U.S. Department of Transportation
Federal Aviation Administration

Office of Airports Safety and Standards

800 Independence Ave., S.W.
Washington, DC 20591

May 21, 2025

Subject: Emerging Entrants Bulletin 25-02, Testing and Demonstrating Autonomous Ground Vehicle Systems (AGVS) at Federally Obligated Airports

Dear National Plan of Integrated Airport Systems (NPIAS) Airport Sponsors:

The testing of autonomous ground vehicle systems (AGVS), which includes remotely operated devices/equipment, on airports has become more prevalent, both domestically and internationally. As the demand for more efficient airport operations grows, there is heightened interest in adopting AGVS (driverless) technology for a variety of airport functions. These applications include: maintenance vehicles (such as mowers, snow removal equipment, sweepers, and foreign object debris detection/retrieval systems), perimeter security vehicles, self-driving aircraft tugs, baggage carts, buses and shuttles.

AGVS have different levels of autonomy and the capability of operating autonomously on a pre-defined route(s) that are selected by a human operator. The AGVS can operate autonomously or be remotely controlled in the following configurations:

1. With an on-board human monitor,
2. Without an on-board human but can be remotely monitored by a human, or
3. Without an on-board human but can be remotely controlled by a human.

The Federal Aviation Administration (FAA) supports innovative technologies like AGVS but prioritizes the safe integration of these systems into active airport environments. The FAA's Office of Airports Safety and Standards, along with the FAA's Airport Technology Research and Development Branch, is currently studying how AGVS can be safely integrated into active airport environments. Until this research is complete, and formal guidance and standards are established by the FAA, **AGVS should only be used for testing[1] and demonstration purposes in non-movement areas[2], and certain remote and landside areas of the airport.** These areas are viewed as safer environments for exploring this technology because they offer a more

[1] Note, the FAA considers AGVS use for 'day-to-day' purposes (e.g., baggage tow tractor, wildlife hazard management, etc.) as a 'testing activity' if a human operator remains capable of regaining instantaneous control of the AGVS should the automated system fail to perform as expected or required. All training requirements (i.e., airport ground vehicle operator training) remain in effect for the human operator monitoring or controlling the AGVS.

[2] Non-movement area - the area, other than that described as the movement area, used for the loading, unloading, parking of aircraft. This may include the apron areas and on-airport fuel farms (*See* Advisory Circular (AC) 150/5210-20, Ground Vehicle Operations to include Taxiing or Towing an Aircraft on Airports).

controlled, less-congested, and low-speed environment for testing, which will reduce the risk of accidents or incidents involving these vehicles. At federally obligated airports, FAA Grant Assurance 19 (Operations and Maintenance) should be considered when testing AGVS. Certificated airports must also ensure compliance with Title 14 Code of Federal Regulations (CFR) Part 139.335(a)(1) "*…Safeguards to prevent inadvertent entry to the movement area by unauthorized persons or vehicles"*. Until guidance and standards for use of AGVS is established by the FAA, AGVS cannot be used as a sole means of compliance with federal regulations and must be supplemented by traditional methods. Additionally, airport sponsors and AGVS operators are responsible for the financial and operational risks associated with AGVS testing and demonstrations. As owners, airport sponsors have the authority to approve or disapprove AGVS testing/demonstrations on their facilities.

On February 15, 2024, FAA issued CertAlert 24-02: *Autonomous Ground Vehicle Systems (AGVS) Technology on Airports*. The purpose of this CertAlert is to provide guidance and awareness regarding the use of AGVS technology on airports. It states that the FAA supports testing of AGVS on airports, but only in "controlled environments[3]". These controlled environments include non-movement areas such as aprons, aircraft gate areas, parking areas, remote and landside areas. **At this time, the FAA does not consider "controlled environments" to include active movement areas[4], safety areas, and object free areas.**

Airport sponsors should carefully evaluate any plans to close parts of the airport solely for AGVS testing or demonstrations, as this may unreasonably restrict access for other tenants. Coordination with your FAA Regional Airports Division/Airports District Offices (ADOs) is recommended to ensure that such closures do not violate federal grant assurances.

Given the dynamic airport environment, it is essential for the airport sponsor to provide appropriate oversight to ensure that the AGVS does not compromise airport safety. To ensure the safety of the airport environment, a human monitor should be physically located in/near the AGVS when it is operating around moving aircraft and airport employees/vehicles/equipment not involved with the testing. The human monitor should be properly badged/escorted by the airport sponsor and be trained and familiar with the airport's policies/procedures for operating vehicles on the airport (i.e., security identification display area badge with driving privileges). The badged individual should have the capability to take control of the AGVS at any time and should follow the safety guidelines identified in AC 150/5210-20, *Ground Vehicle Operations to include Taxiing or Towing an Aircraft on Airports*, Specifically, Chapter 3, Vehicles, Paragraph 3.1.2, Aircraft Operations, which encourages airport-specific solutions to address the airport's unique operating environment and reminds that aircraft always have the right-of-way over vehicles in non-movement areas. The airport sponsor and the AGVS operator (e.g., airport staff, tenants, or other stakeholders) should thoroughly evaluate the operation before moving to autonomous operations without human supervision.

[3] As discussed in CertAlert 24-02, controlled environments are viewed as safer environments for exploring this technology because they offer a less congested, and low speed environment for testing and operation, which will reduce the risk of accidents or incidents involving these vehicles or equipment. Please note, "controlled environments" referenced in this letter is not the same as "ATC controlled environments."

[4] Movement Area - the runways, taxiways, and other areas of an airport that aircraft use for taxiing, takeoff, and landing, exclusive of loading aprons and aircraft parking areas (*See* AC 150/5210-20).

Some AGVS and associated ground infrastructure (e.g., antenna, tower, etc.) are equipped with radio frequency (RF) emitter(s) that transmit on various frequency bands (e.g., radars, wireless communications devices, etc.). For any AGVS equipped with an RF emitter(s) or AGVS with associated ground infrastructure, an FAA Form 7460-1, *Notice of Proposed Construction or Alteration* must be submitted to the FAA for aeronautical study, prior to conducting any on-airport AGVS operations/ground infrastructure construction. This ensures compliance with Title 14 CFR Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*, and there is no frequency interference with communications, navigation, and surveillance systems used throughout the National Airspace System (NAS). Attachment 1 includes instructions for filing FAA Form 7460-1.

Unless there is an exception within Title 47 of the CFR, *Telecommunication*, that permits an AGVS to transmit RF without an 'authorization/license grant' (e.g., unlicensed industrial, scientific, and medical (ISM) equipment)[5], AGVS operators are also required to obtain a 'authorization/license grant' from the Federal Communications Commission (FCC) authorizing RF transmissions.

To assist in their review, airport sponsors are encouraged to request the following information from the AGVS operator prior to testing/demonstration:

1. Overview of the AGVS (e.g., vehicle specifications, safety features, etc.).
2. Test plan/operating concept (e.g., an overview of the activity, location, AGVS route(s), schedule, roles and responsibilities of participants, point(s) of contact during the testing).
3. Copy of the FCC 'transmit authorization/license grant' or the CFR reference for why an FCC 'transmit authorization/license grant' is not required. (For example, the AGVS RF transmission device is compliant with Title 47, Subpart A, Part 15, *Radio Frequency Devices*.)
4. Copy of the FAA aeronautical determination (only required if the AGVS is equipped with an RF emitter or there is associated ground infrastructure (e.g., antenna, tower, etc.).

Airport sponsors should use this information to proactively identify possible safety hazards and implement mitigations as appropriate. Attachment 2 includes a checklist of safety considerations.

If you have any questions, please contact the Office of Airports AGVS Lead, Mike DiPilato, at Michael.DiPilato@faa.gov.

Sincerely,

KERI L LYONS Digitally signed by KERI L LYONS Date: 2025.05.22 08:37:20 -04'00'

Keri Lyn Lyons
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[5] Title 47 (Telecommunication), Chapter 1 (Federal Communications Commission), Subchapter A (General), Part 15 (Radio Frequency Devices).

ATTACHMENT 1:
FAA FORM 7460-1 SUBMISSION INSTRUCTIONS FOR
ON-AIRPORT AUTONOMOUS GROUND VEHICLE SYSTEM (AGVS) PROPOSALS

Included within this attachment are FAA Form 7460-1 *Notice of Proposed Construction or Alteration*, submission instructions for 'on airport' autonomous ground vehicle systems (AGVS) proposals. Proponents can file FAA Form 7460-1 via the FAA's Obstruction Evaluation Airport Airspace Analysis (OE/AAA) website at https://oeaaa.faa.gov, or submit a paper file by sending a completed FAA Form 7460-1 to the appropriate FAA Regional Airports Division/Airports District Offices (ADOs).

For additional information/guidance on filing on-airport aeronautical studies reference: AC 150/5300-20 - Submission of On-Airport Proposals for Aeronautical Study.

1. **New or modified AGVS ground infrastructure (e.g., antenna, tower, etc.).**

   Follow existing guidance for submission of 'On-Airport' proposals to the FAA for aeronautical study.

2. **AGVS with a radio frequency (RF) emitter(s) and no associated ground infrastructure.**

   Follow existing guidance for submission of 'On-Airport' proposals to the FAA for aeronautical study; however,

   - Construction/Alteration Information:
     - Notice of: Select 'Alteration'
     - Duration: Select 'Permanent' or 'Temporary'
     - Select Work Schedule – Start and End

   - Structure Details:
     - Select: 'State'
     - Select: 'Loc ID'
     - Add 'Latitude' and 'Longitude,' which is the first location (point) that will define the AGVS operating area. Additional locations will be added by selecting 'Add New Location(s)' link in https://oeaaa.faa.gov.
     - Add 'Site Elevation (SE)'
     - Add 'Structure Height' (above ground level (AGL)), which includes the height of the AGVS and any externally mounted components (e.g., 'antenna') on the vehicle.

   - Describe Remarks:
     - Directions: The 'Describe/Remarks' text box should include a clear and concise description about the proposal, such as: the purpose of the operation, the proposed operating location(s) of the autonomous ground vehicle system (AGVS), and any associated ground infrastructure.

Note: It is crucial that the proponent provide a clear and concise project description in the 'Describe/Remarks' box that includes proper spelling and grammar. The text in this box is used directly in the aeronautical determination letters, which are made available for public review upon issuance.

- Additional Location(s)
  - 'Add New Locations' (latitudes/longitudes) to define the boundaries of the operating area similar to a construction work area.

- Case Information:
  - Component Type: Select 'OTHER'
  - Development Type: Select 'OTHER – Miscellaneous'
  - Other Desc: Enter Autonomous Vehicle (AGVS)

- Proposed Frequency Bands:
  - Select any combination of the applicable frequencies/powers to be evaluated by the FAA with your filing. If not within one of the frequency bands listed below, manually input your proposed frequency(ies) and power using the 'Add Specific Frequency' link in https://oeaaa.faa.gov.

The AGVS operator must receive an aeronautical determination with no objections or conditional no objections before operating the AGVS and constructing any associated ground infrastructure with an RF emitter(s) at an airport. This will confirm that the AGVS and associated ground infrastructure do not interfere with airport, aircraft, communication, and navigation equipment; therefore, ensuring the safety of National Airspace System (NAS).

3. **AGVS that <u>do not</u> have an RF emitter(s) and no associated ground infrastructure <u>do not</u> need to submit FAA Form 7460-1 to the FAA for aeronautical study.**

ATTACHMENT 2
AUTONOMOUS GROUND VEHICLE SYSTEM (AGVS) SAFETY CONSIDERATIONS CHECKLIST

Airport sponsors may use this checklist as a tool to verify safety considerations prior to initiating AGVS testing/demonstration.

Number	AGVS Safety Considerations	Yes	No	N/A	Comments
Stakeholder Notification / Coordination					
1.	Airport sponsor contacts the FAA Regional Airport Certification and Safety Inspector (Part 139 airports) or Regional Airports Division/Airports District Office (general aviation federally obligated airports) prior to the testing/demonstration.				
2.	AGVS operator (e.g., airport staff, tenants, or other stakeholder) coordinates with the airport sponsor during the development of the testing/demonstration plan to include: appearance of the AGVS, testing/demonstration location, planned route(s) of travel, point(s) of contact during testing, preferred frequency of notification.				
3.	Airport sponsor coordinates with relevant stakeholders during development of the testing/demonstration plan to include: appearance of the AGVS, testing/demonstration location, planned route(s) of travel, point(s) of contact during testing, preferred frequency of notification, etc. Stakeholders include, but are not limited to: • Local Air Traffic Control (ATC) facility, • Aircraft Rescue and Firefighting (ARFF) and/or mutual aid (for airports without on-site ARFF), and • Other stakeholders as appropriate (e.g., local FAA offices, tenants operating near the AGVS test/demonstration area, etc.).				
4.	Airport sponsor approves the AGVS testing/demonstration and is aware of the AGVS safety features, appearance, testing/demonstration location, and planned route(s) of travel, and point(s) of contact during testing.				

Number	AGVS Safety Considerations	Yes	No	N/A	Comments
	Training				
5.	Prior to operating the AGVS on-airport property, the AGVS vendor provides training to the airport sponsor and/or the AGVS operator. This training should include an overview of how the vehicle behaves when it malfunctions (e.g., lost link).				
6.	AGVS human monitor completes the airport's approved driver training and is familiar with the airport's policies/procedures for operating vehicles on the airport.				
7.	AGVS vendor and/or operator provides familiarization training to the airport sponsor and ARFF and/or mutual aid (for airports without an on-site ARFF on how the AGVS is powered (e.g., electricity, fossil fuel, etc.) and the location of the AGVS's fuel source.				
	Emergency Response				
8.	Ensure AGVS has a safety feature(s) to stop the vehicle in the event of an emergency. This should always include a mechanism that can be activated by a human monitor but may also include redundancies at a command-and-control station.				
9.	Ensure awareness by all parties on how to activate the AGVS safety features, if necessary.				
10.	Ensure a lost link and recovery procedure is in place.				
11.	Ensure procedure for the AGVS operator to immediately notify airport operations in the event the vehicle malfunctions, lost link, and/or deviates from its pre-planned course.				
12.	Ensure procedure for immediate notification to ATCT/ARFF/tenants in the event of an AGVS emergency (e.g., vehicle inadvertently enters the movement area /safety area, etc.).				
13.	Ensure procedure for off-nominal event or breakdown of the AGVS (e.g., alert the remote monitor, etc.).				

Number	AGVS Safety Considerations	Yes	No	N/A	Comments
FAA Aeronautical Study (FAA Form 7460-1) / FCC 'Transmit Authorization/License Grant'					
14.	If AGVS has ground infrastructure (e.g., antenna, tower, etc.): *Follow existing guidance when filing 'On Airport' proposals to the FAA for aeronautical study that is found in AC 150/5300-20 - Submission of On-Airport Proposals for Aeronautical Study.*				
15.	If AGVS is equipped with a radio frequency (RF) emitter(s) and no associated ground infrastructure: *Follow guidance in Attachment 1 of this document when filing 'On Airport' proposals to the FAA for aeronautical study.*				
16.	If AGVS is not equipped with an RF emitter(s) and does not have any associated ground infrastructure: *AGVS operator does not need to submit FAA Form 7460-1 to the FAA for aeronautical study).*				
17.	Obtain FAA aeronautical determination, if applicable.				
18.	Obtain Federal Communications Commission (FCC) 'transmit authorization/license grant' or be provided the CFR reference for why an FCC License is not required.				
Airport Safety					
19.	AGVS onboard or remote human monitor always gives way to aircraft, emergency vehicles, and pedestrians in its planned route.				
20.	AGVS adheres to the speed limits for the area(s) it will operate.				
21.	AGVS equipped with markings and lighting meeting applicable requirements of AC 150/5210-5, Painting, Marking, and Lighting of Vehicles Used on an Airport.				
22.	AGVS vendor and/or operator meets the airport's insurance requirements to operate the vehicle on the airport.				
23.	Airport sponsor issues a Notice to Airmen for the AGVS testing/demonstration as a means of increasing situational awareness and surface safety.				

Number	AGVS Safety Considerations	Yes	No	N/A	Comments
Airport Security					
24.	AGVS human monitor(s) holds a security identification display area badge with driving privileges.				
25.	AGVS human monitor(s) are trained on the geographic limits of the airport movement areas, safety areas, object free areas, and instrument landing system critical areas to ensure AGVS does not enter any such defined areas.				