สำนักงานการบินพลเรือนแห่งประเทศไทย
The Civil Aviation Authority of Thailand

Guidance Material for Control of Obstacles

CAAT-GM-AGA-COBS

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Approved By

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Director General of The Civil Aviation Authority of Thailand

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0. Introduction

0.1 Overview

The purpose of this Guidance Material (GM) is to promulgate supplementary guidance to aerodrome operators on the control of obstacles. It aims to provide guidance on what is acceptable to the CAAT with regards to the technical requirements in the Requirment of CAAT No. 14 on aerodrome standards, Chapter 4 on Obstacle Restriction and Removal, and Chapter 6 on Visual Aids for Denoting Obstacles.

0.2 Purpose

This GM explains the process of obstacle control viz. marking and lighting of obstacles, conducting of obstacle surveys, removal or lowering of obstacles and reporting of obstacles to the appropriate authorities. By considering this guidance, the aerodrome operator should be able to establish an effective obstacle control process, and keep the aerodrome and its vicinity safe for aircraft operations.

0.3 Applicability

This Guidance Material applies to Thai aerodrome operators operating a public-use aerodrome.

0.4 Effective Date

30 June 2022

0.5 Reference

a) Requirement of The Civil Aviation Authority of Thailand No. 14 on Aerodrome Standards B.E. 2562

b) Rule of Department of Civil Aviation on Standards of Aerodrome Operating Procedures B.E. 2557

0.6 Queries

If there are any queries in regards to this Guidance Material, please address them to:

Aerodrome Standards Department

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1. Obstacle limitation surface (OLS)

The effective utilisation of an aerodrome may be considerably influenced by man-made activities[1] and natural growth (e.g. trees) within the aerodrome and its vicinity. These may result in:

(a) Limitations on the distances available for take-off and landing operations;

(b) The range of meteorological conditions in which take-off and landing operations can be undertaken;

(c) A reduction in the payload of some aircraft types; or

(d) Any of the combinations above.

Obstacle limitation surfaces (OLS) is defined as:

> "A series of surfaces that define the volume of airspace at and around an aerodrome to be kept free of obstacles in order to permit the intended aircraft operations to be conducted safely and to prevent the aerodrome from becoming unusable by the growth of obstacles around the aerodrome."

[1] Man-made activities include construction activities and aerial activities such as flying or operating a kite, parasail, captive balloon, model aircraft or unmanned airship.

2. Aerodrome Operator's Responsibilities

2.1 Obstacle Control

2.1.1 The OLS established by the CAAT aims to:

a) safeguard the OLS;

b) issue the necessary approvals for construction, vehicles and equipment to be used, including their height requirements and technical specifications of visual aids to be installed on the vehicles and equipment

c) provide height approval to the Local Authority and developers in Thailand, including the maximum allowable height of each building.

2.1.2 As the holder of an aerodrome certificate issued under the Air Navigation Act, the aerodrome operator is responsible for ensuring that aircraft operate safely to/from the aerodrome. In this regard, the operator is responsible for the limitation and control of obstacles within the aerodrome and making arrangements for the removal or lowering of obstacles around the aerodrome. For the latter, the aerodrome operator should formalise an arrangement with the CAAT and other relevant authorities to deal with the timely removal or lowering of obstacles. For those obstacles that could not be removed or lowered, and if deemed that these obstacles would need to be marked and lit, the aerodrome operator should also formalise an arrangement with the CAAT and other relevant authorities for the monitoring of these visual aids. Such arrangements could be captured in the aerodrome manual and/or procedures owned by the aerodrome operator, provided that the CAAT and other relevant authorities are consulted and have agreed to it. These arrangements could be reviewed and changed, at any time, by any party, if necessary. However, all affected parties will need to be consulted and agreed to the proposed changes before the changes can be affected and documented.

2.1.3 The objective of obstacle control is for the aerodrome operator to ascertain that man-made structures or natural growth (e.g. trees) likely to infringe the OLS are discovered before they pose a danger to aircraft operations. Hence, the aerodrome operator should establish a process of systematic and frequent obstacle surveys at the aerodrome and its vicinity. In addition, the obstacle surveys should include checks for any unauthorised construction equipment, which may pose a danger to aircraft operations. The aerodrome operator is to take necessary corrective actions to address any penetrations and/or non-compliances.

2.1.4 The aerodrome operator should minimally consider the following elements for its obstacle control process:

a) Frequency and timing of obstacle surveys;

b) Marking and lighting of obstacles other than natural growths;

c) Staff competency and training;

d) Calibration of equipment required for obstacle surveys;

e) Conduct of day obstacle surveys;

f) Conduct of night obstacle surveys;

g) Documentation and follow-ups;

h) Promulgation of information on obstacles; and

i) Obstacle data analysis and continuous improvement

2.2 Frequency and timing of obstacle surveys

2.2.1 The aerodrome operator should conduct regular day and night obstacle surveys within his aerodrome and its vicinity, and should consider, but not limited to, the following when determining the frequency and timing of such surveys:

a) Locations and types of activities e.g. construction works, operating or flying a kite or model aircraft;

b) Timing at which the activities are being carried out;

c) Area of coverage and scope of each survey;

d) For tree surveys, the species of natural growths (e.g. species of trees); and

e) Records on previous penetrations and/or non-compliances.

2.3 Marking and lighting of obstacles other than natural growths

2.3.1 The aerodrome operator should make every effort to have the obstacles removed or reduced in height so that they no longer pose danger to aircraft operations.

2.3.2 Where it is impractical to remove an obstacle or to have an obstacle reduced in height, it should be appropriately marked and / or lit so as to be clearly visible to pilots in all weather and visibility conditions. RCAAT No. 14, Chapter 5, Part 2 - Visual Aids for Denoting Obstacles, contains detailed requirements concerning marking and / or lighting of obstacles.

2.3.3 It should be noted that the marking and lighting of obstacles is intended to reduce hazards to aircraft by indicating their presence. It does not necessarily reduce operating limitations which may be imposed by the obstacle.

2.3.4 Vehicles and other mobile objects, excluding aircraft, on movement area of an aerodrome are obstacles and should be marked and if the vehicles and aerodrome are used at night or in conditions of low visibility, lighted, except that aircraft servicing equipment and vehicles used only on aprons may be exempt.

2.3.5 The airport operator should inspect all obstacle lights and markings within the aerodrome and its vicinity, and take necessary steps to have unserviceable lights repaired or replaced, and faded markings painted or replaced.

2.4 Staff competency and training

2.4.1 The Air Navigation Act section 60/6 (5) stipulates the requirement for the aerodrome operator to employ an adequate number of qualified and skilled personnel to perform all critical activities for the operation and maintenance of his aerodrome. In this regard, for obstacle control within the aerodrome and its vicinity, the aerodrome operator is to ensure that staff are able to perform the surveys competently through sufficient and appropriate training.

2.4.2 The aerodrome operator should put in place a formal and structured training programme for his staff involved in obstacle control. The training programme should include recurrent training so as to keep the staff updated on new knowledge and technology which may enhance his work.

2.4.3 The relevant aerodrome staff should also be conversant with the following:

a) Correct use of equipment as required for the obstacle surveys;
b) Familiar with the aerodrome layout and its surroundings;
c) Identify different types of tall construction equipment used at sites;
d) Identify different species of trees and their characteristics found within the aerodrome and its vicinity;
e) Read obstacle charts and be able to accurately relate obstacles in the chart to their actual ground locations;
f) Calculate and measure the range and bearing of an obstacle from the aerodrome reference point; and
g) Promulgate a Notice to Airmen (NOTAM) to inform air traffic service and pilots of an obstacle and its location.

2.5 Calibration of equipment required for obstacle surveys

2.5.1 The equipment required for obstacle surveys such as height measuring equipment and Global Positioning System (GPS) device should be calibrated to ensure its accuracy and integrity before using. In most cases, calibration may be done in-house i.e. by the aerodrome staff. Hence, the staff should be familiar with the self calibration process. In other cases, calibration can only be done by the manufacturer. In this regard, the equipment should be sent to the manufacturer for calibration as recommended before its due date.

2.5.2 The aerodrome staff should ensure that the equipment is properly calibrated at all times and its calibration records are retained.

2.5.3 The aerodrome staff should also ensure that there is spare equipment available to be used for obstacle surveys when the main equipment is found to be unserviceable.

2.6 Conduct of day obstacle surveys

2.6.1 Day obstacle surveys within the aerodrome and its vicinity are conducted to ascertain the following:

a) All requirements including maximum allowable height approved by the Authority and marking of construction equipment are being complied with at all times;

b) No objects (e.g. construction equipment) other than those approved by the Authority are erected;

c) Markings on vehicles and other objects (e.g. construction equipment and buildings) are properly maintained;

d) No natural growths (e.g. trees) which penetrate its allowable height;

e) Follow-up on previous penetrations and/or non-compliances, if any.

2.6.2 The aerodrome staff conducting the obstacle surveys should be aware of the developments within the aerodrome and its vicinity. He should also be aware of the outcomes of the previous surveys conducted, i.e. any penetrations and/or non-compliances noted, to effectively plan his survey route. As the route may change from time to time, the staff should record down the changes and their reasons in the checklists used. Being the one to conduct the day obstacle survey, the aerodrome staff should be familiar with the area to be surveyed and the locations of sites to be checked.

2.6.3 The aerodrome staff should carry with him the following non-exhaustive items for the day survey:

a) A copy of checklists for day obstacle survey (to be completed by staff during the survey);

b) A copy of information on construction vehicles and equipment and other requirements granted by the Authority;

c) A copy of information on outcomes of previous surveys conducted;

d) A copy of up-to-date obstacle charts / aerodrome maps;

e) A copy of up-to-date street directory;

f) Binoculars;

g) Digital camera;

h) GPS device;

i) Height measuring instrument; and

2.6.4 The aerodrome staff should first make reasonable effort to assess the sites

i.e. obtaining the necessary permission from and / or making necessary arrangements with the appropriate entity such as land / building owner. After doing so, if the staff is still not able to gain access to any of the sites, he should immediately seek assistance from the Authority responsible. Meanwhile, the staff should make use of observation points to assist him in his survey.

2.7 Survey of construction activities

2.7.1 The aerodrome staff, when on-site, should obtain documentary proof of the approval given by CAAT and airport authority from the person-in-charge of the construction site and verify the numbers, types and heights of construction equipment used at the site. A calibrated height measuring instrument should be used to measure the heights of all construction equipment available at the site. If height measurements of the construction equipment could not be easily taken, the staff could refer to the heights of the surrounding structures for reference.

2.7.2 In the event where a construction equipment has exceeded the height limit granted by CAAT and airport authority, the aerodrome staff is required to advise the person-in-charge to lower the equipment to the allowable height. If the equipment could not be lowered, the staff should immediately report the penetration to CAAT Ground Safety Department, the air traffic service units and other appropriate authorities, and promulgate a NOTAM so that aircraft operations can be conducted safely at all times.

2.7.3 In the event where the person-in-charge is not able to show documentary proof of approval given by CAAT and airport authority, the aerodrome staff should advise the person-in-charge to cease operations, retract / lower equipment and seek CAAT and airport authority approval before the recommencement of the operations. To facilitate the application process, the staff should provide an up-to-date copy of CAAT approval for use of construction vehicles and equipment to the person-in-charge or refer the person-in-charge to CAAT. The aerodrome staff should follow-up with CAAT to ensure approval has been sought and the person-in-charge complies with the requirements stated in the approval.

2.7.4 If the operations could not be ceased, the staff should inform the Authority to ascertain if any of the equipment used has exceeded its height limit, and if yes, the staff should first advise the person-in-charge to lower the equipment and report the non-compliance to CAAT accordingly. If lowering of the equipment could not be achieved, the staff should immediately report the penetration to CAAT, the air traffic service units and other appropriate authorities, and promulgate a NOTAM so that aircraft operations can be conducted safely at all times.

2.7.5 In addition to sighting the approval from CAAT, the aerodrome staff should verify the relevant RCAAT requirements and conditions stated in CAATs approval. An example is the marking of the object using flags which is applicable to surveys conducted within the aerodrome as well as its vicinity. Flags should be displayed on top of, or around the highest edge of the object. It is important to note that the flags should not increase the hazard presented by the object they mark. The aerodrome staff should inspect the flags used. Binoculars should be used for this instance. Flags that are of poor conditions (e.g. faded, torn) should be replaced.

2.8 Survey of trees

2.8.1 In the case of natural growths (e.g. trees), agreement should ideally be reached in writing with the property owner to ensure that future growth will not penetrate the height limits thus, creating new obstacles. The property owner can give such assurance by agreeing to trim the trees when necessary, or by permitting access to the premises to have the trimming done by the aerodrome operator's representative.

2.8.2 It is important to understand the species of the trees which pose a problem, assess the growth rate of these trees and trim them low enough so that the ensuing growth will be below the height limits until the next survey. In this regard, the aerodrome staff should identify trees that are near to their height limits for closer monitoring and / or possible proactive actions (e.g. trimming) to prevent them from exceeding their height limits.

2.8.3 If a tree was found to have exceeded its height limit, the aerodrome staff should immediately inform CAAF, the air traffic service units and other appropriate authorities of the penetration, and promulgate a NOTAM so that aircraft operations can be conducted safely at all times. The aerodrome staff should arrange for the affected tree to be trimmed and after trimming the affected tree, the staff should verify if the height of the tree is below its height limit, and cancel the existing NOTAM issued, if required.

2.9 Conduct of night obstacle surveys

2.9.1 Night obstacle surveys within the aerodrome and its vicinity are conducted to ascertain the following:

a) All requirements including maximum allowable height approved by CAAT and lighting of construction equipment are being complied with at all times;

b) No objects (e.g. construction equipment) other than those approved by CAAT are erected;

c) Lighting on vehicles and other objects (e.g. construction equipment and buildings) are properly maintained;

d) Follow-up on previous non-compliances and / or penetrations, if any.

2.9.2 The aerodrome staff conducting the obstacle survey should be aware of the developments within the aerodrome and its vicinity. He should also be aware of the outcomes of the previous surveys conducted, i.e. any penetrations and/or non-compliances noted, to effectively plan his survey route. As the route may change from time to time, the staff should record down the changes and their reasons in the checklists used. Being the one to conduct the night obstacle survey, the aerodrome staff should be familiar with the area to be surveyed and the locations of sites to be checked.

2.9.3 The aerodrome staff should carry with him the following non-exhaustive items for the night survey:

a) A copy of checklists for night obstacle survey (to be completed by staff during the survey);
b) A copy of information on construction vehicles and equipment and other requirements granted by CAAT;
c) A copy of information on outcomes of previous surveys conducted;
d) A copy of up-to-date obstacle charts / aerodrome maps;
e) A copy of up-to-date street directory
f) Binoculars;
g) Digital camera;
h) GPS device;
i) Height measuring instrument; and
j) Torchlight

2.10 Survey of construction activities

2.10.1 The aerodrome staff, within aerodrome, should obtain documentary proof of the approval given by CAAT and Airport Authority from the person-in-charge of the construction site, if this was not already done during the day obstacle survey. He should verify the numbers, types and heights of construction equipment used at the site. A calibrated height measuring instrument should be used to measure the height of all the construction equipment available at the site. If height measurements of the construction equipment could not be easily taken, the staff could refer to the heights of the surrounding structures for reference. If there were no works at night, the aerodrome staff should ensure that all equipment are retracted / lowered and lighted in accordance with the requirements.

2.10.2 In the event where a construction equipment has exceeded the height limit granted by CAAT, the aerodrome staff is required to advise the person- in-charge to lower the equipment to the allowable height. If the equipment cannot be lowered, the staff should immediately report the penetration to CAAT, the air traffic service units and other appropriate authorities, and promulgate a NOTAM so that aircraft operations can be conducted safely at all times.

2.10.3 In the event where the person-in-charge is not able to produce documentary proof of approval given by CAAT the aerodrome staff should advise the person-in-charge to cease operations, retract / lower equipment if works are ongoing and to seek CAAT's approval before the recommencement of the operations. To facilitate the application process, the staff should provide an up-to-date copy of the CAAT approval for use of construction vehicles and equipment to the person-in-charge. The aerodrome staff should follow-up with CAAT and visit the site the next day or two to ensure approval has been sought and the person-in-charge complies with the requirements stated in the approval.

2.11 Survey of buildings

2.11.1 Similar to the construction equipment mentioned in the above paragraphs, buildings located at the aerodrome and its vicinity are required to be surveyed for obstacle lights. The aerodrome staff should conduct checks to determine the serviceability of the obstacle lights, and ensure that these lights meet the RCAAT specifications as required. Besides checking for the presence of the physical light fixture and whether it is properly lit i.e. the particular light has similar intensity / brightness as the other lights located on the same building or nearby buildings, the staff should also check if the specifications of the light stated in the RCAAT No. 14 and / or the approval granted by CAAT are being complied with.

2.11.2 In any event where the aerodrome staff is not able to ascertain the characteristics of the light, he may obtain documentation proof from the person-in-charge that the lights used are indeed in compliance with the requirements. If the person-in-charge is not able to show any documentary proof, the aerodrome staff should advise him on the requirements and the replacement of the lights, if required. The staff should report the non- compliance to CAAT.

2.12 Survey of vehicles and mobile objects within the airside

2.12.1 As part of the obstacle survey within the airside, the aerodrome staff should be aware that for follow-me vehicles, low-intensity obstacle lights, Type D should be displayed as close as practicable on top of the vehicles. Such low-intensity obstacle lights should be flashing yellow and meet the specifications stated in the RCAAT No.14.

2.12.2 The aerodrome staff should also be aware that for vehicles and other mobile objects within the aerodrome excluding follow-me vehicles and aircraft, low- intensity obstacle lights, Type C, should be displayed as close as practicable on top of the vehicles or objects. Such low-intensity obstacle lights should be flashing-blue for vehicles associated with emergency or security and flashing-yellow for others. These lights should also meet the specifications stated in RCAAT No. 14.

2.12.3 The aerodrome staff should conduct checks to determine the serviceability of the obstacle lights on vehicles and mobile objects, and ensure that these lights meet the RCAAT No. 14 specifications as required. Besides checking for the presence of the physical light fixture and whether it is properly lit i.e. the particular light has similar intensity / brightness as the other lights found on the same vehicle / mobile object or other similar vehicles and mobile objects located around the same area, the staff should also check if the specifications of the light stated in the RCAAT No. 14 are being complied with.

2.12.4 In the event where the aerodrome staff is not able to ascertain the characteristics of the light, he may obtain documentation proof from the person-in-charge of the vehicle or mobile object that the obstacle lights installed on the vehicle or mobile object are indeed in compliance with the RCAAT No. 14.

2.13 Documentation and follow-up

2.13.1 The aerodrome staff should take clear photographs of the sites and all construction equipment, trees, buildings, vehicles and mobile objects sighted during the survey. These photographs should be printed and filed with the completed checklists.

2.13.2 In all cases, it is important that the aerodrome staff records down all the survey information and outcomes in the checklists as they may be used for subsequent surveys or obstacle data analysis. For NOTAM promulgation, geographical coordinates of the location of the penetration should be determined in terms of World Geodetic System – 1984 (WGS-84) format using a calibrated GPS device. The aerodrome operator should annotate in the up-to-date aerodrome obstacle charts, locations of the on-going activities near the aerodrome as well as the penetrations and non-compliances noted during the surveys. For the latter, the aerodrome staff should conduct follow- ups including revisiting the site the next day or two to ensure proper closures of these penetrations and non-compliances, and subsequently inform CAAT AGA Department and the airport authority on their closures.

2.13.3 It is a good practice for the aerodrome staff to share the survey conducted and its outcomes with the other staff who may be conducting subsequent surveys. This sharing may be incorporated into the daily handing / taking over sessions between staff.

2.14 Promulgation of information on obstacles

2.14.1 The geographical coordinates, top elevation, type, marking and lighting, if any of the obstacles within the aerodrome and its vicinity should be measured and reported by the aerodrome operator to the Aeronautical Information Service (AIS).

2.14.2 Whenever a penetration, either temporary or permanent in nature, is identified, the aerodrome operator is required to report the penetration immediately to CAAT AGA Department, the air traffic service units and other appropriate authorities. To this end, the aerodrome operator conducting the obstacle surveys is responsible to ensure that information on obstacles is promptly transmitted to the AIS. The aerodrome operator has the most direct interest in seeing that information is properly disseminated, and through the periodic surveys, the aerodrome operator is most likely to be aware of the presence of new obstacles. It is in his best interest for the aerodrome operator to report all data on obstacles, including marking and lighting, if any to the AIS for promulgation. Such data should be amended at regular intervals as may be necessary to keep it up-to-date.

2.15 Obstacle data analysis and continuous improvement

2.15.1 The aerodrome operator should make use of the obstacle data collected and conduct periodic data analysis. This should allow the aerodrome operator to review the overall effectiveness of the obstacle control process. Through such analysis, the aerodrome operator should also be able to identify potential risks and hotspots, and develop mitigating measures to address them.

2.15.2 The aerodrome operator should seek continuous improvement in the obstacle control process to ensure that safe aircraft operations can be carried out safely and efficiently at his aerodrome. The aerodrome operator should review the process and ensure that it is in compliance with the CAAT requirements at all times.

3. General

3.1 CAAT Approvals

3.1.1 All off-airport development which could have any impact on the OLS is coordinated by the Local Government Authority with CAAT for assessment.

3.1.2 The CAAT Officers assigned will carry out the necessary assessment against OLS and PANS-OPS design criteria. A letter will then be issued by the CAAT to the Director Town and Country Planning detailing the findings of the assessment.

3.1.3 The airport operator/authority planning to carry out any development on the aerodrome, which could have an effect on the OLS, must also coordinate this with the CAAT for assessment.

3.2 Conclusion

3.2.1 A successful obstacle control process requires the collaboration of parties including but not limited to, aerodrome operator, aerodrome regulator, other authorities, property / construction site owners and the general public. Such collaboration should provide a safe environment for efficient and safe operation of aircraft near the aerodrome. In this regard, the aerodrome operator should also constantly engage the relevant parties to ensure that the established process is a robust and effective one