Proposed Cell Tower Placement Near Matson Airport

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Executive Summary:

Aviation Safety Compliance, LLC (ASC) Captains John Cox and Jim Hosey, (Aviation Consultants), conducted a review of the proposed communication tower construction at 1576 Spring Road, Dunkirk, Wisconsin with an unbiased/objective perspective from the standpoint of air navigation and potential conflicts with Matson Airport (2WI6). The standard used is based on the distance of the proposed tower from the approach end of runway 18 at 2WI6 which is 5088' horizontally at a proposed height of 199' vertically. All recommendations are based on the Conditional Use Permit (CUP #2578) and documentation reviewed from the Dane County Planning and Development committee meetings and FAA standards and regulations.

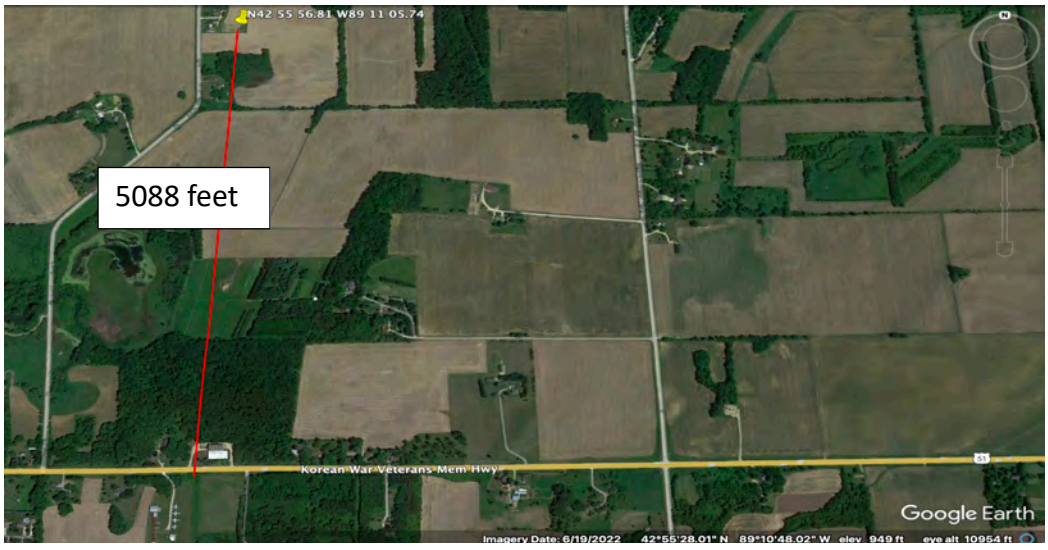
ASC finds that there are societal benefits to the improved communications provided by the tower, but there are adverse impacts to the Matson Airport. There are mitigations that can be implemented, which lower the risks to acceptable levels.

Matson Airport and Proposed Cell Tower Location:

Matson Airport is a small privately owned airport located 2 miles East of Stoughton, Wisconsin (N 42°54’49” W089°11’17”). It has been an airport since April 1948. The runway is aligned north/south designated runway 36/18. There are trees noted on both ends of the runway. The runway is 2500 feet by 100 feet of turf (grass).

This airport is the home airport for approximately 25 single engine aircraft. The owner of the airport reports that transient aircraft use the airport regularly, as does medical evacuation helicopters and a nearby Army National Guard unit. The medical helicopters and Army helicopters use the airport at night.

The proposed tower is located at 1576 Spring Road, Dunkirk, Wisconsin (N 42° 55’ 56.81” W 89° 11’ 05.74). This location is approximately 5088 feet (measured via Google Earth) from the end of the runway at Matson airport and directly in the flight path for arrivals to runway 18 or departures from runway 36. The proposed height is 199 feet (August 29, 2022 letter from Cellusite, LLC to Mr. Majid Allen).



FAA Guidance and Limitations:

The Federal Aviation Administration (FAA) has regulations regarding obstacles that affect the national airspace system. When an applicant files a request with the FAA proposing to construct a tower, the FAA reviews the request and issues a letter detailing the effect of the tower on the airspace system. On June 21, 2022, the FAA issued a letter in which it determined that the tower was not a hazard to air navigation. In that determination the proximity to Matson Airport was not considered, due to it being a private airport. The letter does not address the effect on air traffic into and out of Matson Airport.

From FAA AC 70/7460-1M:

2.1 page 4, 2nd to last sentence; "The FAA may also recommend marking and/or lighting a structure that does not exceed 200 feet (60.96 m) AGL or 14 CFR Part 77 standards because of its particular location".

2.3 page 4, "The FAA will recommend only those marking and lighting systems that meet established technical standards and commercial outside lighting should not be used in lieu of FAA recommended marking and/or lighting. While additional lights may be desirable to identify an obstruction to air navigation, and may on occasion be recommended, the FAA will recommend minimum standards in the interest of safety, economy, and related concerns. Therefore, to provide an adequate level of safety, obstruction lighting systems should be installed, operated, and maintained in accordance with the recommended standards herein".

4.3 page 14, "Lighting Systems. Obstruction lighting may be displayed on structures as follows (refer to subsequent chapters for details):

1. Aviation Red Obstruction Lights. Use flashing lights and/or steady-burning lights during nighttime. Tower structures are typically marked with flashing red lights. Buildings and smaller obstructions located near airports should be marked with steady-burning red lights.

2. Medium-Intensity Flashing White Obstruction Lights. Medium intensity flashing white obstruction lights may be used during daytime and twilight with automatic reduced intensity selected for nighttime operation. When this system is used on structures 700 feet (213.36 m) AGL or less, other methods of marking and lighting the structure may be omitted. Aviation orange and white paint is always required for daytime marking on structures exceeding 700 feet (213.36 m) AGL. This system is not normally recommended on structures 200 feet (60.96 m) AGL or less.

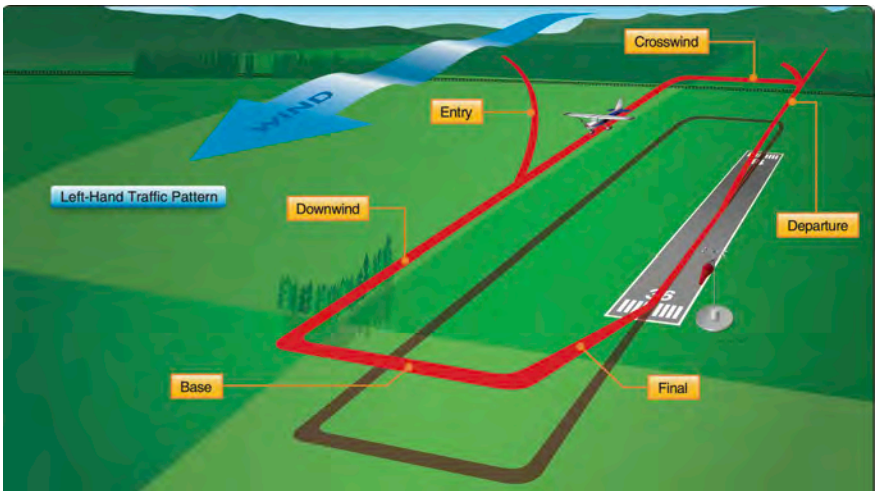
Dual Lighting. This system consists of red lights for nighttime and high- or medium-intensity flashing white obstruction lights for daytime and twilight. When a dual lighting system incorporates medium-intensity flashing white lights on structures 700 feet (213.36 m) AGL or less or high-intensity flashing white lights on structures greater than 700 feet (213.36 m) AGL, other methods of marking the structure may be omitted.

Obstacle Clearance – Approach/ Departure Planes:

When the vertical clearance of an obstacle is evaluated, it must be for aircraft overflying it as they approach to land, and when they overfly it after takeoff. These are two different calculations based on different needs.

Airport Traffic Pattern:

When arriving at an airport, aircraft follow a prescribed flight path known as the traffic pattern. At Matson Airport this consists of a series of left turns that aligns the aircraft with the runway while minimizing the possibility of collision with other traffic.



source: Aeronautical Information Manual

Aircraft arriving at Matson Airport will enter the Downwind ensuring that no other traffic conflicts with their flight path. The altitude is approximately 1000 feet above the ground. The Downwind is around a mile offset from the runway. As the aircraft passed abeam the end of the runway about a mile, it will make a left turn to be perpendicular to the runway and reduce altitude to approximately 500 feet above ground level. When the runway is at about a 45° angle to the aircraft a left turn to the runway is initiated. The distance is around 1 to 11/2 miles. The altitude is between 300-500 feet above ground level.

Vertical Path Guidance:

Aircraft must align with the runway both laterally and vertically. The previous section explained the lateral alignment. Vertical alignment is critical so that the airplane touches down in the touchdown zone at the proper speed so that deceleration can bring the aircraft to a safe stop on the runway. The usual guidance for vertical planning is to descend approximately 300 feet per mile. As the aircraft turns from base to final around one mile from the runway it should be

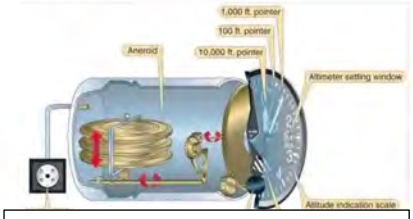
around 300 feet above ground level. This 3 to 1 ratio can be used to determine the effect of an obstacle in the flight path.

When landing at the Matson to the South, the proposed tower would have aircraft overflying it at less than 300 feet above the ground. According to topographical maps it appears the proposed site is approximately 30 feet below the runway resulting in a 30-foot increase in clearance for aircraft. Aircraft flying over at 300 feet would have 131-foot clearance.

Formula TAN(3)5088=267
AMSL = Above Mean Sea Level

At 5088 feet from the departure (arrival to runway 18), end the aircraft will be descending. Considering the 30-foot decrease in elevation aircraft will pass over the proposed tower around 100 feet, using the calculation (267+30-199=98). One additional consideration is the accuracy of the altimeter on the aircraft.

Aircraft measure altitude by sensing air pressure. The greater the altitude, the less the air pressure. As air pressure changes with weather patterns, it must be adjusted to compensate for changes in barometric pressure.



Source: FAA Instrument Flying Handbook

While altitude accuracy is desired, barometric altimeters have inherent errors. The acceptable error for an altimeter is 75 feet, according to FAA guidance.

Altimeter error could erode the 100-foot clearance margin by as much as 75 feet, leaving only a 25-foot clearance (considering the tower is at 199').

Departure Considerations:

Aircraft departing Matson Airport to the North will lift off the runway and establish a climb. The rate of climb will vary by aircraft type, weight, and temperature. Aircraft of the type flying into and out of Matson Airport are small single engine aircraft which do not have high rates of climb. Consequently, a fully loaded single engine aircraft on a hot day will climb slowly and not have attained a lot of altitude by 5088 feet from the departure end.

The FAA uses a 40:1 ratio for calculation of departure obstacle clearance. This ratio results in an altitude of 152 feet per nautical mile. At Matson Airport any obstacle that is higher than 129 feet would penetrate that 40:1 plane located 5088 feet from the departure end of runway 36.

Formula TAN(1.451)5088=129

It should be noted that aircraft will usually climb at a rate greater than 40:1 and that there is a 30-foot decrease in the elevation from the end of the runway to the proposed tower site. This would increase the height above ground to 159 using the 40:1 plane.

Conspicuity:

The ease by which an object can be seen is it's conspicuity. In aviation this is important when objects blend into the background resulting in aircraft getting closer to the object before the pilot sees it.

The proposed site of the tower has conspicuity issues as the background when approaching the south landing runway (runway 18) is trees. A vertical tower in front of vertical trees will be more difficult for a pilot to see.

As discussed in previous sections the pilot of an aircraft landing on runway 18 will be turning from base to final at altitude of 300-500 feet depending on the distance from the runway. This is a high workload time in the flight where the pilot's visual field of focus is constantly changing from external as she/he assesses the flight path and turn to the runway and internal to view the instruments to maintain the proper airspeed, altitude and heading. This rapid and continuous changing from external to internal and back to external reduces the time to notice an obstacle such as a tower.

Findings:

The community will benefit by having a communications tower in the area.

The proposed height of 199 feet is below the requirements for lighting, but the FAA recommends it.

The FAA letter of “No Hazard To Air Navigation” did not consider the effect on aircraft landing and departing from Matson Airport.

The users of Matson Airport (pilots and passengers) should have the same level of safety as those using a public airport.

The proposed tower near Matson Airport will impact air traffic arriving and departing due to the encroachment of the normal flight paths, both arriving and departing.

The ability to see the proposed tower is adversely affected by the background when landing to the south.

The ability to see the proposed tower at night, when medical evacuation flights and Army helicopters fly into Madison Airport is uncertain but could be a significant hazard.

Matson airport should consider a navigational aids (navaids) such as visual glide slope indicators (PAPI/VASI - both runways) with a glide slope greater than 3.0 degrees, possibly 4.0 to increase the glide slope angle to runway 18.

Recommendations:

1. Move the proposed tower site East or West of the current site to deconflict with air traffic using Matson Airport.
2. If the tower is erected on the proposed site, it should be lighted day (white) and night (red).
3. If the tower is erected in the proposed site, it should be of a height not to exceed 163 feet above ground level.

Aviation Safety Compliance, LLC opinion:

The General Standard Approval of a Conditional Use Permit (CUP);

That the establishment, maintenance or operation of the conditional use will not be detrimental to or endanger the public health, safety, comfort or general welfare.

ASC finds that a 199-foot tower on the proposed site would potentially endanger and be detrimental to the public using Matson Airport.

ASC finds that moving the site of the tower East or West would mitigate the risk to an acceptable level.

ASC finds that reducing the height to 163 feet would mitigate the risk to an acceptable level.

ASC finds that the tower should be illuminated with white (day) and red (night) lights regardless of height (199 or 163 feet) to mitigate risk.

That the uses, values and enjoyment of other property in the neighborhood for purposes already permitted shall be in no foreseeable manner substantially impaired or diminished by establishment, maintenance or operation of the conditional use.

ASC finds that the use, values and enjoyment of Matson Airport would be adversely affected by a tower of 199 feet at the proposed site due to the probable reduction in flights into and out of Matson Airport. A tower of 163 feet would mitigate the risk of adverse effect at Matson Airport to an acceptable level.

ASC finds that the use of Matson Airport at night would be adversely affected by reducing or eliminating its use by Medical Evacuation and Army Guard helicopters if there were a 199 foot tower less than one mile from the airport. A tower of 163 feet would mitigate the adverse effect to an acceptable level.

ASC finds that military or medical aircraft using Matson airport at potential special approach arrival or departing procedures would adversely affect the local community if encountering the proposed tower along with endangering these aircraft with a 199-foot tower less than one mile from the Matson Airport. A tower of 163 feet would mitigate the risk to an acceptable level.