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Design Of Helicopter Entry Point At Perum LPPNPI Kendari Branch

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Abstract— This research aims to design a helicopter entry point design that matches the needs of users at Kendari Airport. The method that will be used in this research is the Research and Development method, to be precise Research and Development Level 1. The population used in this research are ATC personnel at Perum LPPNPI Kendari Branch, expert teaching staff in the ATC field, and experts in Procedures for Air Navigation Services and Aircraft Operations (PANS-OPS). Data collection techniques used are documentation studies and interviews. The data processing technique used is the data analysis technique which consists of data reduction, data presentation, and verification. The author made this design based on the applicable rules using the AutoCAD 2022 application media, Global Mapper, and Google Earth Pro. At present, there is no helicopter entry point at Perum LPPNPI Kendari Branch, so when the air traffic controller provides service to the helicopter it will make confusion for the helicopter pilot regarding the flight path that must be passed for the approach.

Keywords— Design, Entry Point, Helicopter

I. INTRODUCTION

Haluoleo International Airport is located in South Konawe Regency, Southeast Sulawesi, Indonesia (IATA: KDI, ICAO: WAWW). Previously, the name of this airport was taken from the name of the Indonesian national hero Robert Wolter Monginsidi who was executed by the Dutch during the Indonesian National Revolution. On 13 February 2010, the airport was renamed in honor of Haluoleo, a Konawe knight. One of the air traffic control services provided by Haluoleo International Airport is service to civilian and military helicopters.

During the implementation of On the Job Training at the Kendari Branch of the Indonesian Aviation Navigation Service Provider Public Corporation (LPPNPI) from April 2022 to June 2022, the frequency of helicopter flights per month can reach 20-40 movements according to needs such as helicopters from the police which often patrol on the radial of 015 degrees with a distance of 10 nm from "KDI" VOR/DME at an altitude of 500 - 1500 feet to unify the situation in the Kendari area, helicopters heading to the Bombana Sugar Factory or vice versa located on radial of 228 degrees with a distance of 53 nm from "KDI"

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VOR/DME in altitude of 1500 – 3000 feet, helicopters heading to Paria Port or vice versa which are located on radial of 229 degrees with a distance of 75 nm from “KDI” VOR/DME at an altitude of 1500 – 3000 feet and helicopters heading for the Malili region or vice versa which are located on radial of 315 degrees with a distance 161 nm from “KDI” VOR/DME.

Table 1. Helicopter Movement Data For 2021-2022 At Perum LPPNPI Kendari Branch

Year	Total Departures and Arrivals
2021	280
2022	240

In addition, the authors found there was no entry point for helicopters, whereas until now the helicopter movement procedure during approach uses the same circuit as other fixed-wing aircraft, this can be a problem because it will affect the smoothness and safety of flight considering the helicopter's higher airspeed. lower than that of fixed-wing aircraft. The entry point is a helicopter entry point that is used as a separator between fixed-wing traffic and helicopters with landmarks/visual references (points) to minimize conflict with fixed-wing traffic.

The absence of an entry point can create ambiguity for helicopter pilots regarding the flight path that must be passed for the approach, when carrying out On the Job Training at the Kendari Branch Perum LPPNPI the author felt a problem when there was fixed-wing traffic that carried out the approach procedure first, then the helicopter traffic instructed to do a holding/orbit in the present position which can happen anywhere without a specific place that has been set. This can potentially affect the smooth running of air traffic services and flight safety. The urgency of having an entry point is explained in the International Civil Aviation Organization Document 4444 and Federal Aviation Administration. It can be concluded that aircraft can enter the traffic circuit with the calculation of other traffic that is currently on the circuit and the separation between fixed-wing and helicopter traffic is very important, helicopter traffic must avoid the flow of fixed-wing traffic to minimize conflict with fixed-wing traffic, but in Perum's SOP LPPNPI Kendari Branch, the movement of the helicopter follows the movement of other VFR aircraft.

An example of the first chronology of events is on April 3, 2022, an aircraft with registration number PK OTS will make an approach at Haluoleo Kendari Airport using runway 26 and at the same time there is a helicopter with registration PK JOH from the south, to be precise, on radial of 165 degrees with a distance of 15 nm from "KDI" VOR/DME will approach using runway 26. Aircraft with PK OTS registration have been given instrument approach clearance by the air traffic controller and the aircraft's position has left the holding fix of runway 26, namely esgix point, while PK JOH is directed to the south area to avoid the final runway 26 and hold on to the south area where the point has not been clearly determined, then after PK OTS landed, PK JOH was given landing clearance using runway 26, an illustration of the incident can be seen in Figure 1.

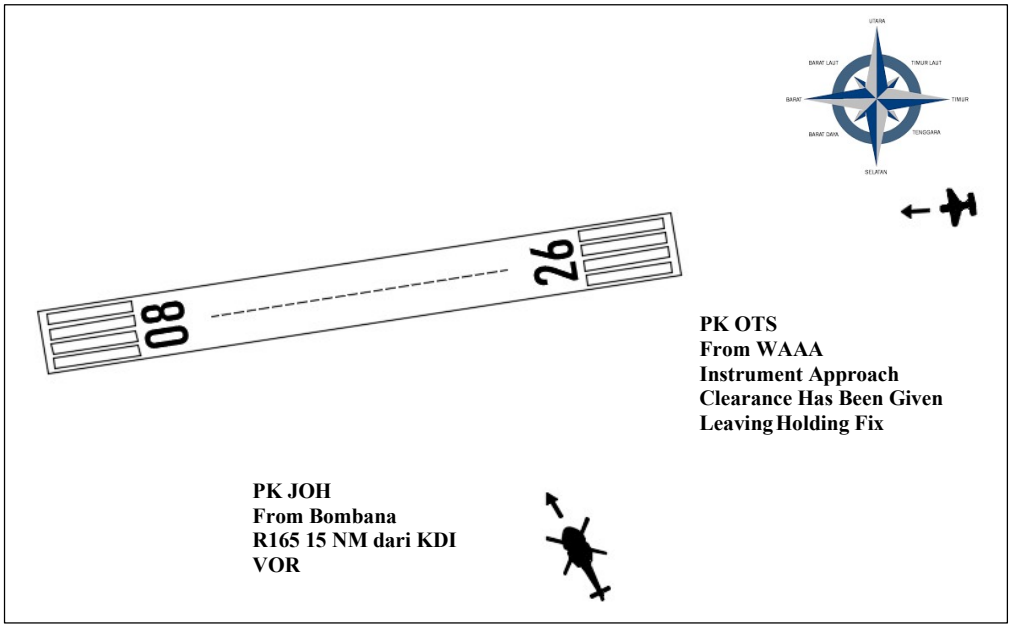

Figure 1. Illustration of Event 1

The second incident was on May 27,2022, an aircraft with registration number PK GLX from Soekarno Hatta International Airport was going to approach Haluoleo Kendari Airport using runway 26 and at the same time there was a helicopter with registration P 1113 from north to be precise on the radial of 050 degrees with a distance of 10 nm from "KDI" VOR/DME will approach using runway 26. The aircraft with PK GLX registration has been given an instrument approach clearance by the air traffic controller and the position has passed the holding fix of runway 26, namely esgix point, while P 1113 is directed to the north area to avoid the final runway 26 and hold on to the north area where the point has not been clearly determined, then after PK GLX landed, P 1113 was given landing clearance using runway 26, an illustration of the incident can be seen in Figure 2.

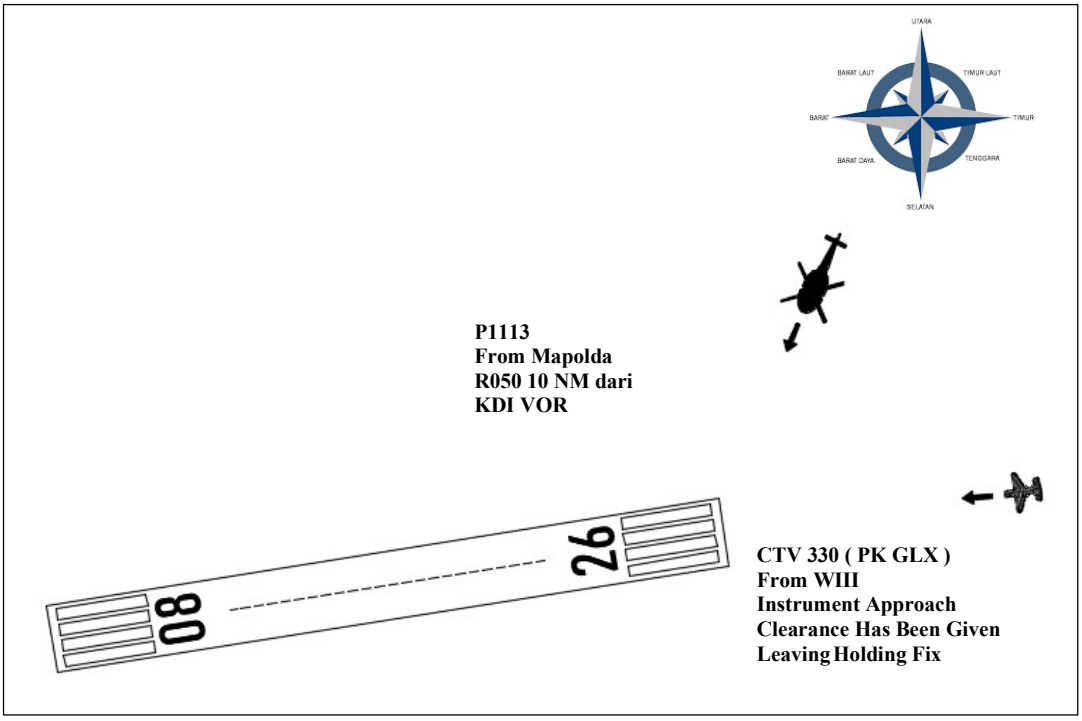

Figure 2. Illustration of Event 2

II. LITERATURE REVIEW

The meaning of the entry point is contained in ICAO Document Annex 11 (2016) Air Traffic Service explained that "Reporting Point is a specified geographical location about which the position of an aircraft can be reported." This means a reporting point is a place or certain locations on the ground that show the position of the aircraft so that it can be used as an entry point or entry point in this case for the arrival of helicopter traffic [1].

The urgency of having an entry point is contained in 3 documents are :

1. Based on the Federal Aviation Administration (FAA) (2017) explained that "Pilots approaching to land in a helicopter must avoid the flow of fixed-wing traffic. However, in all instances, an appropriate clearance must be received from the tower before landing. Landings not to the runway must avoid the flow of fixed-wing traffic". This means the helicopter pilot who will make the approach to land must avoid the flow of the fixed-wing aircraft. However, permission to land from the tower must be obtained by the helicopter pilot to make the landing [2].
2. Based on FAA Advisory Circular 90-66 B (2018) explained that "In the case of a helicopter approaching to a land other than on the active runway, the pilot must avoid the flow of fixed-wing aircraft and land on a marked helipad or suitable clear area.". This means when the helicopter lands at an airport, the helicopter pilot must stay away from the fixed-wing aircraft landing path towards the helipad or an empty area that has been determined [3].
3. Based on ICAO Document 4444 (2016) Point 7.7.2 explained that "Entry of traffic circuit is the clearance to enter the traffic circuit may be given to an aircraft when it is desired that the aircraft approach the landing area in conformity with current traffic circuits but traffic conditions don't yet allow a clearance to land to be given. Depending on the traffic conditions and circumstances, an aircraft may be issued to join at any position in the traffic circuit." This means that the aircraft can be given permission to enter the traffic circuit taking into account other traffic that is currently on the circuit [4].

Conclusion regarding the entry point as a whole: According to FAA AC 90-66 B, (2018) when a helicopter is about to land at an airport, the helicopter pilot must stay away from the landing strip of fixed-wing aircraft. This is also reinforced by ICAO Document 4444, aircraft can enter a traffic circuit by calculating other traffic that is currently on the circuit. According to the FAA Aeronautical Information Manual, the separation between fixed-wing and helicopter traffic is very important. Helicopter traffic must avoid the flow of fixed-wing traffic to minimize conflict with fixed-wing traffic, because the helicopter's airspeed is lower than fixed traffic other wings. To support this, a separate entry point is needed for helicopters in order to minimize conflicts with fixed-wing aircraft. Then landmarks and visual references (points) are also needed to determine the entry point to be made.

Furthermore, if you want to make an entry point for a helicopter, you must follow the following requirements are:

1. Based on Doc ICAO 9426, (1984) / ATS Planning Manual, Chapter 4 "Visual arrival routes should link a specified significant point where the en-route phase of a flight is terminated with a point where the aerodrome traffic circuit can be joined. ". This means is that visual aircraft arrival routes must connect significant points (entry points) which then end with points where aircraft can join the traffic circuit at an aerodrome [5].
2. Based on Doc ICAO 9426, (1984) / ATS Planning Manual, Chapter 4 "Significant points defining visual routes should be established at geographical locations which can be easily identified by visual reference to prominent landmarks. The locations of radio navigation aids may also be used as significant points, if practical.". This means is visually significant entry points must be in geographic locations that are easily identifiable visually with reference to landmarks. The location of the navigation device can also be used as a significant point if needed.
3. Based on Document ICAO Annex 11 Air Traffic Services Designators for significant points not marked by the site of a radio navigation aid, "The name code of the designator should be easily identified in voice communications and shall be free of ambiguity with those being used for the other significant points in the same area.". This means the naming of the code must be easy to pronounce and not contain ambiguous meanings by using significant points (entry points) in the same areas.

III. RESEARCH METHOD

In this research, the authors used the Research and Development research method, where the level used was Level 1. According to Pradana, Level 1 Research and Development is that researchers conduct research that produces designs, but does not produce and test them [6].

At research and development level one, there are three stages of research carried out, namely as follows:

1. Research 1 was conducted by the author to find and collect information about the potential or

   problems that occur.

2. Research 2 was conducted by the author to determine the right and needed product designs.
3. Research 3 was conducted by the author to validate the product design so that its validity was tested internally by ATC personnel, air traffic controller education experts, and PANS-OPS designers.

The population that the authors determined in this research were all air traffic controller personnel at the Kendari Branch of Perum LPPNPI, education experts in the field of air traffic controllers (lecturers), and PANS-OPS designers. In this research, the sampling technique used was purposive sampling and snowball sampling. Purposive sampling is a sampling technique for data sources in certain aspects. Snowball sampling is a sampling technique for data sources that are small at first but gradually become large.

In this research, the authors carried out several data collection techniques, namely:

1. Documentation research

   This technique is carried out to find potential problems and find information or data related to the problem being researched by the author. The data sources used are international and national documents on aviation, laws, regulations, and other written sources such as AIC, archives, letters, survey reports, and pictures taken in the field.

2. Interview

   Interview is conducted as a data collection technique, if you want to do preliminary research and also if the researcher wants to find out about things from respondents who are deeper and the number of respondents is small/small [7]. The research instrument that the author used for research stages 1 and 2 were unstructured interviews with air traffic controller personnel at the LPPNPI Kendari branch, and at research stage 3 the author conducted unstructured interviews with 1 (one) PANSOPS designer, 1 (one) person education expert in air traffic controller field, and 1 (one) air traffic controller personnel at Perum LPPNPI Kendari Branch.

After collecting the necessary data, then the next author analyzes existing data so that it can be presented properly. The author uses the data analysis technique of the Miles and Huberman model as explained by Sugiyono [8]:

1. Data Reduction

   Data reduction can be interpreted as summarizing, sorting out the main things, and focusing on the things that are important. Then the data that has been reduced data can provide a clear picture and make it easier for researchers in the research process.

2. Data Display (Data Presentation)

   After reducing the data, the author presents it to make it easier for the reader to understand what happened. In this case, the author presents the data by using narrative text, tables, and graphics if needed to draw conclusions.

3. Conclusion Drawing (Verification)

   The third step is drawing conclusions and verification. At this stage the author did to find out the truth of the design made based on the opinion of experts in the specified fields.

IV. Analysis And Discussion

Based on the data that the authors obtained from the results of documentation studies and interviews that the authors conducted during the preliminary research and need assessment stages, it can be concluded that helicopter flights often come suddenly which causes the ATC workload to increase and is quite complicated when meeting with commercial flights, then the absence of a helicopter entry point can increase the possibility of potential hazards such as Breakdown of Separation (BOS) and difficulties in controlling. Helicopter entry points can assist air traffic controllers in managing air traffic flow.

Based on the experience of the respondents, when the traffic is busy, the efficiency of the helicopter arrival procedure can be felt to be inefficient. Then the helicopter entry point is needed to provide convenience to the air traffic controller personnel by clarifying the path of the helicopter's arrival. According to the respondents, the placement of the helicopter entry points on the north and south sides of Haluoleo Kendari Airport is correct. Based on the data presented by the author, the authors found the potential to design a helicopter entry point at the Kendari Branch of Perum LPPNPI.

After researching the potential problems and the designs to be made, the author made a design for a helicopter entry point at the Kendari Branch Perum LPPNPI with reference to Document 9906 Quality Assurance Manual for Flight Procedure Design [9]. The method that the author uses is the COTS software method, namely using the AutoCAD 2022 application media to outline the layout of Haluoleo Kendari Airport, map the obstacles around Haluoleo Kendari Airport, and design a helicopter entry point. The author uses the Global Mapper application to create a map illustration around Haluoleo Kendari Airport, and the Google Earth application to obtain satellite imagery from the visual reference that the author determines and measures the distance between the entry points made with the VOR and the threshold so that deviations may occur.

Helicopter entry points, namely Point Alpha and Bravo, are determined based on consideration of the direction of arrival of helicopter traffic from the north and south, obstacles around Haluoleo Kendari International Airport, ground reference points that are easily identified visually by referring to landmarks, and safe distances from aero from traffic. circuit based on ICAO Document 4444 (2016) Chapter 6.1: Reduction in Separation Minima in The Vicinity of Aerodrome which states that if the two aircraft can see each other continuously then they can maintain separation from each other. The following is the design of the helicopter entry point that the author made :

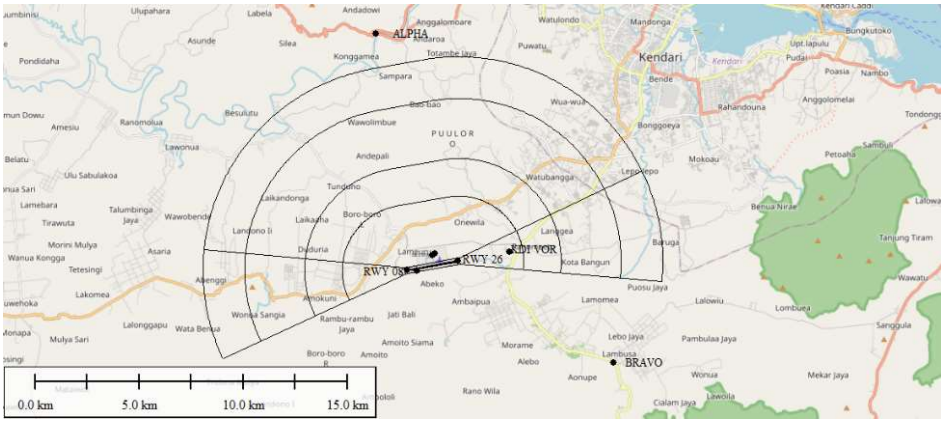

Figure 3. Illustration of Helicopter Entry Point Design

1. Point Alpha

   a. Located on the north side of Haluoleo Kendari Airport on radial of 328 degrees as far as 6.58 NM from KDI VOR and 6.20 NM from the Aerodrome Reference Point (ARP) with coordinates 03°58'54.88"S 122°23'43.94"E.

   b. Has a lower limit of GND/WATER and an upper limit of 4000 ft.

   c. This point is used for helicopters flying visually and coming from the northeast, north, northwest, and west.

   d. The visual reference from this point is the Pohara Bridge which is located above the Konaweha River with the following characteristics:

1) It can be seen from the top view that it is made of rectangular gray iron.
2) Has a height of 30 ft (9.14 m).
3) There is an obstacle to the west of Point Alpha in the form of a hill with a height of 280 m / 820 ft (obstacle altitude+ vegetation) with a distance of 1.74 NM from Point Alpha.

Figure 4. Ground Visual Reference Point Alpha

2. Point Bravo
   a. Located on the south side of Haluoleo Kendari Airport on radial of 137 degrees as far as 3.95 NM from KDI VOR and 5.58 NM from ARP with coordinates 04° 07'25.36"S 122°29'51.46"E.
   b. Has a lower limit of GND/WATER and an upper limit of 4000 ft.
   c. This point is used for helicopters flying visually and coming from the east, southeast, south, and southwest.
   d. The visual reference from this point is the Konawe Selatan 1 State Islamic Senior High School building with the following characteristics:
      1) It can be seen from the top view that it has a square-shaped blue roof.
      2) Has a height of 81 ft.
      3) There is an obstacle to the west of Point Bravo in the form of a hill with a height of 584 m / 1916 ft (obstacle altitude + vegetation) with a distance of 8.30 NM from Point Bravo.

Figure 5. Ground Visual Reference Point Bravo

The author also makes Standard Operational Procedures for Departure and Arrival of Helicopters as follows:

There are three places that are used as helicopter take-off and landing areas as follows:

a. Alpha spot: located on the Alpha Taxiway

b. Bravo spot: located on the Bravo Taxiway

c. Charlie spot: is on Taxiway Charlie (only used for military helicopters)

Helicopters are permitted to take off and land in designated areas, unless due to traffic or other operational reasons.

1. Helicopter departure procedure
    a. Taxi instructions are given by Haluoleo Tower.
    b. Helicopters perform ground or air taxiing from parking stands and must avoid traffic in the maneuvering area.
    c. Take off clearance is given by Haluoleo Tower.
    d. Helicopter departure using take off direction 08 via Bravo spot.
    e. Helicopter departure using take off direction 26 via Alpha spot.
    f. Military helicopter departure using take off direction 08/26 via Charlie spot.
    g. If there are departure helicopters and arrival helicopters arriving at the same time, vertical separation is carried out, namely 2,200 ft and 3,200 ft.
2. Helicopter arrival procedures
    a. Arrival helicopters from the east, southeast, south, and southwest carry out the approach via the Bravo entry point.
    b. Arrival helicopters from the northeast, north, northwest, and west approach via the Alpha entry point.
    c. The helicopter must not operate above 4000 ft within a 10 NM radius of the VOR/DME “KDI”.
    d. Before approaching Point Alpha or Bravo, the helicopter pilot must immediately notify Haluoleo Tower on the appropriate frequency. Haluoleo Tower will inform the pilot about the landing direction, altimeter setting, surface wind, etc.

e. If there are fixed-wing aircraft at the aerodrome traffic circuit, the helicopter must be at a minimum altitude of 2200 ft so that there is vertical separation from the fixed-wing aircraft (the height of the helicopter at Point Alpha/Point Bravo can also be adjusted to the traffic in the vicinity of the aerodrome).

f. If the pilot fails to make contact with the Haluoleo Tower, the pilot must hover at the designated entry point, namely Point Alpha and Point Bravo until radio communication returns to normal operation. If for the next 5 minutes, the pilot is still unable to make contact with the Haluoleo Tower, he must fly at the minimum speed to the specified aerodrome while observing the surrounding area to ensure that no traffic will conflict with the helicopter. As it approached the airport, the helicopter hovered briefly to try to attract the attention of ATC and attempted to make contact again with Haluoleo Tower.

g. Landing direction clearance is provided by Haluoleo Tower.

h. Helicopter arrival using landing direction 08 via Alpha spot.

i. Helicopter arrivals use runway 26 via the Bravo spot.

j. The arrival of military helicopters using landing direction 08/26 via Charlie spot.

k. After landing, the helicopter is required to carry out ground or air taxiing via the existing taxiway to the parking space provided and must avoid traffic in the maneuvering area.

V. CONCLUSION

Based on the formulation of the problem that the author has determined based on the analysis of the research results presented, the author designs a helicopter entry point to improve safety and ease in handling helicopter arrival traffic located on the north and south sides of Haluoleo Kendari Airport. Point Alpha is located on the north side of Haluoleo Kendari Airport on a radial of 328 degrees at 6.58 NM from KDI VOR and 6.20 NM from the Aerodrome Reference Point (ARP) at coordinates 03°58'54.88"S 122°23'43.94"E with visual reference from this point is the Pohara Bridge which is located over the Konaweha river. Meanwhile, Point Bravo is located on the south side of Haluoleo Kendari Airport on a radial 137 degrees at 3.95 NM from KDI VOR and 5.58 NM from ARP at coordinates 04° 07'25.36"S 122°29'51.46"E with a visual reference from this point namely the Madrasah Aliyah Negeri 1 Konawe Selatan building. The author has made the design using a method based on ICAO Document 9906 using the AutoCAD 2022 application, Global Mapper, and Google Earth Pro, then the design was validated by ATC Personnel at Perum LPPNPI Kendari Branch, ATC Education Expert and PANS-OPS Designer and has been declared feasible to be implemented with the improvements that the author has added.

VI. ACKNOWLEDGMENT

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