
 - (c) Substantially dustless and without loose particles;
 - (d) Such as to meet the grade and drainage requirements of CAR 31.4301 and CAR 31.4302.
- 31.43031 Hard-surfaced Areas - Same as CAR 31.40031, except that the references to CAR 31.4001 and CAR 31.4002 shall be to CAR 31.4301 and CAR 31.4302 instead.
- 31.4304 Obstructions - Same as CAR 31.4004.

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31.431 Approaches

31.4310 Zoned Areas - Same as CAR 31.4010, with the following exceptions:

- (a) That the zoned area shall be one mile in width.
- (b) That the approach zone shall be a trapezoidal portion of the zoned area, 300 feet in width at the boundary of the field and broadening to a width of 900 feet one mile distant.
- (c) That, if there are no runways, approach zones shall be located wherever they would have to be to meet the requirements of CAR 31.4010 if there were runways meeting the requirements of CAR 31.43001 and CAR 31.43002.

31.4311 Freedom from Obstructions

31.43110 Approach Zones - Same as CAR 31.40110, except that an obstruction shall be any structure, natural feature or other object, including any airport building, boundary cone, flood-light mounting, or other airport appurtenance, the height of which is more than one-fifteenth its distance from the nearest boundary of a landing field less than 5000 feet above sea level, or more than one-twentieth its distance from the nearest boundary of a landing field having a higher elevation.

31.43111 Turning Zones - Same as CAR 31.40110.

31.432 Marking - Same as CAR 31.402, except that, so far as CAR 31.4021 is concerned:

- (a) The obstructions required to be marked shall include all man-made structures or objects, including, but without limitation, towers, masts, smokestacks, tanks, buildings, power-lines, fences, and airport appurtenances, which:
 - (1) are obstructions within the meaning of the terms as used in CAR 31.4311; or
 - (2) are located within $\frac{1}{2}$ mile of the landing field and are either over 100 feet in height or over 100 feet higher above sea-level than the surface of the landing field.

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- (b) There shall be no minimum requirements with respect to the width of the stripes painted on obstructions of the narrow type, the size of the checkerboard blocks painted on obstructions of the extended type, or the size of the flags used to mark parts of the landing area unsafe for aircraft use.

- 31.433 Lighting
- 31.4330 Definitions - Same as CAR 31.4030.
- 31.4331 Measurements - Same as CAR 31.4031.
- 31.4332 Minimum Requirements - Same as CAR 31.4232, except that all references to paragraphs beginning with 31.40, except those beginning with 31.403, in the provisions of CAR 31.40 incorporated in CAR 31.4232 by reference, shall be to the corresponding paragraphs of CAR 31.43, and except as modified by the following paragraphs.
- 31.43320 Obstruction Lighting - Same as CAR 31.40322, except that the objects required to be obstruction-lighted shall be all man-made structures and objects required by CAR 31.432 to be marked as obstructions, and, in addition, all natural features, including, but without limitation, trees and hills, which:
 - (a) Are obstructions within the meaning of term as used in CAR 31.4311; or
 - (b) Are located within ½ mile of the landing field and are either over 100 feet in height or over 100 feet higher above sea-level than the surface of the landing field.
- 31.43321 Instrument Lighting - No requirements.
- 31.43322 Emergency Power Supply - No requirements if the source of the electric power ordinarily available is reasonably reliable, but same as CAR 31.403221 otherwise.
- 31.434 Aircraft Servicing Facilities
- 31.4340 Fuel - Same as CAR 31.4040.
- 31.4341 Repairs - No requirements.

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- 31.4342 Storage - Same as CAR 31.4042.
- 31.435 Traffic Control Facilities - No requirements.
- 31.436 Meteorological Facilities
- 31.4360 Instrument-landing Equipment - No requirements.
- 31.4361 Wind Tee - The airport shall provide a wind tee if it is not equipped with a wind cone or "sock". Such tee shall be located off the landing field and shall be readily visible under normal conditions of daytime visibility from an altitude of 5000 feet.
- 31.4362 Wind Cone - The airport shall provide a wind cone or "sock" if it is not equipped with a wind tee. Such cone shall be so mounted as to give a true indication of the direction of the wind on the landing field, and shall be easily visible from all parts of the landing field and from an aircraft approaching from any direction.
- 31.4363 Meteorological Equipment - No requirements.
- 31.437 Emergency Facilities
- 31.4370 Hangar Fire-fighting Equipment - Each hangar shall be equipped with:
- (a) At least one fire-extinguisher of either the foam or carbon dioxide type, having a capacity of at least $2\frac{1}{2}$ gallons, for each 2500 square feet of aircraft storage floor space, or with apparatus of some other type but equivalent performance.
 - (b) At least one portable mounting, bearing either at least four extinguishers of one-quart or larger size, containing a vaporizing liquid having a carbon tetrachloride base, or at least two two-pound or larger size carbon dioxide extinguishers.
 - (c) Such other fire-fighting equipment as may be necessary to meet the minimum requirements of the National Board of Fire Underwriters.

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- 31.4371 Fire-fighting Equipment of Other Buildings - The minimum fire equipment of all airport buildings other than hangars shall consist of "first-aid" portable fire-extinguishers meeting the requirements of the National Board of Fire Underwriters with respect to number and type. In addition, any building space used for dipping and painting, motor testing, oil storage, or other purpose involving exposure to the air of a highly inflammable liquid, shall have equipment designed to combat gasoline and oil fires, and shall be separate from all other portions of the building of which it is a part. All fire-fighting equipment shall meet the requirements of the National Board of Fire Underwriters.
- 31.4372 Field Fire-fighting Equipment - No requirements other than those stated in CAR 31.4374.
- 31.4373 First-aid Facilities - Same as CAR 31.4173.
- 31.4374 "Crash Truck" - Minimum equipment for use in the event of an "aircraft crash" or "crack-up" shall include:
- (a) A motor vehicle, or trailer and motor vehicle;
 - (b) Suitable and adequate mechanical equipment; and
 - (c) Portable fire-fighting equipment, capable of extinguishing an airplane fire of major proportions, that may either be carried in the motor vehicle or be itself mounted on wheels, and which, in either case, shall be equivalent in effectiveness to the wheeled foam extinguisher specified in CAR 31.4070(d).
- 31.4375 Wrecking Truck - No requirements.
- 31.4376 "Crash Boat" - No requirements.
- 31.438 Buildings - The airport shall be equipped with at least one hangar and such additional hangars and other buildings as the Secretary of Commerce may consider reasonably necessary for the efficient aeronautical operations of the type and to the extent carried on at the time the airport is under consideration for rating. No airport building shall be within the landing field, or within 500 feet of the center line of a landing strip designed for instrument-landing, or so as to constitute an obstruction within approach zone or any turning zone adjacent to an approach zone for a runway used for instrument-landing.

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31.439 Other Facilities

31.4390 Aprons, Taxiways, and Loading Areas - No requirements.

31.4391 Roads, Parking Lot, and Fence - No requirements, except that the airport shall be equipped with a fence ordinarily adequate to keep human beings and animals from the landing and loading areas, enclosing all areas of the airport usable by aircraft.

31.4392 Administration Building Facilities - No requirements

31.44 The I5 Rating: No requirements, except that the airport shall provide a landing field usable in cases of emergency for the landing of small landplanes, and except that, if it is equipped with a beacon, such beacon shall be of the rotating type and shall meet the requirements of CAR 31.403200, except that its auxiliary beam shall be aviation yellow rather than aviation green.

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(Outline No. 10)

31.5 MINIMUM REQUIREMENTS FOR SEAPLANE

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31.50 WI RATING

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31.5 MINIMUM REQUIREMENTS FOR SEAPLANE AIRPORTS

31.50 WL Rating

31.500 Landing Area

31.5000 Layout - The landing area shall consist of water areas forming a seaplane basin, a main channel, and an auxiliary channel. The main channel shall be aligned in general direction with the prevailing wind, and the auxiliary channel in a direction at least 60 degrees from that of the main channel and frequently that of winds of the vicinity having a velocity of more than 20 miles per hour. Both channels shall be equipped with a turning area at each end.

31.5001 Location - The landing area shall be a part or parts of a sheltered body of water ordinarily used for the mooring or anchorage of ocean-going craft. The basin shall be particularly well sheltered and shall be relatively near the landing area of an airport having a rating of L1, L2, or L3.

31.5002 Size

31.50020 Basin - The basin shall be large and deep enough for service of seaplanes by tender, for the anchorage of at least two seaplanes each weighing 90,000 lbs., and for use of the facilities required by CAR 31.501 by seaplanes of equal weight, all at the same time.

31.50021 Main Channel - The main channel shall be at least $4\frac{1}{2}$ miles in length, 1000 feet in width at all points, and 15 feet in depth at all points. Its turning areas shall be at least 2000 feet in diameter and 15 feet in depth.

31.50022 Auxiliary Channel - The auxiliary Channel shall be at least $2\frac{1}{2}$ miles in length, 1000 feet in width at all points, and 15 feet in depth at all points. Its turning areas shall be at least 2000 feet in diameter and 15 feet in depth.

31.5003 Obstructions - All landing area surfaces shall be completely clear of surface and underwater obstructions, natural and artificial, to a height of at least 300 feet, except as such surfaces are used by seaplanes and surface craft, and except as the surface of the basin is used for seaplane anchorage and for provision of loading and beaching facilities.

31.501 Landing Facilities

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- 31.5010 Loading - The airport shall be equipped with suitable floats and docks of such size and number and so constructed as to permit safe and efficient embarkation on, debarkation from, and loading and unloading of, a seaplane weighing 90,000 lbs. Such floats and docks shall be located within the basin and proximate to the administration building.
- 31.5011 Beaching - The airport shall be equipped with ramps and other equipment suitable for efficient beaching, launching, and transportation between basin and hangar, of a seaplane weighing 90,000 lbs. Such ramps and other equipment shall be located on the side of the basin nearest the hangar or hangars.
- 31.502 Marking
- 31.5020 Boundary Buoys - The boundaries of all seaplane channels shall be permanently marked by means of buoys anchored not less than 1000 feet apart. All buoys shall be painted in alternating vertical stripes of chrome yellow and black.
- 31.5021 Obstruction Marking - All man-made structures or objects over 100 feet higher than the surface of the landing area and located within one mile of any portion of the airport, including, but without limitation, any tower, mast, bridge, smoke-stack, tank, building, powerline, fence, or airport appurtenance, shall be marked in accordance with the requirements of CAR 31.4021.
- 31.5022 Identification Marker - Same as CAR 31.4020.
- 31.5023 Signal Flag - No requirements.
- 31.503 Lighting
- 31.5030 Boundary and Range Lights - All buoys used to mark the boundaries of the landing area shall be equipped with flashing lights, constructed to flash simultaneously at regular intervals, with each flash and each period of eclipse lasting not more than 2.0 seconds nor less than .75 seconds. Such lights shall be "aviation white" in color except where they are located at the end of a channel, in which case they may be "aviation green". In all other respects, buoy lights, if white, shall meet the specifications for boundary lights stated in CAR 31.40321, and, if green, those for range lights, stated in the same paragraph, except that the lights shall have an intensity of not less than 25 candlepower in all directions of azimuth, from 20 degrees below the horizontal to the zenith.

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- 31.5031 Floodlighting ; The airport shall be provided with equipment for the floodlighting of all loading and beaching facilities to an intensity of not less than 0.5 foot candles, and in such a way as to permit use thereof at night without undue difficulty, Such floodlighting equipment shall be satisfactory to the Bureau in all respects.
- 31.5032 Obstruction Lighting - All man-made structures or objects required by CAR 31.5021 to be marked, and, in addition, all natural features over 100 feet higher than the surface of the landing area and located within one mile of any portion of the airport, shall be obstruction lighted in accordance with the requirements of CAR 31.40322.
- 31.5033 Building Interior Lighting - Same as CAR 31.40327.
- 31.5034 Instrument Lighting
- 31.50340 Wind Cone - Same as CAR 31.403281.
- 31.50341 Ceiling Projector - Same as CAR 31.403282.
- 31.5035 Miscellaneous Requirements
- 31.50350 Identification Marker Lighting - Same as CAR 31.403290.
- 31.50351 Power Supply - Except for buoy lights, which may be operated by means of electricity, acetylene gas, or other satisfactory power or fuel, deriving such power or fuel from units contained within the buoys, all lights shall be electrically operated with usual and emergency sources of electric power meeting the requirements of CAR 31.403291.
- 31.50352 Remote Control - All airport lights other than the buoy lights shall be controllable from a master control board located in the airport traffic control room, providing separate control of all such lights, by types.
- 31.50353 Automatic Switching - All buoy lights shall be equipped with automatic switching equipment, of either the light sensitive or time-clock type, designed to turn such lights off within 30 minutes of the time of sunrise and on within 30 minutes of the time of sunset. Such equipment shall meet the requirements of CAR 31.403293.
- 31.50354 Wiring Diagram - Same as CAR 31.403294.
- 31.50355 Protection - Same as CAR 31.403295.

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- 31.504 Aircraft Servicing Facilities - Same as CAR 31.404.
- 31.505 Traffic Control Facilities - For use in controlling sea-plane traffic, the airport shall be equipped with a control tower located to provide an unobstructed view of the basin and the main channel. Such tower shall be constructed in accordance with the requirements of CAR 31.4050 and shall be equipped in accordance with the requirements of CAR 31.4051.
- 31.506 Meteorological Facilities
- 31.5060 Instrument-landing Facilities - The airport shall be equipped with a satisfactory instrument-landing approach system utilizing approach lights and horizontal and vertical radio beams in accordance with established practice. Such system shall be installed in connection with the main channel, and shall meet all applicable requirements of CAR 31.4060.
- 31.5061 Wind Cone - The airport shall be equipped with a wind cone or "sock" meeting the requirements of CAR 31.4062.
- 31.5062 Meteorological Equipment - Same as CAR 31.4063.
- 31.507 Emergency Facilities
- 31.5070 Hangar Fire-fighting Equipment - Same as CAR 31.4070.
Equipment
- 31.5071 Fire-fighting of Other Buildings - Same as CAR 31.4071.
- 31.5072 First-aid Facilities - As a minimum, the airport shall be equipped with a first-aid room, well ventilated and lighted and conveniently located, and with at least one first-aid kit meeting the standards of the Bureau of Air Commerce.
- 31.5073 "Crash Boat" - The airport shall be equipped with a power-driven boat, satisfactory to the Secretary of Commerce in size, speed, and all other respects, for emergency use in removing all occupants of a fully-loaded seaplane weighing 90,000 lbs., forced down or otherwise disabled off-shore. Such "crash boat" shall be equipped in accordance with CAR 31.4076.
- 31.508 Buildings - The airport shall be equipped with an administration or terminal building, at least one hangar, separate from or combined with the administration building, and such additional hangars and other buildings as the Secretary of Commerce may consider reasonably necessary for efficient aeronautical operations of the type and to the extent carried on at the time the airport

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is under consideration for rating. All airport buildings shall be located conveniently near the shore of the basin and shall be well lighted and ventilated and adequately heated.

31.509 Other Facilities

31.5090 Road, Parking Lot, and Fence - The airport shall be equipped with the following:

- (a) A service road connecting a nearby highway and the administration building, permitting easy ingress to and egress from the airport.
- (b) A parking lot convenient to the administration building and of a size sufficient to accommodate the number of automobiles ordinarily requiring such facility.
- (c) A fence ordinarily adequate to keep human beings and animals from all airport buildings, loading facilities, and beaching facilities.

31.5091 Administration Building Facilities - Same as CAR 31.4092, except that portable screens need not be provided.

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(Outline No. 12)

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- 31.51 The W2 Rating
- 31.510 Landing Area
- 31.5100 Layout - Same as CAR 31.5000, except that an auxiliary channel shall not be required. If an auxiliary channel is provided, however, it shall meet the minimum requirements of CAR 31.5000 therefor.
- 31.5101 Location - Same as CAR 31.5001.
- 31.5102 Size
- 31.51020 Basin - The basin shall be large and deep enough for service of seaplanes by tender, the anchorage of at least two seaplanes each weighing 65,000 lbs., and for use of the facilities required by CAR 31.511 by seaplanes of equal weight, all at the same time.
- 31.51021 Main Channel - The length, width, and depth of the main channel, and the diameter and depth of its turning areas, shall be adequate in the opinion of the Secretary of Commerce for operations of a 65,000 lb. seaplane.
- 31.51022 Auxiliary Channel - If an auxiliary channel is provided, its length, width, and depth, and the diameter and depth of its turning areas, shall likewise be adequate in the opinion of the Secretary of Commerce for operations of a 65,000 lb. seaplane.
- 31.5103 Obstructions - Same as CAR 31.5003.
- 31.511 Landing Facilities
- 31.5110 Loading - Same as CAR 31.5010, except that the criterion as to the suitability of the required floats and docks shall be safe and efficient embarkation on, debarkation from, and loading and unloading of, a seaplane weighing 65,000 lbs.
- 31.5111 Beaching - Same as CAR 31.5011, except that the criterion as to the suitability of the required ramps and other equipment shall be efficient beaching, launching, and transportation between basin and hangar, of a seaplane weighing 65,000 lbs.
- 31.512 Marking
- 31.5120 Boundary Buoys - Same as CAR 31.5020.
- 31.5121 Obstruction Marking - Same as CAR 31.5021.

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- 31.5122 Identification Marker - Same as CAR 31.5022.
- 31.5123 Signal Flag - No requirements.
- 31.513 Lighting
- 31.5130 Boundary and Range Lights - Each channel marker buoy re-
quired by CAR 31.5120 shall be equipped with a boundary or range
light meeting the requirements stated and referred to in CAR
31.5032.
- 31.5131 Floodlighting - Same as CAR 31.5031.
- 31.5132 Obstruction Lighting - Same as CAR 31.5032.
- 31.5133 Building Interior Lighting - Same as CAR 31.5033.
- 31.5134 Instrument Lighting - Same as CAR 31.5034.
- 31.5135 Miscellaneous Requirements - Same as CAR 31.5035.
- 31.514 Aircraft Servicing Facilities - Same as CAR 31.414.
- 31.515 Traffic Control Facilities - Same as CAR 31.505, except
that the references to CAR 31.4050 and CAR 31.4051 shall be to
CAR 31.4150 and CAR 31.4151 instead.
- 31.516 Meteorological Facilities - Same as CAR 31.506.
- 31.517 Emergency Facilities - Same as CAR 31.507, except that
the power-driven boat required for emergency use in removing
occupants of a seaplane forced down or otherwise disabled off-
shore, shall be satisfactory to the Secretary of Commerce in
size, speed, and all other respects for use with respect to a
fully loaded seaplane weighing 65,000 lbs., and except that the
references to CAR 31.4070, CAR 31.4071, and CAR 31.4076 shall
be to CAR 31.4170, CAR 31.4171, and CAR 31.4176 instead.
- 31.518 Buildings - Same as CAR 31.508.
- 31.519 Other Facilities
- 31.5190 Road, Parking Lot, and Fence - Same as CAR 31.5090.
- 31.5191 Administration Building Facilities - Same as CAR 31.4192,
except that portable screens need not be provided.

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31.52 W3 RATING

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31.52 W3 Rating

31.520 Landing Area

31.5200 Layout - The landing area shall consist of water areas forming a seaplane basin and a channel or expanse permitting landing and taking-off in a direction approximately opposite to that of the prevailing wind. Such channel or expanse shall be within convenient taxiing distance of the basin.

31.5201 Location - The landing area shall be a sheltered body of water or a part thereof. The basin shall be particularly well sheltered, and shall be located relatively near the landing area of an airport having a rating of L1, L2, L3, or L4.

31.5202 Size

31.52020 Basin - The basin shall be large enough, in the opinion of the Secretary of Commerce, for service of seaplanes by tender, for the anchorage of at least two seaplanes of a size equal to that of the largest chartered or itinerant seaplane expected to be accommodated, and for use of the facilities required by CAR 31.521 by seaplanes of equal weight, all at the same time.

31.52021 Channel - The dimensions and depth of the channel or expanse of water used for landing and taking-off shall be adequate in the opinion of the Secretary of Commerce for operations of the largest seaplane expected to be accommodated, whether chartered or itinerant.

31.5203 Obstructions - Same as CAR 31.5003.

31.521 Landing Facilities

31.5210 Loading - The airport shall be equipped with suitable floats and docks of such size and number and so constructed as to permit safe and efficient embarkation on, debarkation from, and loading and unloading of, a seaplane equal in weight to the heaviest chartered or itinerant seaplane expected to be accommodated. Such floats and docks shall be located within the basin and proximate to the airport buildings.

31.5211 Beaching - Same as CAR 31.5011, except that the criterion as to the suitability of the required ramps and other equipment shall be efficient beaching, launching, and transportation between basin and hangar, of a seaplane equal in weight to the largest chartered or itinerant seaplane expected to be accommodated.

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- 31.522 Marking
- 31.5220 Boundary Buoys - No requirements, except that if landing area buoys are used to mark the boundaries of the landing area, they shall meet the requirements of CAR 31.5020.
- 31.5221 Obstruction Marking - Same as CAR 31.5021, except that the distance from the airport within which structures and objects must be marked shall be $\frac{1}{2}$ mile.
- 31.5222 Identification Marker - Same as CAR 31.5022.
- 31.5223 Signal Flag - The airport shall be equipped with a signal flag and facilities for flying same in clear view of, and as notice to, water traffic that seaplane operations are carried on in the vicinity. Such flag shall be at least three feet square, and shall show alternating vertical stripes of chrome yellow and black.
- 31.523 Lighting
- 31.5230 Boundary and Range Lights - No requirements, except that if channel marker buoys are provided and such buoys are equipped with lights, such lights shall meet the requirements and specifications stated and referred to in CAR 31.5030.
- 31.5231 Floodlighting - No requirements, except that if floodlighting equipment is provided, it shall be satisfactory to the Bureau in all respects.
- 31.5232 Obstruction Lighting - No requirements, except that if a structure, object, or natural feature is obstruction lighted, such obstruction lighting shall be in accordance with the requirements of CAR 31.5032.
- 31.5233 Building Interior Lighting - Same as CAR 31.5033.
- 31.5234 Instrument Lighting - No requirements.
- 31.5235 Miscellaneous Requirements - No requirements.
- 31.524 Aircraft Servicing Facilities - Same as CAR 31.434.

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- 31.525 Traffic Control Facilities - No requirements.
- 31.526 Meteorological Facilities - The minimum meteorological equipment required shall consist of a wind cone or "sock" mounted on one of the airport buildings and readily visible under normal conditions of daytime visibility from an altitude of 5000 feet.
- 31.527 Emergency Facilities
- 31.527C Hangar Fire-fighting Equipment - Same as CAR 31.4361.
- 31.5271 Fire-fighting Equipment of Other Buildings - Same as CAR 31.4361.
- 31.5272 First-aid Facilities - Same as CAR 31.5072, except that the airport need not provide a first-aid room.
- 31.5273 "Crash Boat" - No requirements.
- 31.528 Buildings - The airport shall be equipped with at least one hangar and such additional buildings and other hangars as the Secretary of Commerce may consider reasonably necessary for efficient aeronautical operations of the type and to the extent carried on at the time the airport is under consideration for rating.
- 31.529 Other Facilities
- 31.529C Road, Parking Lot, and Fence - No requirements, except that the airport shall be equipped with a fence ordinarily adequate to keep human beings and animals from airport buildings, loading facilities, and beaching facilities.
- 31.5291 Administration Building Facilities - No requirements.

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31.535	Traffic Control Facilities.....	75
31.536	Meteorological Facilities.....	75
31.537	Emergency Facilities.....	75
31.538	Buildings.....	75
31.539	Other Facilities.....	75

CIVIL AIR REGULATIONS

- 31.53 31.53
- 31.530 Landing Area.
- 31.5300 Layout - No requirements.
- 31.5301 Location - No requirements.
- 31.5302 Size - The landing area shall be large and deep enough, in the opinion of the Secretary of Commerce, for landing, taking-off, and other operations of the largest itinerant seaplane expected to be accommodated.
- 31.5303 Obstructions - The landing area shall be sufficiently clear of surface and underwater obstructions, natural and artificial, in the opinion of the Secretary of Commerce, to permit landing, taking-off, and other operations of the largest itinerant seaplane expected to be accommodated.
- 31.531 Landing Facilities
- 31.5310 Loading - No requirements, except that facilities shall be provided permitting the occupants of an itinerant seaplane to land and embark with safety.
- 31.5311 Beaching - Same as CAR 31.5211, except that the criterion shall be efficient beaching, launching, and transportation between basin and hangar, of a seaplane equal in weight to the heaviest itinerant seaplane expected to be accommodated.
- 31.532 Marking - No requirements, except that if buoys are used to mark the boundaries of the landing area they shall be painted in accordance with the requirements of CAR 31.5020.
- 31.533 Lighting - No requirements.
- 31.534 Aircraft Servicing Facilities - No requirements
- 31.535 Traffic Control Facilities - No requirements
- 31.536 Meteorological Facilities - No requirements
- 31.537 Emergency Facilities - No requirements
- 31.538 Buildings - No requirements
- 31.539 Other Facilities - No requirements

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(Outline No. 15)

31.6. MINIMUM REQUIREMENTS FOR AIRSHIP AIRPORTS

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(Outline No. 16)

31.60 THE D1 RATING

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31.6 MINIMUM REQUIREMENTS FOR AIRSHIP AIRPORTS

31.60 The DL Rating

31.600 Landing Facilities

31.6000 Landing Area - The airport shall have a landing field, hereinafter referred to as the airship landing field, consisting of a cleared, comparatively level, and improved field, free of all obstructions and having a radius from its center of at least 1000 feet in all directions. Such area shall be separate and apart from any area used for the landing of landplanes.

31.6001 Mooring Mast - The airport shall be equipped with a mooring mast of a type meeting the standards of the Navy Department for mooring of an airship having a gas capacity of 10,000,000 cubic feet.

31.601 Approaches - The approaches to the airship landing field¹ shall be entirely clear of all obstructions, including any structure, natural feature, or other object.

31.602 Marking

31.6020 Boundary Markers - The airship landing field need not be outlined by boundary markers, but, if it is so outlined, the markers shall meet the requirements of CAR 31.4020, and this area shall be separated from any other landing area by a row of such markers between them.

31.6021 Obstruction Marking - Same as CAR 31.4021.

31.6022 Identification Marker - Same as CAR 31.4022.

31.603 Lighting

31.6050 Beacon - The airport shall be equipped with a revolving beacon satisfactory to the Bureau in all respects, having color and flash characteristics different from those of any other airport or airway beacon.² Such beacon shall be mounted at or near the top of the mooring mast or atop a building or tower located near the airship landing area.

-
1. The formula for determination of such approaches to be announced at a later date.
 2. Specifications to be issued at a later date.

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- 31.6031 Boundary Lights - The airship landing area need not be outlined by boundary lights, but, if it is so outlined, the lights and lighting shall be satisfactory to the Bureau in all respects¹ and this area shall be separated from any other landing area by a row of such lights between them.
- 31.6032 Obstruction Lights - Same as CAR 31.40322.
- 31.6033 Floodlighting - Equipment shall be provided permitting floodlighting of the airship landing area and mooring mast in such a way as to permit the mooring at night, without undue difficulty, of an airship having a gas capacity of 10,000,000 cubic feet. Such floodlighting shall be satisfactory to the Bureau in all respects.¹
- 31.6034 Building Interior Lighting - Same as CAR 31.40327.
- 31.6035 Instrument Lighting - Same as CAR 31.40328.
- 31.6036 Miscellaneous Requirements - Same as CAR 31.40329.
- 31.604 Aircraft Servicing Facilities
- 31.6040 Fuel - The airport shall be equipped to store, and supply an airship having a gas capacity of 10,000,000 cubic feet with, water and suitable fuel and oil.
- 31.6041 Lifting Gas - The airport shall be equipped to store a quantity of lifting gas sufficient to meet regular needs and shall have adequate facilities for supplying an airship therewith.
- 31.6042 Repairs - Same as CAR 31.4041.
- 31.6043 Storage - The airport shall provide space for the storage of an airship having a gas capacity of 10,000,000 cubic feet, and with such additional aircraft storage space as may be reasonably necessary in the opinion of the Secretary of Commerce.
- 31.605 Traffic Control Facilities - The airport shall provide a room in the administration building for use as a base in controlling aircraft traffic. Such room shall be equipped with the following:

1. Specifications to be issued at a later date.

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- (a) A radio transmitter having a 50 mile range under any weather conditions, designed to transmit voice on a frequency of 278 kilocycles, and meeting all applicable requirements stated in the "Rules and Regulations of the Federal Communications Commission."
- (b) Such radio receiving sets of the crystal controller type as may be reasonably necessary.
- (c) An additional radio receiving set effective through a frequency range of 200 to 400 kilocycles or a teletypewriter providing U.S. Weather Bureau teletypewriter service.
- (d) A wind direction indicator of the recording type.
- (e) A wind velocity indicator of the recording type.
- (f) A temperature indicator of the recording type.
- (g) A sensitive type altimeter for use in correcting aircraft altimeters for barometric pressure.
- (h) An alarm signal for use in warning of emergencies.

31.606 Meteorological Facilities

31.6060 Wind Cone - The airport shall be equipped with a wind cone or "sock" meeting the requirements of CAR 31.4062.

31.6061 Meteorological Equipment - Same as CAR 31.4063, except that the references to CAR 31.4051 shall be to CAR 31.605 instead.

31.607 Emergency Facilities

31.6070 Fire-fighting Equipment - All airship hangers or sheds shall be so equipped for fire-fighting as to meet the minimum requirements of the National Board of Fire Underwriters. All other airport buildings shall be protected against fire in accordance with the requirements of CAR 31.4071.

31.6071
31.6092

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- 31.6071 First-aid Facilities - Same as CAR 31.4073.
- 31.6072 "Crash Boat" - Same as CAR 31.4076.
- 31.609 Buildings - The airport shall be equipped with the following buildings:
- (a) An administration or terminal building of such size and so designed as to provide the facilities required by CAR 31.6092.
 - (b) One or more hangars or sheds, separate from or combined with the administration building, of such a size and so designed as to provide the facilities specified in CAR 31.604.
 - (c) Such additional buildings as the Secretary of Commerce may consider reasonably necessary for efficient aeronautical operations of the type and to the extent carried on at the time the airport is under consideration for rating. No airport building shall be located on the airship landing field or so as to constitute an obstruction within the approaches. All buildings shall be well lighted and ventilated and adequately heated.
- 31.609 Other Facilities
- 31.6090 Road, Parking Lot, and Fence - Same as CAR 31.4091.
- 31.6091 Communication Facilities - The airport shall provide adequate communication facilities, including railway or highway facilities for the transportation of lifting gas.
- 31.6092 Administration Building Facilities - Same as CAR 31.4092.

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31.61 D2 RATING

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31.6100	Landing field.....	80
31.6101	Mooring Mast.....	30
31.611	Approaches.....	80
31.612	Marking.....	80
31.613	Lighting.....	80
31.614	Aircraft Servicing Facilities.....	80
31.6140	Fuel.....	80
31.6141	Lifting Gas.....	80
31.6142	Repairs.....	80
31.6143	Storage.....	80
31.615	Traffic Control Facilities.....	80
31.616	Meteorological Facilities.....	80
31.6160	Wind Cone.....	80
31.6161	Meteorological Equipment.....	30
31.617	Emergency Facilities.....	80
31.6170	Fire-fighting Equipment.....	80
31.6171	First-aid Facilities.....	80
31.6172	"Crash Boat".....	80
31.618	Buildings.....	30
31.619	Other Facilities.....	80

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31.61
31.612

31.61

B2 Rating

- 31.610 Landing Facilities
- 31.6100 Landing Field - Same as CAR 31.6000.
- 31.6101 Mooring Mast - Same as CAR 31.6001.
- 31.611 Approaches - Same as CAR 31.601.
- 31.612 Marking - Same as CAR 31.602.
- 31.613 Lighting - Same as CAR 31.603, except that there shall be no requirements with respect to automatic switching.
- 31.614 Aircraft Servicing Facilities
- 31.6140 Fuel - Same as CAR 31.6040.
- 31.6141 Lifting Gas - No requirements.
- 31.6142 Repairs - Same as CAR 31.4141.
- 31.6143 Storage - The airport shall provide such airship storage space as may be reasonably necessary in the opinion of the Secretary of Commerce.
- 31.615 Traffic Control Facilities - No requirements.
- 31.616 Meteorological Facilities
- 31.6160 Wind Cone - Same as CAR 31.6060.
- 31.6161 Meteorological Equipment - Same as CAR 31.4163, except that the references to CAR 31.4151 shall be disregarded.
- 31.617 Emergency Facilities
- 31.6170 Fire-fighting Equipment - Same as CAR 31.6070.
- 31.6171 First-aid Facilities - Same as CAR 31.6071, except that there need not be a separate first-aid room.
- 31.6172 "Crash Boat" - Same as CAR 31.6072.
- 31.618 Buildings - Same as CAR 31.608, except that there shall be no minimal requirement with respect to provision of an airship hangar or shed.
- 31.619 Other Facilities - Same as CAR 31.609, except that there shall be no minimal requirements with respect to railway or highway connections for transportation of lifting gas.

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(Outline No. 18)

31.62 D3 RATING

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31.627	Emergency Facilities.....	81
31.628	Buildings.....	81
31.629	Other Facilities.....	81

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- 31.62 B3 Rating
- 31.620 Landing Facilities
- 31.6200 Landing Field - Same as CAR 31.6000, except that the radius from the center of the landing field shall be at least 500 feet in all directions.
- 31.6201 Mooring Mast - The airport shall be equipped with some means of mooring and making fast, under normal weather conditions, an airship having a gas capacity of 300,000 cubic feet. It is not necessary that there be a mooring mast if such mooring can be achieved by other means.
- 31.621 Approaches - Same as CAR 31.601, except that the approaches need not be entirely clear of all obstructions so long as, in the opinion of the Secretary of Commerce, the obstructions present are not such as would present a serious hazard to the landing of an airship having a gas capacity of 300,000 cubic feet.
- 31.622 Marking - No requirements.
- 31.623 Lighting - No requirements.
- 31.624 Aircraft Servicing Facilities - No requirements, except that the airport shall provide facilities for supplying an airship having a gas capacity of 300,000 cubic feet with water and suitable fuel and oil.
- 31.625 Traffic Control Facilities - No requirements.
- 31.626 Meteorological Facilities - No requirements.
- 31.627 Emergency Facilities - No requirements.
- 31.628 Buildings - No requirements.
- 31.629 Other Facilities - No requirements.

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31.7 THE AIRPORT RATING CERTIFICATE

- 31.70 Provision for Issuance - To provide the airport operator with an official certification of the rating or ratings assigned the airport, the Airport Rating Certificate will be issued to the operator by the Secretary of Commerce upon determination by him of the rating or ratings for which the airport is qualified in accordance with the minimum requirements of this Chapter and of Chapter 32. If such determination is for any reason delayed, the Secretary may issue a temporary Certificate to be effective until issuance of the permanent Certificate.
- 31.71 Nature - The Airport Rating Certificate will indicate the rating assigned the airport in question.
- 31.72 Basis for Issuance - The Secretary's determination of the rating or ratings for which an airport is qualified may be based upon an application made by the operator as herein provided and/or upon inspection and examination as herein provided, acquainting the Secretary with the nature of the physical features, equipment, and facilities of the airport, with the nature of its operation and maintenance, and with the qualifications of its personnel and management. Such determination will be reached, however, only after the airport operator has been afforded a reasonable opportunity to be heard.
- 31.720 Application - If application for rating is made, it shall consist of three duly authenticated copies of the form supplied for the purpose, made out in accordance with the directions appearing on said form, and any additional information desired by the Secretary of Commerce shall be furnished upon request.
- 31.721 Inspection - Whether application for rating is made or not, the Secretary of Commerce may, to the extent of his authority, inspect and examine any airport at any time; and the operator of the airport shall cooperate fully in this respect.
- 31.73 Amendment - The Airport Rating Certificate will be amended, or revoked and a new Certificate issued, whenever it is found by the Secretary of Commerce that a change in the rating of the airport is warranted due to change in its physical features, equipment, or facilities, or in the nature of its operation or maintenance, or in its personnel or management. Such action will be based upon application therefor and/or upon inspection in accordance with CAR 31.72, and will be taken only after the airport operator has been afforded a reasonable opportunity to be heard. In the meantime, however, the Certificate may be suspended in whole or in part.

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- 31.74 Display - The Airport Rating Certificate, or a copy thereof, shall be conspicuously posted in the principal airport building where it may be readily seen, and shall be presented for inspection upon demand of the Secretary of Commerce or upon the reasonable request of any interested person.
- 31.75 Life - The Airport Rating Certificate, when issued, will remain effective for an indeterminate time, or until such time as:
- (a) It is revoked; or
 - (b) The airport in question ceases to be used as such.
- 31.76 Transferability - The Airport Rating Certificate is transferable as from one airport operator or his successor, but not as from one airport to another.
- 31.77 Revocation -
- (a) The Airport Rating Certificate may be revoked and another issued changing the rating to the lowest possible for an airport providing landing facilities of the same type as those of the airport in question, for any of the following reasons:
 - (1) Any material misrepresentation made knowingly by the airport operator to the Secretary of Commerce.
 - (2) Any material change in the physical features, equipment, or facilities of the airport in question, or in its operation, maintenance, personnel, or management, made without notification to the Secretary of Commerce in advance thereof.
 - (3) Violation of any provision of the Air Commerce Act or any rule or regulation duly issued thereunder.
 - (4) Any unsafe operation of the airport in question.
 - (5) Failure to comply with any requirement of this Chapter or of Chapter 32, applicable in the case of the rating or ratings held.

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- (b) The Airport Rating Certificate may be revoked and no other rating given if it is determined by the Secretary of Commerce that the erstwhile airport no longer meets the minimum requirements for the lowest rating possible.

31.78 Surrender - Upon notice from the Secretary of Commerce of the revocation of the Airport Rating Certificate, or upon request of the Secretary, the operator to whom it has been issued shall promptly return such certificate to the Secretary.

31.79 Appeal - The operator of any landable area purported to be an airport or landing field but refused any rating, or any operator not satisfied with the rating or ratings assigned to the airport operated by him, may appeal from the decision of the Secretary of Commerce at any time after the expiration of thirty days from the date of such decision, and the Secretary will thereupon afford such operator a reasonable opportunity to be heard.

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(Outline No. 19)

32.4 MINIMUM REQUIREMENTS FOR LANDPLANE AIRPORTS

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- 32. AIRPORT RATING (OPERATION, MAINTENANCE, PERSONNEL AND MANAGEMENT)
- 32.0 PROVISION FOR RATING - See CAR 31.0
- 32.1 DEFINITIONS - See CAR 31.1
- 32.2 RATINGS - See CAR 31.2
- 32.3 MINIMUM REQUIREMENTS - The requirements herein are the minimum for airport ratings as to operation, maintenance, personnel, and management.1
- 32.4 MINIMUM REQUIREMENTS FOR LANDPLANE AIRPORTS

1. Minimum requirements for airport ratings as to physical features, equipment, and facilities, are stated in Chapter 31 of these Regulations.

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32.40 The L1 Rating

32.400 Operation

32.4000 In General

32.40000 Airport Use - Whether or not the airport is operated as a route terminal or scheduled intermediate stop for airline operations¹, all facilities provided shall be available without unjust discrimination and on equal terms to all operators and flyers of landplanes. If the airport is used as an international terminal it shall have been certified by the Department of State to be a port of entry, and shall provide the usual customs and other facilities necessary.

32.40001 Equipment - Each item of equipment provided by the airport shall be used for the purpose for which it is intended, in the manner in which it is intended to be used and in accordance with the usual standards for use of similar equipment. This requirement shall be additional to all specific requirements as to the use of certain equipment.

32.4001 Lighting - (To be supplied)

32.4002 Traffic Control - Aircraft traffic at the airport shall be so controlled at all times that all movements of aircraft are made with as great a degree of safety and efficiency as possible, in accordance with flying rules promulgated by the operator of the airport and approved by the Secretary of Commerce, and in accordance with all applicable provisions of this chapter and other chapters of these Regulations. Such control shall be exercised primarily by means of radio if possible, preferably two-way radio.

32.4003 Meteorological Information Service - A meteorological information service shall be maintained at the airport for the benefit of flyers, airlines, and any other parties interested. Service shall include the following:

- (a) The procurement hourly of data concerning local meteorological conditions, including, at a minimum, wind direction and velocity, visibility, height of ceiling, barometric pressure, temperature, and general weather conditions.

1. The L1 Rating is intended to denote an airport suitable in all respects for use as a superterminal, on an "unrestricted" basis, by scheduled intrastate, interstate, or international airlines operating the largest landplanes.

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- (b) The procurement of similar information as to meteorological conditions at neighboring airports to which flights are commonly made.
- (c) The procurement daily of copies of the current weather map issued by the U.S. Weather Bureau.
- (a) The posting on the required bulletin board (See CAR 31.4092(b)) of all meteorological data required by this paragraph to be procured.
- (e) The furnishing of such information to anyone requesting same, including conveyance thereof to pilots of aircraft in flight by means of radio, if possible.

32.401 Maintenance

32.4010 In General - All physical features, equipment, and facilities provided by the airport shall be inspected and checked frequently, kept in repair, and so maintained as to continue at all times to meet the requirements of CAR 31.40. This requirement shall be additional to all specific requirements as to the maintenance of certain equipment.

32.4011 Landing Field - The landing field shall be inspected daily and maintained in the condition required by CAR 31.400. This shall include keeping it clear of high grass and other obstructions, and free of snow (unless packed to provide a firm iceless surface). Any dangerous area shall be made safe as soon as possible, and, until this is done, shall be kept closed to aircraft use and marked in accordance with CAR 31.4021 and lighted in accordance with CAR 31.40321 and CAR 31.40327.

32.4012 Approaches - Conscientious efforts shall be made to keep the approaches free from obstructions in accordance with the requirements of CAR 31.4010, by obtaining control of all land below the approaches, by prevailing upon owners thereof not to obstruct the approaches, by sponsoring or supporting adoption of local and State airport zoning ordinances and laws, or by any other method possible.

32.4013 Lighting - All lighting equipment shall be inspected and checked frequently and kept in repair, reporting on the same to the Secretary of Commerce at monthly and annual intervals. The monthly report shall cover as a minimum the following points:

- (a) Condition of all lamps
- (b) Size of all lamps
- (c) Tightness of all lamps

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- (d) Presence of spare lamps in beacons
- (e) Operation of lamp changers
- (f) amount of glassware broken
- (g) Glassware fastening
- (h) Cleanness inside and outside of glass
- (i) Cleanness of reflectors
- (j) Condition of series cutouts
- (k) Full load voltage at outlets
- (l) Monthly energy consumption
- (m) Condition of rotating equipment
- (n) Condition of slip-rings and brushes
- (o) Oil in moving parts
- (p) Oil in transformers
- (q) Condition of fuses

The annual report shall cover as a minimum the following points:

- (a) Illumination from landing area floodlights
- (b) Insulation resistance of all underground cables
- (c) Resistance of system ground
- (d) Condition of all poles and supporting structures.

32.402

Personnel - The airport shall have sufficient personnel in attendance at all times for satisfactory operation and maintenance. Any employee of a type required to be licensed by some other chapter of these Regulations shall have the required Certificate of Competency.

32.403

Management - Management of the airport shall be in the hands of one person who shall be directly responsible for satisfactory operation and maintenance thereof in accordance with CAR 32.400 and CAR 32.401. Such airport manager shall be licensed, having a Certificate of Competency as required by Chapter of these Regulations.

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- 32.41 The L2 Rating
- 32.410 Operation
- 32.4100 In General
- 32.41000 Airport Use - Same as CAR 32.40000¹
- 32.41001 Equipment - Same as CAR 32.40001.
- 32.4101 Lighting - (To be supplied)
- 32.4102 Traffic Control - Same as CAR 32.4002.
- 32.4103 Meteorological Information Service - Same as CAR 32.4003,
except that the reference, in subsection (d) to CAR 31.4092 (b),
shall be to CAR 31.4192 instead.
- 32.411 Maintenance
- 32.4110 In General - Same as CAR 32.4010, except that the reference
to CAR 31.40 shall be to CAR 31.41 instead.
- 32.4111 Landing Field - Same as CAR 32.4011, except that the
reference to CAR 31.400 and CAR 31.4021 shall be to CAR 31.410
and CAR 31.421 instead.
- 32.4112 Approaches - Same as CAR 32.4012, except that the reference
to CAR 31.4010 shall be to CAR 31.4110 instead.
- 32.4113 Lighting - Same as CAR 32.4013.
- 32.412 Personnel - Same as CAR 32.402.
- 32.413 Management - Same as CAR 32.403, except that the references
to CAR 32.400 and CAR 32.401 shall be to CAR 32.410 and CAR 32.411
instead.

-
1. The L2 Rating is intended to denote an airport suitable in all respects for use as a terminal, on an "unrestricted" basis, by scheduled interstate, intrastate, or international airlines operating large landplanes.

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32.42	<u>L3 Rating</u>
32.420	Operation
32.4200	In General
32.42000	Airport Use - Same as CAR 31.40000 ¹ .
32.42001	Equipment - Same as CAR 32.40001.
32.4201	Lighting - (To be supplied)
32.4202	Traffic Control - Same as CAR 32.4002.
32.4203	Meteorological Information Service - Same as CAR 32.4003, except that the reference, in subsection (d) to CAR 31.4092 (b), shall be to CAR 31.429 instead.
32.421	Maintenance
32.4210	In General - Same as CAR 32.4010, except that the reference to CAR 31.40 shall be to CAR 31.48 instead.
32.4211	Landing Field - Same as CAR 32.4011, except that the references to CAR 31.400 and CAR 31.4021 shall be to CAR 31.420 and CAR 31.421 instead.
32.4212	Approaches - Same as CAR 32.4012, except that the reference to CAR 31.4010 shall be to CAR 31.4211 instead.
32.4213	Lighting - Same as CAR 32.4013.
32.422	Personnel - Same as CAR 32.402.
32.423	Management - Same as CAR 32.403, except that the references to CAR 32.400 and CAR 32.401 shall be to CAR 32.420 and CAR 32.421 instead.

1. The L3 Rating is intended to denote an airport suitable in all respects for use as a terminal, on a "restricted" basis, by scheduled intrastate, interstate, or international airlines operating large landplanes.

C I V I L A I R R E G U L A T I O N S

- 32.43 The L4 Rating
- 32.430 Operation
- 32.4300 In General
- 32.43000 Airport Use - Whether or not the airport is operated as a base for charter or itinerant operations¹, all facilities provided shall be available without unjust discrimination and on equal terms to all operators and flyers of landplanes.
- 32.43001 Equipment - Same as CAR 32.40001.
- 32.4301 Lighting - (To be supplied).
- 32.4302 Traffic Control - No requirements.
- 32.4303 Meteorological Information Service - No requirements.
- 32.431 Maintenance
- 32.4310 In General - Same as CAR 32.4010, except that the reference to CAR 31.40 shall be to CAR 31.43 instead.
- 32.4311 Landing Field - Same as CAR 32.4011, except that the references to CAR 31.400 and CAR 31.4021 shall be to 31.430 and CAR 31.4321 instead.
- 32.4312 Approaches - Same as CAR 32.4012, except that the reference to CAR 31.4110 shall be to CAR 31.4310 instead.
- 32.4313 Lighting - No requirements.
- 32.432 Personnel - Same as CAR 32.402.
- 32.433 Management - No requirements.

1. The L4 Rating is intended to denote an airport suitable in all respects for use as such by operators or flyers of small landplanes in chartered or itinerant operations.

C I V I L A I R R E G U L A T I O N S

- 32.44 L5 Rating
- 32.440 Operation
- 32.4400 In General
- 32.44000 Airport Use - Whether or not the airport is operated as an emergency landing field¹, all facilities shall be available without unjust discrimination and on equal terms to all operators and flyers of land planes.
- 32.44001 Equipment - No requirements.
- 32.4401 Lighting - No requirements.
- 32.4402 Traffic Control - No requirements.
- 32.4403 Meteorological Information Service - No requirements.
- 32.441 Maintenance
- 32.4410 In General - Same as CAR 32.4010, except that the reference to CAR 31.40 shall be to CAR 31.44 instead.
- 32.4411 Landing Area - No requirements.
- 32.4412 Approaches - No requirements.
- 32.4413 Lighting - No requirements.
- 32.442 Personnel - No requirements.
- 32.443 Management - No requirements.

1. The L5 Rating is intended to denote an airport suitable in all respects for use as an emergency landing field by operators and flyers of small landplanes.

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(Outline No. 22)

32.50 WL RATING

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CIVIL AIR REGULATIONS

32.5 MINIMUM REQUIREMENTS FOR SEAPLANE AIRPORTS

32.50 W1 Rating

32.500 Operation

32.5000 In General

32.50000 Airport Use - Whether or not the airport is operated as a terminal for transoceanic, international airline operations,¹ all facilities provided shall be available without unjust discrimination and on equal terms to all operators and flyers of seaplanes. If used as an international terminal, the airport shall have been certified by the Department of State to be a port of entry, and shall provide the usual customs and other facilities necessary.

32.50001 Equipment - Same as CAR 32.40001.

32.5001 Landing Area - The basin and channels shall be officially designated as a seaplane landing area by the governmental agency having jurisdiction over navigation of the waters of which they are parts, shall be indicated as such on all official navigation maps and charts, and shall be mentioned as such in all "Notices to Mariners" and similar publications. Except for portions of the channels of the landing area also forming a part or parts of a shipping lane or channel officially designated as such, the entire landing area, by authority of the same agency, shall be restricted at all times to use by seaplanes for landing, taking-off and other seaplane operations. The portions of seaplane channels forming a part or parts of a shipping lane or channel shall be restricted to the same use, but only at the time of actual seaplane operations, such restrictions to be effectuated not only by the buoys and lights required by CAR 31.5020 and CAR 31.5030 but by the speedboat patrol required by CAR 32.5002.

32.5002 Landing Facilities - The facilities for seaplane embarkation, disembarkation, loading, unloading, beaching, launching, and transportation between basin and hangar (see CAR 31.501) shall be available at all hours of the day and night during the entire year.

1. The W1 Rating is intended to denote an airport suitable in all respects for use as a super terminal, on an "unrestricted" basis, by scheduled transoceanic, international airlines operating seaplanes weighing 80,000 pounds or more.

- 32.5003 Speedboat Patrol - All portions of seaplane channels forming a part or parts of a shipping lane or channel shall be patrolled at all times of actual use thereof for the landing or taking-off of a seaplane as a warning to shipping of such seaplane operations. Such patrol shall be by means of a speedboat capable of 50 knots, which with siren sounding, shall run near one side of the channel, ahead of and parallel with the seaplane whenever it crosses such shipping lane or channel at an altitude of less than 100 feet.
- 32.5004 Lighting - All boundary, range, and obstruction lights shall be operated each night from within 30 minutes of the time of sunrise to within 30 minutes of the time of sunset, and, during any period of any day when the illumination level is less than 30 foot candles. All other lights shall be operated whenever needed.
- 32.5005 Instrument-Landing System - The instrument-landing approach system (see CAR 31.5061) shall be operated whenever visibility is less than 10 - 1.7782.¹
- 32.5006 Traffic Control - Same as CAR 32.4002.
- 32.5007 Meteorological Information Service - Same as CAR 32.4003.
- 32.501 Maintenance
- 32.5010 In General - Same as CAR 32.4010, except that the reference to CAR 31.40 shall be to CAR 31.50 instead.
- 32.5011 Landing Area - All landing area surfaces shall be maintained in the condition required by CAR 31.5004. This shall include keeping them dredged to the required depth and clear of driftwood and all other floating obstructions.
- 32.5012 Boundary Buoys - All boundary buoys shall be inspected frequently, kept in repair, and maintained at their proper anchorage.
- 32.5013 Marking - All markers and markings shall be maintained in such a way as to be clearly visible under ordinary weather conditions at a height of 5000 feet.
- 32.5014 Lighting - Same as CAR 32.4013.
- 32.502 Personnel - Same as CAR 32.402.
- 32.503 Management - Same as CAR 32.403, except that the references to CAR 32.400 and CAR 32.401 shall be to CAR 32.500 and CAR 32.501 instead.

1. Representing the transmissivity when a 30 candle power light is visible at a distance of one mile.

32.51
32.5110

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32.51 W2 Rating

32.510 Operation

32.5100 In General

32.51000 Airport Use - Whether or not the airport is operated as a terminal for airline operations,¹ all facilities provided shall be available, without unjust discrimination and on equal terms, to all operators and flyers of seaplanes. If used as an international terminal, the airport shall have been certified by the Department of State to be a port of entry, and shall provide the usual customs and other facilities necessary.

32.51001 Equipment - Same as CAR 32.50001.

32.5101 Landing Area - Same as CAR 32.5001 so far as the requirement that the basin and channels be officially designated as a seaplane landing area is concerned. So far as restrictions on the use of the landing area are concerned, the entire landing area, by authority of the governmental agency having jurisdiction over navigation of the waters of which it is a part, shall be restricted to use by seaplanes for landing, taking-off, and other seaplane operations, at the time of such operations, such restrictions to be effectuated not only by the buoys and lights required by CAR 31.5120 and CAR 31.5130 but by the speed boat patrol required by CAR 32.5103.

32.5102 Landing Facilities - Same as CAR 32.5002, except that the reference to CAR 31.501 shall be to CAR 31.511 instead.

32.5103 Speed Boat Patrol - Same as CAR 32.5003.

32.5104 Lighting - Same as CAR 32.5004.

32.5105 Traffic Control - Same as CAR 32.5005.

32.5106 Meteorological Information Service - (To be supplied).

32.511 Maintenance

32.5110 In General - Same as CAR 32.5010, except that the reference to CAR 31.50 shall be to CAR 31.51 instead.

1. The W2 Rating is intended to denote an airport suitable in all respects for use as a terminal, on a "restricted" basis, by scheduled intrastate, interstate, or international airlines operating seaplanes of not more than 65,000 pounds.

C I V I L A I R R E G U L A T I O N S

- 32.5111 Landing Area - Same as CAR 32.5011, except that the reference to CAR 31.5004 shall be to CAR 31.5104 instead.
- 32.5112 Boundary Buoys - Same as CAR 32.5012.
- 32.5113 Marking - Same as CAR 32.5013.
- 32.5114 Lighting - Same as CAR 32.5014.
- 32.512 Personnel - Same as CAR 32.502.
- 32.513 Management - Same as CAR 32.503, except that the reference to CAR 32.500 and CAR 32.501 shall be to CAR 32.510 and CAR 32.511 instead.

C I V I L A I R R E G U L A T I O N S

- 32.52 W3 Rating
- 32.520 Operation
- 32.5200 In General
- 32.52000 Airport Use - Whether or not the airport is operated as a base for chartered or itinerant operations,¹ all facilities provided shall be available, without unjust discrimination and on equal terms, to all operators and flyers of seaplanes.
- 32.52001 Equipment - Same as CAR 32.50001.
- 32.5201 Landing Area - Same as CAR 32.5001 so far as the requirement that the landing area be officially so designated is concerned. No requirements with respect to restrictions on the use of the landing area.
- 32.5202 Landing Facilities - Same as CAR 32.5002, except that the reference to CAR 31.501 shall be to CAR 31.521 instead.
- 32.5203 Speed Boat Patrol - No requirements.
- 32.5204 Lighting - Same as CAR 32.5004.
- 32.5205 Traffic Control - No requirements.
- 32.5206 Meteorological Information Service - (To be supplied).
- 32.521 Maintenance
- 32.5210 In General - Same as CAR 32.5010, except that the reference to CAR 31.50 shall be to CAR 31.52 instead.
- 32.5211 Landing Area - Same as CAR 32.5011, except that the reference to CAR 31.5004 shall be to CAR 31.5204 instead.
- 32.5212 Boundary Buoys - No requirements.
- 32.5213 Marking - Same as CAR 32.5013.
- 32.5214 Lighting - Same as CAR 32.5014.
- 32.522 Personnel - Same as CAR 32.502.
- 32.523 Management - No requirements

1. The W3 Rating is intended to denote an airport suitable in all respects for use as such by operators or flyers of small seaplanes in chartered or itinerant operations.

C I V I L A I R R E G U L A T I O N S

- 32.53 W4 Rating
- 32.530 Operation
- 32.5300 In General
- 32.53000 Airport Use - Whether or not the airport is operated as an auxiliary or emergency seaplane landing facility,¹ all facilities provided shall be available, without unjust discrimination and on equal terms, to all operators and flyers of seaplanes.
- 32.53001 Equipment - Same as CAR 32.50001.
- 32.5301 Landing Area - No requirements.
- 32.5302 Landing Facilities - No requirements.
- 32.5303 Speed Boat Patrol - No requirements.
- 32.5304 Lighting - No requirements.
- 32.5305 Traffic Control - No requirements.
- 32.5306 Meteorological Information Service - No requirements.
- 32.531 Maintenance
- 32.5310 In General - Same as CAR 32.5010, except that the reference to CAR 31.50 shall be to CAR 31.53 instead.
- 32.5311 Landing Area - Same as CAR 32.5011, except that the reference to CAR 31.5004 shall be to CAR 31.5304 instead.
- 32.5312 Boundary Buoys - No requirements.
- 32.5313 Marking - No requirements.
- 32.5314 Lighting - (To be supplied)

1. The W4 Rating is intended to denote an airport suitable in all respects for use as an auxiliary or emergency facility by itinerant flyers and other operators of small seaplanes.

32.532
32.7

CIVIL AIR REGULATIONS

- 32.532 Personnel - No requirements.
- 32.533 Management - No requirements.
- 32.6 MINIMUM REQUIREMENTS FOR AIRSHIP AIRPORTS - (To be supplied)
- 32.7 AIRPORT RATING CERTIFICATES - See CAR 31.7

DIAGRAM - A
Percentage Increase in Minimum Length of Landing Area at
Altitudes up to 10,000 Feet above Sea Level

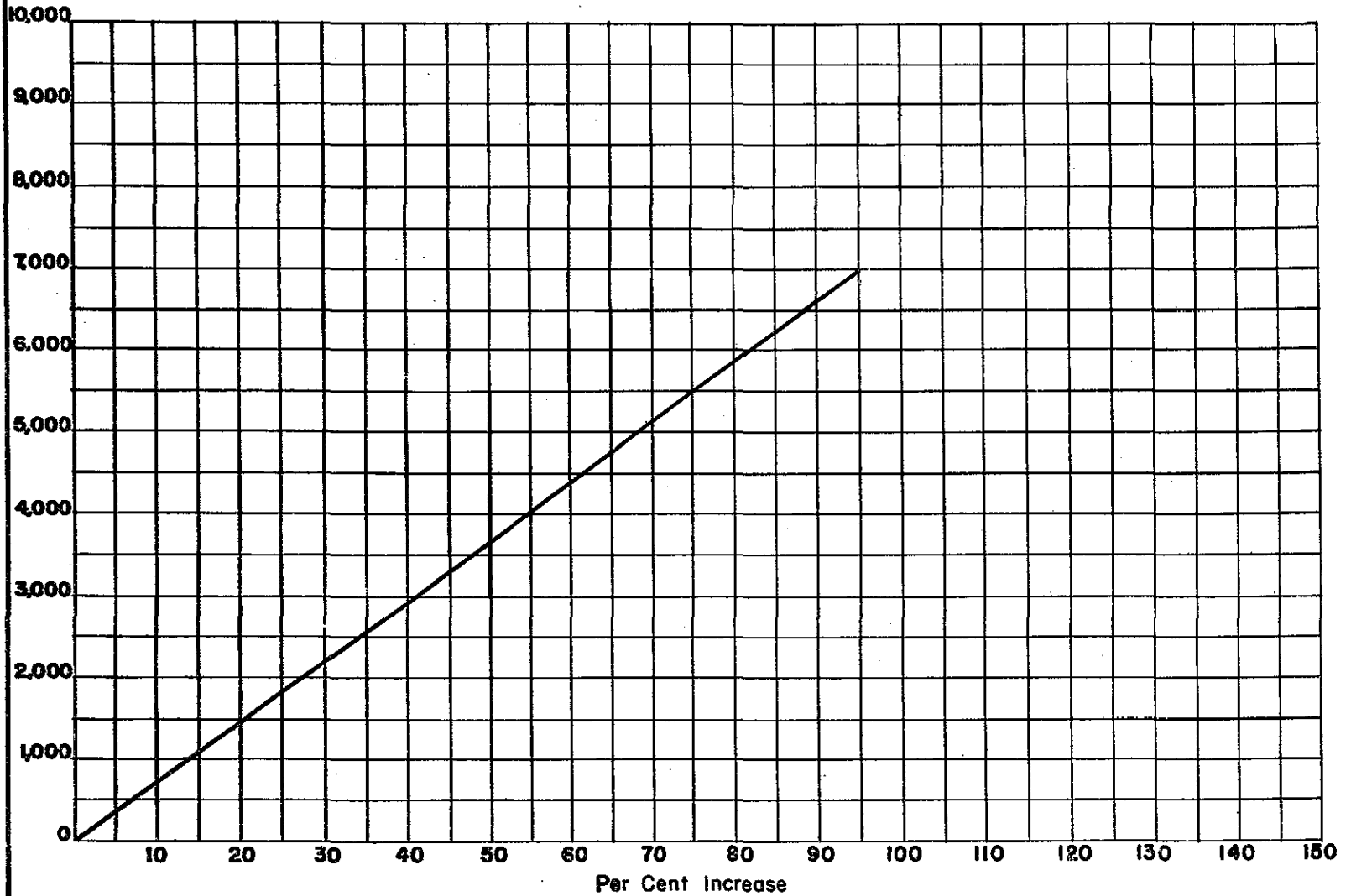
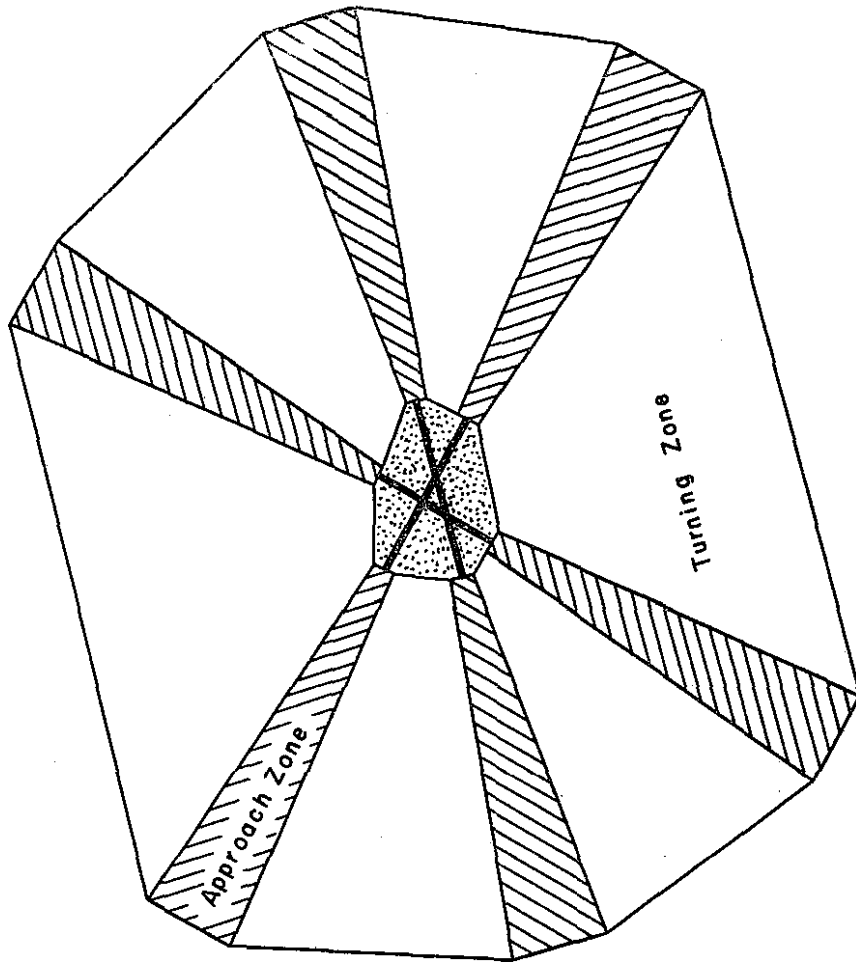


DIAGRAM - B

View, from above, of Landing Field, showing Zoned Area, Approach Zones and Turning Zones.



KEY

DOTTED Area is Landing Field.

BLACK Areas are Runways.

SHADED Areas are Approach Zones.

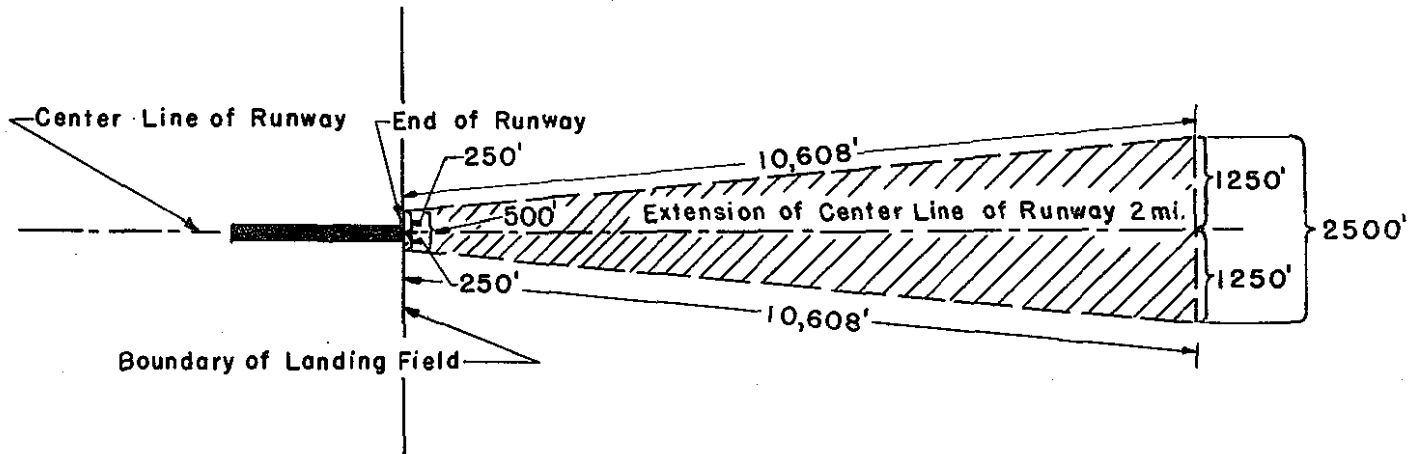
WHITE Area are Turning Zones.

SHADED and WHITE Areas together comprise Zoned Area.

Scale 1" = 4000'

DIAGRAM-C

View, from above, of Approach Zone, showing layout and dimensions.



Scale 1" = 2000'

DIAGRAM - D

Three Types of Obstructions Required to be Marked and Light

- A- An Object, within the Turning Zone, the height of which is more than one seventh its distance from the nearest boundary of the Landing Field.
- B- An Object over 100 ft. in height and located within one mile of the Landing Field
- C- An Object over 100 ft. higher above Sea Level than the Surface of the Landing Field.
and located within one mile of the Landing Field.

