4-241 OVERVIEW. This section contains a summary of takeoff operations and describes the standards for the development and approval of a Low Visibility Operations/Surface Movement Guidance and Control System (LVO/SMGCS) plan for U.S. airports where scheduled air carriers are authorized to conduct operations (taxi, takeoff, and/or landing) when the visibility is less than Runway Visual Range (RVR) 1200, as defined in Federal Aviation Administration (FAA) Order 8000.94, Procedures for Establishing Airport Low-Visibility Operations and Approval of Low-Visibility Operations/Surface Movement Guidance and Control System Operations. An LVO/SMGCS plan facilitates the safe movement of aircraft and vehicles on the airport by establishing more rigorous control procedures and requiring enhanced visual aids.

4-242 APPLICABILITY. Within Flight Standards (FS), in the Flight Technologies and Procedures Division, the Flight Procedures and Airspace Group is responsible for the planning, implementation, inspection, and approval of all LVO/SMGCS operations. In addition to that responsibility, the appropriate air carrier inspectors must ensure that each air carrier initial and/or recurrent pilot ground training program includes information about airport surface movement during night and low visibility environments and familiarization with airport markings, signs, and lighting. This is critical for Category (CAT) II/III operations, as well as lower-than-standard takeoff operations.

4-243 REFERENCES, FORMS, AND JOB AIDS.

A. References (current editions):

- FAA Order 6560.10, Runway Visual Range (RVR).
- Advisory Circular (AC) 120-57, Surface Movement Guidance and Control System.
- Technical Standard Orders (TSO).
- U.S. Flight Information Publications (FLIP).
4-244 DEFINITIONS.

A. Airport LVO/SMGCS Working Group. Includes Airport Authority and key FAA representatives and tenant groups that will participate in LVO/SMGCS or are impacted by LVO/SMGCS operations. Herein referred to as the Airport LVO/SMGCS Working Group.

B. Clearance Bar. A clearance bar consists of three in-pavement, steady-burning yellow lights (refer to the Aeronautical Information Manual (AIM)).

C. FAA LVO/SMGCS Team. The FAA LVO/SMGCS Team consists of an appropriate Flight Procedures and Airspace Group All Weather Operations (AWO) subject matter expert (SME), an air traffic control tower (ATCT) or other designated air traffic control (ATC) representative, and an appropriate Airport Certification Safety Inspector.

D. Gate Designator Markings. Pavement markings used to identify an aircraft parking position/gate(s).

E. Geographic Position Markings. Pavement markings used to identify the location of aircraft or vehicles during low visibility conditions. They are referred to as “spots” by ATC (refer to AC 150/5340-1, Standards for Airport Markings).

F. Judgmental Oversteering. When the taxiway centerline does not provide an adequate turn radius, the pilot may intentionally oversteer the aircraft nose wheel to keep the aircraft’s main gear within the defined edges of the taxiway.

G. Movement Area. Refers to the runways, taxiways, and other areas of an airport that are used for taxiing, hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and aircraft parking areas (refer to part 139, § 139.5).

H. Nonmovement Area. Refers to taxiways and apron areas that are not under ATC.

I. Runway Guard Lights (RGL)—Elevated. Fixture consists of a pair of elevated flashing yellow lights installed on both sides of a taxiway at the runway hold position marking. Their function is to confirm the presence of an active runway and assist in preventing runway incursions (refer to the AIM).

J. Runway Guard Lights (RGL)—In-Pavement. Fixture consists of a row of in-pavement, flashing yellow lights installed across the entire taxiway at the runway hold position marking. Their function is to confirm the presence of an active runway and to assist in preventing runway incursions (refer to the AIM).

K. Stop Bar. Stop bar lights consist of elevated and in-pavement red fixtures that are installed at the runway holding position or instrument landing system (ILS) critical area holding position marking. Stop bars may be controllable by ATC and will include a system of
in-pavement, green taxiway centerline lights (TCL)/lead-on lights at locations where aircraft will enter or cross a runway.

L. Low Visibility Operations/Surface Movement Guidance and Control System (LVO/SMGCS). An LVO/SMGCS consists of the provision of guidance to, and control or regulation of, all aircraft, ground vehicles, and personnel on the movement area of an aerodrome. Guidance relates to facilities, information, and advice necessary to enable the pilots of aircraft or the driver of ground vehicles to find their way on the aerodrome and to keep the aircraft or vehicle on the surfaces or within the areas intended for their use. Control or regulation means the measures necessary to prevent collisions and to ensure that the traffic flows smooth and freely (refer to International Civil Aviation Organization (ICAO) Doc 9476-AN/927, Manual of Surface Movement Guidance and Control Systems (SMGCS)).

M. Surface Movement Surveillance System (SMSS). A system that provides positive identification and accurate positional information on all aircraft and vehicles. It might vary from a marshaller escorting a single airplane to and from a runway, to something as sophisticated as an airport surface detection equipment (ASDE)-X.

N. Surface Painted Holding Position Sign. Pavement marking that is used to identify a specific runway. These markings are configured the same as the associated sign (refer to AC 150/5340-1).

O. Surface Painted Direction Sign. Pavement markings that are configured the same as the associated sign and provided when it is not possible to provide taxiway direction signs at intersections (refer to AC 150/5340-1).

P. Surface Painted Location Sign. Pavement markings that are configured the same as the associated sign, and which are used to supplement the signs located alongside the taxiway and assist the pilot in confirming the designation of the taxiway on which the aircraft is located (refer to AC 150/5340-1).

Q. Taxi Route. In this section, a specific sequence of lighted taxiways used by aircraft during low visibility operations.

R. Unserviceable. In this section, refers to equipment that is inoperative, obscured (i.e., by ice, snow, or sand), degraded, not operating normally (e.g., abnormally low intensity), or not performing its intended function.

4-245 OPERATOR REQUIREMENT—LOW VISIBILITY TAXI AND TAKEOFF OPERATIONS.

A. General. Current ground operation systems have not always provided an adequate level of safety during night operations and low visibility conditions. There have been occurrences of aircraft accidents with resulting fatalities. LVO/SMGCS programs were developed in accordance with the Safety Management System (SMS)-centered AC 120-57 and were first implemented in September 1992.
1) These criteria outline the pilot crewmember training requirements under part 121, § 121.415(g) and part 135, § 135.329(e) in all weather, day, and night surface movement operations.

2) Air carrier inspectors must ensure that each air carrier initial and/or recurrent pilot ground training programs include information about airport surface movement during night and low visibility environments and familiarization with airport markings, signs, and lighting.

3) Additional information can be found in AC 120-57, Appendix 1, Related Reading Material.

B. Flightcrew Training and Qualification Requirements. If an operator requests authorization to conduct lower-than-standard takeoffs, the flightcrew must be trained and qualified in their respective crew positions for the applicable takeoff minimums requested. The pilot in command (PIC) is ultimately responsible for ensuring that the flightcrew members are appropriately qualified before conducting an authorized lower-than-standard takeoff.

1) Individual pilots must be trained in their respective crew positions (parts 91 subpart K (part 91K), 121, and 135) and checked (parts 91K, 121, 125, and 135) in takeoffs using the appropriate requested minimums before being approved for conducting such takeoffs.

2) Pilot qualification must consist of an initial check that includes one takeoff at the lowest requested takeoff minimums. It is also required during each pilot’s recurrent qualification cycle. This qualification must be completed in a flight simulator capable of replicating the applicable takeoff visibility, and the simulator must be set at (or lower than) the applicable takeoff visibility during such takeoffs.

3) Additional crew qualification for a check airman or a qualified FAA inspector, beyond that shown herein for regular flightcrews is not required.

4) Principal Operations Inspectors (POI) must ensure that operators requesting lower-than-standard takeoff minimums provide appropriate training for flightcrews, including the procedures listed below, as appropriate:

- Confirming the takeoff runway alignment (Safety Alerts for Operators (SAFO) 07003, Confirming the Takeoff Runway, includes guidance and/or advisory information about acceptable techniques);
- Rejected takeoffs in a low visibility environment;
- Low visibility instrument takeoff cross-check priorities;
- Engine failure during critical phases of takeoff in low visibility;
- Acceleration and climb disorientation factors and illusions;
- Use of Head-Up Display (HUD) takeoff guidance systems (when installed in aircraft for RVR 300 authorization only);
- Taxiing in a low visibility environment with emphasis on preventing runway incursion and LVO/SMGCS training (AC 120-57 includes guidance and/or advisory information about acceptable techniques);
- Taxiway critical areas;
• Crew coordination and planning;
• Required ground-based visual aids (such as stop bars and taxi holding position lights);
• Required ground-based electronic aids (such as ILS and transmissometers); and
• Determination of takeoff alternate airports.

C. Operations Specifications (OpSpecs)/Management Specifications (MSpecs)/Letters of Authorization (LOA). When appropriate, POIs will issue OpSpec C056 and/or C078 to parts 121 and 125 operators, OpSpec C057 and/or C079 to part 135 operators, and OpSpec C056 to part 129 foreign air carriers. These OpSpecs contain specific flightcrew, aircraft, and airport requirements when lower-than-standard takeoff minimums are used. Additional information specific to each OpSpec can be found in Volume 3, Chapter 18, Section 5 for domestic operators, and Volume 12, Chapter 4, Section 4 for part 129 foreign air carriers.

4-246 LVO/SMGCS OPERATIONAL APPROVAL FOR AIRPORTS.

A. Responsibilities. The Flight Technologies and Procedures Division is the FAA point of contact (POC) for the LVO/SMGCS program and will maintain a status list of LVO/SMGCS airports. When needed, the Flight Technologies and Procedures Division will also provide advice and guidance in resolving LVO/SMGCS questions.

1) Flight Procedures and Airspace Group. The Flight Procedures and Airspace Group is responsible for the approval of LVO/SMGCS operations at all airports. This approval is a joint responsibility of FS, Airports, and Air Traffic Organization (ATO) divisions. These responsibilities include:

   a) Participation in LVO/SMGCS Meetings. A representative of the Flight Procedures and Airspace Group AWO SME should participate in the Airport LVO/SMGCS Working Group meetings.

   b) Review and Approval of LVO/SMGCS Plans. The Flight Procedures and Airspace Group is responsible for coordinating the review of draft LVO/SMGCS plans to determine conformance with the criteria contained in existing FAA Orders, ACs, and the guidance in this section. This should include coordination with Airports and ATO. The airport operator will be notified of any deficiencies or recommendations. The Flight Technologies and Procedures Division will also be the approving authority for LVO/SMGCS plans and subsequent revisions and LVO/SMGCS operations.

   c) Onsite Inspection. An onsite inspection should be accomplished for all LVO/SMGCS airports and can be completed as an ongoing process, a specific event, or in association with the airport certification inspection. The inspection should be accomplished by the Flight Procedures and Airspace Group appropriate AWO SME, Airports, ATO personnel, and other airport tenant officials. The onsite inspection should be accomplished at night to simulate restricted visibility conditions, and will be used to evaluate lighting, markings, procedures, etc., as denoted in the LVO/SMGCS plan. The evaluation should also include the review of appropriate communications between ATC and the airport operator on the initiation
and termination of LVO/SMGCS procedures, and availability of the airport LVO/SMGCS taxi chart. Evaluation of alternative procedures of inoperative components, such as stop bar and taxiway centerline lighting systems, Surface Movement Radar (SMR), etc., should also be reviewed if installed. Noted deficiencies and corrective recommendations will be provided to the airport operator and appropriate organizations. The onsite inspection(s) should be completed prior to beginning initial LVO/SMGCS operations.

d) Tabletop Exercise. Prior to initial LVO/SMGCS operations at an airport, the appropriate AWO SME with specific airport knowledge, representatives from the Flight Procedures and Airspace Group, ATCT, Airports, the airport’s operations department, and key tenants should conduct a tabletop exercise of the approved LVO/SMGCS plan. This exercise is to identify any unforeseen risks in the plan and to validate that training has been adequate.

e) Adherence to LVO/SMGCS Plans. When notified of an LVO/SMGCS deficiency or recommendation, the Flight Procedures and Airspace Group will advise the appropriate FAA organization (Airports or ATO) and/or airport operator. Safety-related deficiencies may require the temporary withdrawal of approval for specified low visibility operations.

2) Airports Division—Controlling Region. The FAA’s controlling regional Airports division will have responsibility for:

a) Participation in LVO/SMGCS Meetings. A representative of the Airports division and/or Airport District Office (ADO) should participate in Airport LVO/SMGCS Working Group meetings.

b) Review of LVO/SMGCS Plans. The Airports division should review LVO/SMGCS plans in coordination with FS and ATO.

c) Advice and Guidance. The Airports division is responsible for providing advice and guidance to Airport LVO/SMGCS Working Groups regarding such matters as the standards on lighting, marking, signs, and paving. They may also advise on the eligibility of projects for Airport Improvement Program (AIP) funding.

3) ATO Division. The controlling FAA ATO division will be responsible for those sections of the LVO/SMGCS plan that are under its control and should correct deficiencies that are observed or brought to its attention.

a) Participation in LVO/SMGCS Meetings. A local or regional ATO representative should participate in Airport LVO/SMGCS Working Group meetings. They should assure that designated low visibility routes and procedures will enhance the safe and expeditious flow of traffic on the movement area during low visibility conditions.

b) Advice and Guidance. ATO is responsible for providing advice and guidance to Airport LVO/SMGCS Working Groups.
c) Review of LVO/SMGCS Plans and Taxi Route Charts. ATO is responsible for reviewing submitted LVO/SMGCS plans and low visibility taxi route charts in coordination with FS and Airports. The chairman of the Airport LVO/SMGCS Working Group will be notified of any deficiencies and recommendations. The low visibility taxi route charts will be coordinated with the Flight Technologies and Procedures Division and Aeronautical Information Services (AJV) for suitability.

d) Initiation and Termination of LVO/SMGCS Procedures. ATO will be responsible for initiating and terminating each phase of LVO/SMGCS procedures in accordance with the LVO/SMGCS plan. (Initiation of LVO/SMGCS procedures will take some time. Therefore, the implementation and termination should be based on meteorological trends of increasing/decreasing RVR values and weather phenomena, such as patchy fog and pilot reports.) ATC will notify airport operations of the pending initiation of LVO/SMGCS procedures. Airport operations should notify the ATO division when all appropriate tenants have been contacted. ATC will subsequently notify airport operations of their termination of low visibility operations.

e) Automatic Terminal Information Service (ATIS). The initiation of LVO/SMGCS procedures should be broadcast on the ATIS.

f) For operations below RVR 600, ATC will operate stop bar lights where installed.

g) Geographic Positioning. ATC will control aircraft and ground vehicles on the movement area by monitoring their geographic positioning and spatial relationship. The LVO/SMGCS plan should outline ATC procedures to be employed in the event the SMSS becomes inoperative during visibilities less than RVR 600.

h) Notifying and Assisting Aircraft Rescue and Fire Fighting (ARFF). During low visibility operations, the role of ATC in notifying and assisting ARFF services increases in significance. Procedures, systems, and/or techniques should be established and reviewed annually, in coordination with the airport operator, to ensure that aircraft requiring assistance can be located and ARFF services provided.

4) Airport Operator. The airport operator will be responsible for those sections of the LVO/SMGCS plan that are under its control and should correct deficiencies that are observed or brought to its attention. The airport operator will designate, from its staff, the chairperson of the airport’s LVO/SMGCS Working Group. The airport operator should:

a) Call and chair meetings of the airport’s LVO/SMGCS Working Group. This group should meet at least annually to review the LVO/SMGCS plan, procedures, and operations. They should also solicit attendance from appropriate personnel from the organizations listed in subparagraph 4-246B1).

b) Coordinate actions necessary to analyze the cost–benefit study in regard to desired minimums to reach an Airport LVO/SMGCS Working Group consensus on which desired minimums are feasible and cost beneficial, and to achieve the installation and operation of facilities, equipment, and/or procedures required to support low visibility operations.
c) Coordinate the drafting, editing, submission, publication, distribution, and revision of the LVO/SMGCS plan.

d) Assure that initial and recurrent training on LVO/SMGCS procedures is accomplished and documented for ARFF personnel, airport vehicle operators, and tenant vehicle operators.

e) Notify other organizations having responsibilities under the LVO/SMGCS plan about deficiencies observed or brought to their attention that require their correction.

f) If remote electronic monitoring capability is not available, ensure the timely inspection of airfield visual aids, such as lights, signs, and markings. Assure timely issuance and cancellation of appropriate Notices to Airmen (NOTAM) regarding outages of airport facilities and equipment that support low visibility operations.

g) Notify tenants of ATC’s impending initiation or termination of LVO/SMGCS procedures.

h) Advise ATC of airfield conditions or irregularities that may impact ATC operations.

i) Coordinate with the Airport LVO/SMGCS Working Group actions necessary in developing a low visibility chart.

j) Make follow-me services available.

5) Tenant Organizations. Airport tenants will be responsible for adherence to the LVO/SMGCS plan and will correct deficiencies that are observed or brought to their attention.

B. Initiation of LVO/SMGCS.

1) Airport LVO/SMGCS Working Group. The airport operator, in consultation with the users, should establish an LVO/SMGCS Working Group for all takeoff and landing operations below RVR 1200. The Airport LVO/SMGCS Working Group should include representatives from:

a) Airport staff involved with airfield operations, lighting, ARFF, security/traffic control, and any other appropriate personnel.

b) FAA ATO (local and/or regional).

c) FAA ADO or regional office.

d) FAA FS office.

e) FAA Airway Facilities Sector office.

f) Appropriate scheduled airlines.
g) Appropriate Airlines for America (A4A) representative.

h) Air Line Pilots Association International (ALPA) or other appropriate pilot groups.

i) Appropriate cargo/package operators and military aviation tenants.

j) Appropriate operators under part 91 and/or service corporations (includes general aviation and corporate operators).

2) **Airport Evaluation.** Since no two airports nor aircraft capabilities are alike, the Airport LVO/SMGCS Working Group should review the existing airport layout, facilities, instrument flight rules (IFR) minimums, and operational procedures at the airport prior to the development of the airport LVO/SMGCS plan. Comparison of the existing and planned operating capability with the guidelines of AC 120-57 should determine what additional measures are necessary to achieve the desired low visibility operations. This review should include at least the following:

a) Airport layout and surface traffic patterns (includes runways, taxiways, fillets, and taxilanes used for current low visibility operations and those needed to achieve new low visibility operations).

b) Air traffic procedures used for current low visibility operations, and changes or additional facilities needed to support new low visibility operations.

c) Surface lighting, marking, and signs used for runways, taxiways, taxilanes, and gate lead-in markings. (Identify additional needs in support of low visibility operations; i.e., stop bars, RGLs, clearance bars, taxiway centerline lighting, reflectors, geographic position markings, etc. Additionally, review the capability to electronically monitor and inspect lighting systems.)

d) Equipment, procedures, and training to support ARFF services in low visibility operations.

e) Ground support vehicle operations during low visibility conditions. (Review any restrictions, controls, or training needed, and whether airport operations or tenants will provide, if necessary, follow-me or towing services on the movement area.)

f) Protection of ILS critical areas and obstacle-free zones.

g) Snow removal equipment routing and priorities during low visibility conditions.

h) The adequacy of current airport charts.

i) Advanced technologies for below RVR 600 operations (e.g., Enhanced Vision Systems (EVS), HUD systems, Forward Looking Infrared (FLIR) systems, and Global Positioning Systems (GPS)).
3) **LVO/SMGCS Operations Minimum Selection.** Most airports authorized for CAT II/III operations already have most of the basic airport signing, lighting, and marking required under an LVO/SMGCS plan. The additional requirements contained in AC 120-57 are designed to enhance the safety of low visibility operations. These requirements represent both an initial capital cost and continuing maintenance and operations budget requirements. Prior to establishing the ultimate low visibility minimums for the LVO/SMGCS plan, the Airport LVO/SMGCS Working Group should perform a detailed analysis to ensure that the benefits from seeking lower takeoff or landing minimums justify the initial costs of the equipment and continuing maintenance costs. The analysis should consider at least the following:

a) A compilation and evaluation of historic low visibility weather data for the airport. The data may be obtained from the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI) headquarters in Asheville, NC; the local National Weather Service (NWS); or other private industry sources. This data should reflect actual RVR values and be analyzed for time of day and the number and frequency of affected aircraft operations.

b) A determination of which users are capable of using the low visibility takeoff and landing procedures. This is available from the FAA-published CAT II/III Status List. The list contains current air carriers, aircraft type, and airport authorizations.

c) Costs for both RVR ranges—less than RVR 1200 down to and including RVR 600, and less than RVR 600. These costs may include:

1. Taxiway edge lights.
2. TCL.
3. RGLs.
4. Stop bar lights.
5. Associated hardware and software.
6. Taxiway/ramp markings.
7. ASDE-III or equivalent.
8. Expanded communications facilities/ramp control.
9. Paving (taxiway fillets).
10. Ground equipment/vehicles (follow-me, tow, or ARFF vehicles).
11. Charting.
13. Training.
4) **Airport LVO/SMGCS Plan.** A detailed LVO/SMGCS plan should be developed for each airport to cover existing or planned low visibility operations. AC 120-57, Appendix 2, Sample Surface Movement Guidance and Control System Plan, contains a sample LVO/SMGCS plan. AC 120-57, Appendix 3, Guidelines for SMGCS Operations Below 1,200 Feet RVR Down to and Including 600 Feet RVR, and Appendix 4, Guidelines for SMGCS Operations Below 600 Feet RVR, contain guidance for developing an LVO/SMGCS plan.

   a) Airports with takeoff and/or landing operations below RVR 1200 should submit to the Flight Procedures and Airspace Group a completed LVO/SMGCS plan. The plan should include a timetable for budgeting and implementing the various components of the proposed plan. The airport operator should promptly initiate action to institute its LVO/SMGCS plan once FAA approval to proceed is received. Upon receipt of the plan, the FAA will advise the airport operator which actions included in the timetable, if any, should be delayed.

   b) The LVO/SMGCS plan should cover planned low visibility operations. Each low visibility operation and taxi route should be described in detail with its supporting facilities and equipment.

   c) The plan should clearly identify the responsibilities of those involved (e.g., airport operator, ATC, ARFF, air carriers, and ground vehicle operators). The plan should also clearly identify how and when these responsibilities will be carried out (e.g., the plan may identify different requirements for operations between RVR 1200 and RVR 600, and those operations below RVR 600).

   d) All LVO/SMGCS plans should be submitted to the responsible FAA Flight Procedures and Airspace Group office for approval.

   e) Revisions to LVO/SMGCS plans may be accomplished by the Airport LVO/SMGCS Working Group, when desired, and routed through the Flight Procedures and Airspace Group for approval.

C. **Visual Aid Requirements.** During low visibility operations, adequate visual cues to pilots and vehicle operators are necessary in order to maintain their situational awareness and to ensure the continuation of safe, efficient ground operations. Visual aids should be installed in accordance with the standards set forth in the AC 150/5340-series (listed in AC 120-57, Appendix 1).

1) **Taxiway Lighting—Movement Area.**

   a) For operations below RVR 1200, one of the following should be installed along each taxi route in the movement area:
1. Taxiway edge lights; or

2. TCLs supplemented with raised edge reflectors on curves and turns.

NOTE: Centerline lights are more effective than edge lights in low visibility operations; however, at airports where ice and snow could obscure centerline lights, it may be advantageous to install edge lights.

b) For operations below RVR 1200, taxiway edge lights should be installed at intersections along the taxi route where an aircraft is expected to turn, and the taxiway width or pavement fillet does not meet the design standards of AC 150/5300-13, Airport Design.

c) For operations below RVR 600, TCLs supplemented on curves and turns with edge lights should be installed along each taxi route in the movement area. The TCLs should extend continuously from the runway centerline (RCL) to the nonmovement area. When the taxi route crosses or extends onto a runway, RCL lights should be installed.

NOTE: It is recommended that taxiway lights be turned off, to the maximum extent possible, on those taxiways or runway exits that are not part of a low visibility taxi route.

2) Taxiway Lighting—Nonmovement Area.

a) For operations below RVR 1200, down to and including RVR 600, neither lighting nor reflectors are required.

NOTE: The installation of TCL lights or, secondarily, TCL reflectors, is recommended along taxiway and taxilane centerlines to provide improved guidance.

b) For operations below RVR 600:

1. TCLs should be installed, or

2. The LVO/SMGCS plan must contain provisions for taxiing assistance for pilots in the form of a follow-me vehicle, towing via a tug or ground marshalling.

3) Lights at Access to Active Runways.

a) For operations below RVR 1200:

1. Except as provided in the following paragraph, all taxiways that provide access to an active runway (regardless of whether they are part of the low visibility taxi route) should have RGLs installed at the runway holding position on the taxiway. If both a runway holding position and ILS critical area holding position marking are present, RGLs should be installed at the runway holding position only. (Refer to AC 120-57, Appendix 5, Sample Lighting Configuration for Operations Below 1,200 ft RVR to 600 ft RVR.)
2. In certain instances, the Airport LVO/SMGCS Working Group may determine that RGLs may not be necessary at certain taxiway/runway intersections. In making such an evaluation, the Airport LVO/SMGCS Working Group should consider if the intersection and runway environment is safeguarded from the inadvertent entry of aircraft and vehicles through other means (e.g., traffic volume and routings, airport configuration).

NOTE: The new installation or upgrading of elevated RGLs may not be required if in-pavement RGLs or stop bar lights are installed at the same location.

   b) For operations below RVR 600:

      1. In addition to the criteria specified in subparagraph 4-246C2)a), all illuminated (i.e., centerline and/or edge lights turned on) taxiways that provide access to an active runway (regardless of whether or not they are part of the taxi route) should have stop bar lights installed at the runway holding position. If both a runway holding position and an ILS critical area holding position marking are present, the stop bar should be installed at only the ILS critical area holding position. Stop bars on taxiways, which are used to enter or cross an active runway, should be capable of being operated individually. Such stop bars are termed “controlled stop bars.” The remaining “uncontrolled” stop bars may be operated by a single switch. Stop bar lights are used to positively control access to an active runway. At the approach end of a runway, in-pavement green lead-on lights will illuminate to provide a secondary visual confirmation of clearance onto the runway by ATC personnel.

      2. All non-illuminated taxiways (i.e., centerline and edge lights turned off) will be considered not available for taxiway or runway access, and do not need stop bars installed. However, the Airport LVO/SMGCS Working Group should evaluate the need for any additional “uncontrolled” stop bars.

   4) Runway Guard Lights (RGL). There are two configurations of RGLs. The following criteria should be used to determine which configuration should be installed at a specific runway holding position.

      a) Elevated RGLs should be installed at the runway holding position if the taxiway does not have TCLs installed and is 150 feet wide or less. However, if the taxiway has a stop bar installed at the runway holding position, elevated RGLs should be co-located with the stop bar, regardless of taxiway width or the presence of TCLs.

      b) In-pavement RGLs should be installed at the runway holding position if the taxiway is greater than 150 feet wide or a stop bar is installed at the ILS critical area holding position.

      c) In-pavement combination stop bar/RGL fixtures (dual red/yellow lens) may be installed at the discretion of the airport operator. The yellow in-pavement lights may not be turned on when the stop bar is in operation. If the stop bar is located at an ILS critical area holding position, dual red/yellow fixtures should not be selected. (This would result in the installation of two sets of RGLs at different locations that serve the same intersection.)
NOTE: At airports where ice and snow could obscure in-pavement RGLs, it may be advantageous to also install elevated RGLs.

5) Clearance Bars/Holding Position Markings. Hold points along taxi routes should be appropriately denoted by the following:

   a) For operations below RVR 1200, taxiway holding position markings should be painted to denote hold points.

   b) For operations below RVR 600, clearance bar lights should be installed at hold points, in addition to the taxiway holding position marking and geographic position marking.

6) Taxi Guidance Signing and Marking.

   a) For operations below RVR 1200, taxi guidance signs should be installed at taxiway intersections. Surface painted signs should be located on the pavement where they will enhance the operation as determined by the Airport LVO/SMGCS Working Group, or where it is not feasible to install guidance signs.

      1. Paint markings that are bright and which provide good contrast with the pavement are a significant low visibility guidance aid. These markings along low visibility taxi routes should receive special attention and be repainted when the conspicuity is degraded through wear and tear. Taxiway centerline markings, outlined with black borders, should be painted on light-colored pavements.

      2. The use of reflective or glass beaded paint should be used for geographic position markings. Glass beads should not be added to black paint.

   b) For operations below RVR 600, geographic position “spot” markings identifying hold points, and co-located with a lighted clearance bar light, should be painted on the taxiway pavement. A geographic position marking located without a taxiway clearance bar light can also be used for positioning information or where location verification or additional guidance is expected to be needed. These markings will be at locations in the movement area where they enhance low visibility operations as determined by the Airport LVO/SMGCS Working Group.

7) Monitoring and Visual Inspection of Lighting Aids. Controlled stop bars should be electronically monitored with a status indication provided in the ATCT. It is recommended that all other lighting systems that support low visibility operations be electronically monitored.

   a) For operations below RVR 1200:

      1. An initial visual inspection of stop bar lights, RGLs, clearance bar lights, TCLs, and taxiway edge lights installed on the low visibility routes or taxiways that intersect the low visibility runway(s) should be conducted by the airport operator prior to the implementation of LVO/SMGCS procedures. This visual inspection is conducted to ensure that the lighting
systems are “serviceable” as described in subparagraph 4-246C8), and that the lighting system status indicated on any associated electronic monitoring systems reflect the actual operating condition of the lights. All controlled stop bars should be checked for proper function (i.e., operation of sensors, lead-on lights, etc.). TCLs that lie beyond all uncontrolled stop bars are not part of a standard stop bar system and therefore need not be visually inspected.

2. A periodic visual inspection need not be conducted for lighting systems described in AC 120-57, subparagraph 8f(1)(a) that are electronically monitored, except when meteorological conditions may render them unserviceable (e.g., snow, blowing snow, sand, etc.). Those lighting systems that are not electronically monitored should be periodically inspected every 2 to 4 hours. The interval is normally based on taxiway complexity/configuration, number of low visibility routes, number of taxiways that provide access to active runways, etc.

b) For operations below RVR 600:

1. With the following exception, a visual inspection of stop bar lights, RGLs, clearance bar lights, TCLs, and taxiway edge lights installed on the low visibility routes or taxiways that intersect the low visibility runway(s) should be conducted by the airport operator prior to the commencement of operations below RVR 600. Exception: Unless meteorological conditions may render the lights unserviceable (e.g., snow, blowing snow, sand, etc.), the status of any of the aforementioned lighting systems that are electronically monitored may be determined from the lighting status indication on the monitor, provided that the monitor is capable of remotely detecting the unserviceability conditions described in subparagraph 4-246C8). An inspection conducted within 2 hours prior to commencement of operations below RVR 600 would be acceptable for this inspection. This visual inspection is conducted to ensure that the lighting systems are serviceable as described in subparagraph 4-246C8). Because controlled stop bars are checked for proper function at the initial visual inspection and because of continuous use by aircraft, reinspection of stop bars for functionality need not be performed. TCLs that lie beyond uncontrolled stop bars need not be visually inspected.

2. The serviceability of lighting systems described in subparagraph 4-246C7)b)1, except taxiway edge lights, which are electronically monitored with a system capable of remotely detecting the unserviceability conditions described in subparagraph 4-246C8), should be determined every 2 hours from the lighting status indication on the monitor. Lighting systems that are not electronically monitored with a system of the same capability should be periodically inspected every 2 hours to ensure that the lighting systems remain serviceable. The periodic inspection of controlled stop bars need not include a check for proper function. TCLs that lie beyond all uncontrolled stop bars need not be visually inspected.


a) Taxiway edge lights, TCLs, clearance bar lights, RGLs, and stop bar lights supporting low visibility operations that are not electronically monitored should be included in a system of preventive maintenance that has the following objectives:
1. Taxiway edge lights, taxiway edge reflectors, and TCLs along the low visibility taxi route: no two adjacent lights or reflectors unserviceable.

2. Stop bar lights or in-pavement RGLs: no more than three lights per location unserviceable, nor two adjacent lights unserviceable.

3. Elevated RGLs: no more than one light in a fixture unserviceable.

4. Clearance bar lights: no more than one light unserviceable.

b) When any of the lighting aids do not meet the maintenance objectives above:

1. Traffic should be rerouted to areas where the visual aids are operating normally;

2. Alternative procedures should be implemented to accommodate the operations; or

3. Low visibility operations should be terminated until the lighting aids are returned to normal service.

c) Lighting aids along the low visibility taxi route(s) that are inoperative should be repaired promptly with minimal disruption of service. If warranted, appropriate NOTAMs should be issued or canceled expeditiously.

9) Maintenance Criteria for Lighted Signs.

a) Mandatory instruction signs at entrances to the active low visibility runway(s) and location and direction signs along low visibility taxi routes where aircraft will be required to hold or turn should be inspected prior to implementation of LVO/SMGCS procedures, and every 2 to 4 hours thereafter while the LVO/SMGCS plan is in effect.

b) When any required sign is not illuminated, unserviceable, or missing, it should be repaired promptly with minimal disruption of service. If warranted, appropriate NOTAMs should be issued or canceled expeditiously, and:

1. Traffic should be rerouted to areas where the visual aids are operating normally;

2. Alternative procedures should be implemented to accommodate the operations; or

3. Low visibility operations should be terminated until the sign(s) are returned to normal service.
**D. SMSS.**

1) For operations below RVR 1200, an SMR, such as ASDE-III equivalent, or alternative technologies that allow ATC to establish the geographic position of all aircraft and vehicles may be used.

2) For operations below RVR 600, an SMR should be installed and operational. In the event that the SMR becomes inoperative during operations below RVR 600, operations may continue while utilizing approved geographic positioning procedures until operations below RVR 600 are terminated. The SMR must be operational before resuming operations below RVR 600.

**E. Airport Facilities and Services.**

1) **Assisting Aircraft Rescue and Fire Fighting (ARFF).** During reduced visibility conditions, the role of ATC in notifying and assisting ARFF services increases in significance. Procedures, systems, and/or techniques should be established and reviewed annually, in coordination with the airport operator, to ensure that aircraft requiring assistance can be located and ARFF services provided. For operations below RVR 600, the pre-positioning of ARFF equipment (so as not to create a new obstacle), installation of FLIR and GPS, or other approved alternative technology should be considered.

2) **Taxiway Configuration.** The Airport LVO/SMGCS Working Group should examine the airport for adequacy of fillets and landing gear and/or wingtip clearances along taxiways used in low visibility conditions.

   a) For operations below RVR 1200, it is recommended that inadequate taxiway fillets be upgraded to meet current standards. Those locations that are not upgraded should be depicted on appropriate LVO/SMGCS low visibility taxi route charts. The notation may be in the form of a symbol identifying specific turning points or a general note such as “judgmental oversteering required along the taxi route.”

   b) For operations below RVR 600, inadequate taxiway fillets and clearances at turning points or other locations along taxi routes used for operations below RVR 600 should be upgraded to meet the current standard.

3) **LVO/SMGCS Procedures.** LVO/SMGCS procedures should be developed for each LVO/SMGCS airport authorized for low visibility operations. The procedures should include a method of notifying key personnel of participating organizations that LVO/SMGCS procedures have been initiated or terminated by ATC. Copies of the approved LVO/SMGCS plan and any revisions should be provided to all parties involved.

   a) All vehicle operators should receive LVO/SMGCS training in areas such as airport lights, signs, and markings procedures to follow if lost in the aircraft movement area, and (if applicable) radio telephone procedures, including lost-communication procedures. The airport operator should review driver training programs to ensure that low visibility procedures are included and the training is documented. Vehicle operators supporting LVO/SMGCS operations should have a low visibility taxi route chart or equivalent available.

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b) Procedures for evaluating special situations such as construction activities, snow removal, and deicing procedures should be included in the LVO/SMGCS plan to determine any limitations that should be imposed on those vehicle activities when the LVO/SMGCS plan is implemented.

c) For operations below RVR 1200, describe the method of limiting vehicle access to aircraft movement areas. Vehicular traffic in the movement areas should be restricted to the essential minimum to support low visibility operations. The Airport LVO/SMGCS Working Group should review vehicle control and, if necessary, identify additional marking, lighting, restrictions, or other measures necessary to control vehicles in nonmovement areas.

d) For operations below RVR 600, the Airport LVO/SMGCS Working Group should ensure positive control of vehicles in situations where active roadways cross-designated taxi routes in movement areas. This may include such methods as barriers, gates, signs, markings, traffic lights, and road guards.

4) **Apron Traffic Management.** For operations below RVR 600, the LVO/SMGCS plan should include an apron traffic management plan for all nonmovement apron areas used by aircraft or vehicles. The apron traffic management plan should indicate the party(s) who will coordinate the traffic movement in the apron area. The apron management entity(s) must limit access to the apron area to ensure the safe movement of all aircraft and vehicles operating within the area. Roadways which cross taxilanes must be kept clear by positive control methods, such as radio communications, when aircraft are using the apron area.

5) **Taxiing Assistance in Nonmovement Areas.** For operations below RVR 600, where centerline lights are not installed, the LVO/SMGCS plan must contain provisions for taxiing assistance. Taxiing assistance may include such measures as follow-me vehicles or towing via a tug. The assistance should be provided by a method agreed upon by the Airport LVO/SMGCS Working Group. Ground marshalling may be used to assist aircraft from the intersection of the taxilane centerline and the gate lead-in line.

**F. Airport Condition Reporting.** The loss of minimums for low visibility landings or takeoffs can adversely affect aircraft operations, overall safety, and capacity. There are a number of critical components such as stop bar lights, centerline lights, etc., which, if they become inoperative, may have an immediate impact on availability of takeoff or landing operations. This especially affects operations below RVR 600. It is time critical that pilots and dispatchers be notified quickly of these outages and their effects on operations. This will enable timely and appropriate decisions to be made.

1) Due to its importance, such adverse impacts on operations should be quickly disseminated by the airport operator via means available (i.e., landline communications) to local station dispatchers and on ATIS in order to alert pilots of aircraft inbound to the airport.

2) The timely notification of inoperative components should be thoroughly covered in the LVO/SMGCS plan and with interested parties such as ATC, the airport operator, and local tenants.
3) Inoperative components affecting low visibility operations may be reported through the NOTAM system and/or the FAA Traffic Management System (TMS).

G. Flight Operations. The LVO/SMGCS plan should identify any aspects of the following list of items that are specific or unique to the airport, relative to low visibility operations. Aircraft operators should address these items in appropriate training programs for all flightcrew and ground support personnel who may be involved in aircraft or vehicle operations on the movement or nonmovement areas of the airport. Such training should also be documented. Training items include but are not limited to:

1) Apron (ramp) operations.
2) ILS critical areas, runway safety areas, and obstacle-free zones.
3) Stop bar lights.
4) RGLs.
5) TCLs, including ILS critical areas alternating green and yellow lights from RCL.
6) Clearance bar lights.
7) Runway lead-on and lead-off lights.
8) Geographic position markings.
9) Taxiway and runway hold position markings.
10) Movement/nonmovement boundary marking.
11) Other pavement markings such as surface painted signs.
12) Use of low visibility taxi route(s) chart(s).
13) Taxi procedures at turns requiring judgmental oversteering.

H. Airport Low Visibility Taxi Route(s) Chart(s).

1) A low visibility taxi route(s) chart(s) must be provided for use by the flightcrew, ATC personnel, ARFF personnel, ground support vehicle operators, and ground marshalling crews, if appropriate. The airport low visibility taxi route chart should be limited to one page, if possible, and is generated by the Airport LVO/SMGCS Working Group in coordination with regional ATO, FS, and Airports divisions. The taxi route chart is coordinated with the Flight Procedures and Airspace Group and concerned ATO personnel.

2) The chart(s) should provide at least the following information:
a) Designated low visibility taxi route(s) for operations below RVR 1200 down to and including RVR 600.

b) Designated low visibility taxi route(s) for operations below RVR 600, if applicable.

c) A legend depicting appropriate symbology and terminology.

d) Location of runways, taxiways, aprons, and concourses.

e) Location of RCLs and TCLs, including lead-on and lead-off lights.

f) Location of stop bar lights.

g) Location of geographic position markings.

h) Location of taxiway hold points.

i) Location of clearance bar lights.

j) Location of movement area boundaries.

k) Location of inadequate fillets on taxiway turns and the need for judgmental oversteering by pilots.

l) Location of deicing pads.

m) Location of ARFF stations.

n) Unique airport characteristics and/or procedures.

I. Sample LVO/SMGCS Plan. Figure 4-20, Sample Surface Movement Guidance and Control System Plan, contains a sample LVO/SMGCS plan. The airport depicted in this sample plan is fictitious. This plan describes only operations less than RVR 1200 down to and including RVR 600. When developing the LVO/SMGCS plan, Table 4-6, Quick Reference Guide—RVR 1200 to RVR 600 Requirements, and Table 4-7, Quick Reference Guide—Less-Than-RVR 600 Requirements, may be used. They contain quick reference guides relating the LVO/SMGCS requirements to the guidance in this section.
### Table 4-6. Quick Reference Guide—RVR 1200 to RVR 600 Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approved Low Visibility Operations/Surface Movement Guidance and Control System (LVO/SMGCS) plan developed in accordance with AC 120-57, Surface Movement Guidance and Control System.</td>
<td>4-241</td>
</tr>
<tr>
<td>Either taxiway edge lights or taxiway centerline lights (TCL) with raised edge reflectors on curves and turns.</td>
<td>4-246C1)a)</td>
</tr>
<tr>
<td>Taxiway edge lights at all difficult turns (not in compliance with design standards of AC 150/5300-13, Airport Design).</td>
<td>4-246C1)b)</td>
</tr>
<tr>
<td>No special nonmovement area requirements below Runway Visual Range (RVR) 1200 (however, TCLs are recommended).</td>
<td>4-246C2)a)</td>
</tr>
<tr>
<td>Runway guard lights (RGL) at runway holding position (in-pavement RGL required if taxiway is wider than 150 feet).</td>
<td>4-246C3)a) and b)</td>
</tr>
<tr>
<td>Taxi guidance signs at all intersections.</td>
<td>4-246C6)a)</td>
</tr>
<tr>
<td>Twelve-inch taxiway lines highlighted with black borders (light surfaces). (All paint markings of high quality—not worn.)</td>
<td>4-246C6)a)1</td>
</tr>
<tr>
<td>Holding position markings and geographic position (pink numbered circles and intermediate holding point markings). (Glass beaded or reflective paint.)</td>
<td>4-246C5)a)</td>
</tr>
<tr>
<td>Initial visual inspection of all LVO/SMGCS lighting prior to starting LVO/SMGCS operations.</td>
<td>4-246C7)a)1</td>
</tr>
<tr>
<td>Unmonitored lights periodic (2- through 4-hour inspections in LVO/SMGCS operations).</td>
<td>4-246C7)a)2</td>
</tr>
<tr>
<td>Surface Movement Surveillance System (SMSS) or alternative technologies that allow air traffic control (ATC) to establish the position of all aircraft and vehicles.</td>
<td>4-246D1)</td>
</tr>
</tbody>
</table>
### Table 4-7. Quick Reference Guide—Less-Than-RVR 600 Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>All of the Requirements for Operations below Runway Visual Range (RVR) 1200.</td>
<td></td>
</tr>
<tr>
<td>Taxiway centerline lights (TCL) supplemented on turns and curves with edge lights. TCLs continuous starting from runway centerline (RCL). (Non-LVO/SMGCS taxiway lights should be turned off.)</td>
<td>4-246C1(c)</td>
</tr>
<tr>
<td>Nonmovement area TCLs or follow-me or aircraft towing or ground marshalling.</td>
<td>4-246C2(b)</td>
</tr>
<tr>
<td>Stop bar lights at runway holding position unless instrument landing system (ILS) critical area is separated from runway holding position; stop bars are only at ILS critical area hold position, and runway guard lights (RGL) are at the runway hold position (elevated stop bars if bad weather radar obscures stop bars).</td>
<td>4-246C3(b)</td>
</tr>
<tr>
<td>Controlled stop bars at runway crossings, and runway entrances. (At approach ends, also in-pavement lead on lights linked with controlled stop bars.)</td>
<td>4-246C3(b)</td>
</tr>
<tr>
<td>All unlit taxiways are not available for taxi.</td>
<td>4-246C3(b)2</td>
</tr>
<tr>
<td>Must consider specific extra stop bar needs depending on airport set up.</td>
<td>4-246C3(b)2</td>
</tr>
<tr>
<td>Combination in-pavement stop bar/RGLs (dual red/yellow are at the option of the airport management except when stop bar has to be at the ILS critical area holding position.</td>
<td>4-246C4)</td>
</tr>
<tr>
<td>Clearance bar lights located at all taxiway geographic position markings (the pink numbered circles) (“spots”).</td>
<td>4-246C5(b)</td>
</tr>
<tr>
<td>Geographic position markings to be used in addition to holding position markings where location identification clarification is needed.</td>
<td>4-246C6(b)</td>
</tr>
<tr>
<td>Surface Movement Surveillance System (SMSS) and a procedure for SMSS failure below RVR 600.</td>
<td>4-246D2)</td>
</tr>
<tr>
<td>Prior to operations below RVR 600, inspect:</td>
<td>4-246C7(b)</td>
</tr>
<tr>
<td>1. Stop bar lights.</td>
<td></td>
</tr>
<tr>
<td>2. RGLs (Wig Wags)</td>
<td></td>
</tr>
<tr>
<td>OR monitoring with:</td>
<td></td>
</tr>
<tr>
<td>3. Clearance bar lights remote unserviceability.</td>
<td></td>
</tr>
<tr>
<td>4. TCLs’ capabilities.</td>
<td></td>
</tr>
<tr>
<td>5. Taxiway edge lights on LVO/SMGCS taxiways.</td>
<td></td>
</tr>
<tr>
<td>6. Inspection of lights or detection every 2 hours in &lt; RVR 600 operations.</td>
<td></td>
</tr>
<tr>
<td>Requirement</td>
<td>Reference</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Inoperative Components—when replacement required:</td>
<td>4-246C8) and 9)</td>
</tr>
<tr>
<td>1. Taxiway lights—two adjacent lights or reflectors.</td>
<td></td>
</tr>
<tr>
<td>2. Stop bar lights—more than three lights or two adjacent.</td>
<td></td>
</tr>
<tr>
<td>3. In-pavement RGL—more than three lights or two adjacent.</td>
<td></td>
</tr>
<tr>
<td>4. Elevated RGL—more than one light in a fixture.</td>
<td></td>
</tr>
<tr>
<td>5. Clearance bar lights—more than one light.</td>
<td></td>
</tr>
<tr>
<td>6. Taxiway sign—must be lighted.</td>
<td></td>
</tr>
<tr>
<td>7. During LVO/SMGCS, reroute traffic or stop operations until corrected.</td>
<td></td>
</tr>
</tbody>
</table>

### Figure 4-20. Sample Surface Movement Guidance and Control System Plan

Surface Movement Guidance and Control System Plan for ______ International Airport

February 29, 2008

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**1.0 INTRODUCTION**

1.1 This Low Visibility Operations/Surface Movement Guidance and Control System (LVO/SMGCS) plan describes enhancements, procedures and actions at _____ International Airport (__________________________) that are applicable to the airport operator, air traffic control (ATC), airlines, and other tenants of the airport during low visibility conditions.

1.2 These enhancements, procedures, and actions are in accordance with the guidance set out in FAA Advisory Circular (AC) 120-57, Surface Movement Guidance and Control System. An LVO/SMGCS plan is necessary for airports where scheduled air carriers conduct takeoff or landing operations in visibility conditions of less than Runway Visual Range (RVR) 1200.
1.3 The procedures contained in this plan were developed by the LVO/SMGCS Working Group, which consisted of representatives from: airport staff involved with airfield operations, lighting, Aircraft Rescue and Fire Fighting (ARFF), security/traffic control, and airport consultants; ATO (local and/or regional); FAA Airport District Office (ADO) or regional office; FAA Flight Standards (FS); FAA Airway Facilities Sector office; appropriate scheduled airlines; appropriate Airlines for America (A4A) representative; Air Line Pilots Association International (ALPA) or other appropriate pilot groups; appropriate cargo/package operators; military aviation tenants; appropriate operators under Title 14 of the Code of Federal Regulations (14 CFR) part 91; and service corporations. (Includes general aviation and corporate operators.)

1.4 This document does not supersede established policies, procedures, rules, or guidelines for airports, aircraft or vehicle operators, or ATC. It does prescribe certain airfield lighting and marking improvements and operating procedures that have been designed to enhance the safety and efficiency of aircraft and vehicle movements.

1.5 To enhance the safety of low visibility operations, part 91 operators should follow the guidance in this plan to the maximum extent possible and expect follow-me assistance to and from the runway environment.

1.6 This plan addresses both current and future enhancements to support low visibility takeoff, landing, and taxiing operations at the airport. The work of the Airport LVO/SMGCS Working Group will continue after the initial plan is approved by the FAA. The Airport LVO/SMGCS Working Group should meet as necessary, but not less than once a year to assess low visibility operations, and to modify the plan as necessary.

2.0 DEFINITIONS

2.1 Airfield. That portion of the airport intended to be used wholly or in part for the arrival, departure, and movement of aircraft.

2.2 Airport Apron Controller. The term “airport apron controller” refers to personnel from the airlines and “airport operations” providing joint control of the concourse nonmovement area.

2.3 Airport Operations. The term “airport operations” refers to personnel assigned from the airport operations department who are responsible for the overall management of the airfield. This may include airport security, technical services, apron control, air cargo area, airport operations and safety, and other activities specified in 14 CFR part 139.

2.4 Apron (Ramp). A defined area on an airport intended to accommodate aircraft for purposes of loading or unloading passengers or cargo, refueling, parking, and maintenance. The apron area includes the following components:
(1) Aircraft Parking Positions. Intended for parking aircraft to enplane/deplane passengers, load or unload cargo.

(2) Aircraft Service Areas. On or adjacent to an aircraft parking position. Intended for use by personnel/equipment for the servicing of aircraft and staging of equipment to facilitate loading and unloading of aircraft.

(3) Taxilanes. Apron areas that provide taxiing aircraft access to and from parking positions.

(4) Vehicle Roadways. Identified rights-of-way on the apron area designated for service and ARFF vehicles.

2.5 Clearance Bar. A clearance bar consists of three in-pavement, steady-burning yellow lights.

2.6 Controlling Region. Refers to the FAA geographic region in which an airport is located.

2.7 Geographic Position Marking. Pavement markings used to identify the location of aircraft or vehicles during low visibility conditions. They are referred to as “spots” by ATC.

2.8 Low Visibility Operations. The movement of aircraft or vehicles on the airport paved surfaces when visibility conditions are reported to be less than RVR 1200.

2.9 Movement Area. Refers to the runways, taxiways, and other areas of an airport that are used for taxiing or hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps, and aircraft parking areas.

2.10 Nonmovement Area. Refers to taxiways and apron areas that are not under ATC.

2.11 Runway Guard Lights (RGL) (Elevated). Fixture consists of a pair of elevated flashing yellow lights, installed on both sides of a taxiway, at the runway hold position marking. Their function is to confirm the presence of an active runway and assist in preventing runway incursions.

2.12 Runway Guard Lights (RGL) (In-Pavement). Fixtures consists of a row of in-pavement, flashing yellow lights installed across the entire taxiway at the runway hold position marking. Their function is to confirm the presence of an active runway and assist in preventing runway incursions.

2.13 Stop Bar. Stop bar lights consist of elevated and in-pavement red fixtures that are installed at the runway holding position or ILS critical area holding position marking. Stop bars may be controllable by ATC and will include a system of in-pavement green taxiway centerline lights (TCL)/lead-on lights at locations where aircraft will enter or cross a runway.

2.14 Low Visibility Operations/Surface Movement Guidance and Control System (LVO/SMGCS). An LVO/SMGCS consists of the provision of guidance to, and control or regulation of, all aircraft, ground vehicles, and personnel on the movement area of an
aerodrome. Guidance relates to facilities, information, and advice necessary to enable the pilots of aircraft, or the drivers of ground vehicles, to find their way on the aerodrome and to keep the aircraft or vehicles on the surfaces or within the areas intended for their use. Control or regulation means the measures necessary to prevent collisions and to ensure that the traffic flows smooth and freely.

2.15 Surface Painted Holding Position Sign. Pavement marking which is used to identify a specific runway. These markings are configured the same as the associated sign.

2.16 Surface Painted Direction Sign. Pavement markings that are configured the same as the associated sign and provided when it is not possible to provide taxiway direction signs at intersections.

2.17 Surface Painted Location Sign. Pavement markings that are configured the same as the associated sign, that are used to supplement the signs located alongside the taxiway, and that assist the pilot in confirming the designation of the taxiway on which the aircraft is located. (Refer to AC 150/5340-1, Standards for Airport Markings.)

2.18 Taxi Route. A specific sequence of lighted taxiways used by aircraft during low visibility operations.

### 3.0 FACILITIES, SERVICES, AND EQUIPMENT

3.1 Runways. The airport has two north–south parallel runways that are used, individually or in combination, for both takeoffs and landings in a northerly flow direction for this plan. Runway 35L and Runway 35R are useable for takeoffs and landings down to RVR 600. Each of these runways are 12,000 feet long and are served by Category (CAT) III instrument landing systems (ILS); touchdown, midpoint, and rollout RVR equipment; runway instrument markings; Approach Lighting System with Sequenced Flashing Lights (ALSF)-2; touchdown zone (TDZ) and centerline lighting; and high-intensity edge lighting.

3.2 Taxiway Lighting. Continuous green TCLs and blue taxiway edge lights are installed on all taxiways leading to and from the low visibility runways. Continuous green TCLs are installed on all apron taxiways. Taxi routes and taxi procedures are described in paragraph 6, Air Traffic Control Procedures.

3.3 Runway Guard Lights (RGL). Elevated RGLs are located at all runway access points and may be illuminated at all times to prevent runway incursions.

3.4 Stop Bars. Lighted stop bars are installed at all runway access points. During low visibility operations, the stop bars, located on the first two taxiways that are used as runway entrances for departure aircraft on Runway 35L and Runway 35R, are controlled by ATC.

3.5 Taxiway Clearance Bars. Taxiway clearance bars are located at various locations throughout the airport. These clearance bars occur at the edges of runway protection zones where aircraft tail heights or vehicles might penetrate runway operational surfaces, and where taxiway-to-taxiway intersections warrant additional caution. Clearance bars are illuminated
whenever the TCLs are illuminated. Aircraft are not required to hold at a taxiway clearance bar unless directed to do so by ATC.

3.6 Taxiway Guidance Signing and Marking Inspections. Taxiway guidance signing and marking are inspected routinely as part of the airport operations’ airfield inspection program. Electronic monitoring is provided for all signs and lights associated with low visibility taxi routes. This monitoring alerts ATC whenever threshold outage levels are exceeded. Airport maintenance is also notified by an alarm and will take corrective action.

3.7 Nonmovement Area Control. Control of the nonmovement area between and around the concourses is administered by the airlines and/or the airport operations department. Other nonmovement areas are controlled by the tenants of those respective areas. Appropriate movement/nonmovement area markings are installed on apron edges.

3.8 Surface Movement Surveillance. The airport has airport surface detection equipment (ASDE)-III. FAA utilizes this equipment to monitor the geographical position of aircraft and vehicles during reduced visibility conditions and at night.

3.9 Follow-Me Service. The airport operations department will provide follow-me service for air carrier aircraft upon request, subject to availability of equipment and the need to accomplish higher priority duties. To enhance safe operations in low visibility conditions, part 91 operators should expect follow-me services to and from the runway environment. The airport operations follow-me vehicle is identified by yellow flashing emergency lights. A follow-me request may be initiated by the pilot, ATC, or the airport apron controller.

3.10 Aircraft Docking. The airline assumes control of the aircraft in the vicinity of the gate, as directed by the airport apron controller, and provides aircraft docking by the use of wing walkers, follow-me vehicles, tugs, or other appropriate means as set out in the airline’s operations manual.

4.0 AIRCRAFT RESCUE AND FIRE FIGHTING (ARFF)

4.1 ARFF Coverage. Each of the ARFF stations provide primary coverage during low visibility operations, depending on runway use configuration. ARFF Station #1 is located at the intersection of Taxiway AA and Taxiway G and provides primary coverage to the west airfield. ARFF Station #2 is located adjacent to Runway 17R on Taxiway CS and provides primary coverage to the east airfield. Equipment and personnel will remain on alert status at these stations when low visibility operations are in progress.

4.2 ARFF Coordination. Coordination between ATC and ARFF is accomplished annually to ensure effectiveness of ARFF services. This coordination is accomplished as part of the annual airport emergency plan review required by part 139.
5.0 VEHICLE CONTROL

5.1 Vehicle Access. Vehicle access to the airport is controlled by a system of perimeter fencing and gates. All airport and tenant vehicles entering the Airport Operations Area (AOA) are identified by a mandatory apron access permit displayed on the windshield of the vehicles, which is obtained from the airport operations department and enforced by airport security. Vendors and contractor vehicles are also identified through the apron permit system or are escorted by authorized personnel. Airport security shall ensure that all vehicles operating on the AOA are properly marked and lighted. During low visibility conditions, vehicles requiring access from outside the restricted security area must be cleared by airport operations through a security gate before entrance is gained to the AOA.

5.2 Vehicle Service Roads. Except for the necessary movement in leased areas, vehicles must be operated within the clearly marked system of vehicle service roads. These service roads are identified by solid white edge lines with a dashed white line used as a centerline divider. Where a service road intersects a taxiway, a solid white stop line is provided across the vehicle lane at a point that assures adequate clearance from taxiing aircraft. Standard stop and yield signs are installed in line with the stop line (on the right side of the road) at each service road entrance onto a taxiway. Dashed white lines may be provided across certain taxiways where driver reference is needed, because of the width of the intersecting taxiway and the possibility of the driver becoming lost in low visibility conditions.

5.3 Driver Training. Vehicles driven on the AOA during low visibility conditions will only be operated by drivers who have completed LVO/SMGCS driver training. All personnel authorized to drive on the airfield in movement or nonmovement areas are provided driver training by the airport operations department. Exception: Qualified tenants may provide training to their employees under the supervision of the airport operations department. Construction crews and other temporary access personnel are provided individual instruction by airport operations. All airport and tenant driver training courses use video training aids, which include LVO/SMGCS lighting, signing, marking, and procedures, and include written tests. Drivers are instructed to pay particular attention to striped and dashed yellow lines used in combination with one another; i.e., a single stripe and single dash, or two stripes and two dashes. These markings denote runway holding positions or the movement/nonmovement area boundary and must not be crossed without authorization from ATC. The driver training programs are reviewed annually by airport operations to ensure that they are current.

5.4 Access Restrictions. Only vehicles operated by the airport or by FAA Airway Facility maintenance personnel are allowed on the airport movement area. All other access to the movement area will be coordinated and approved by airport operations. In low visibility conditions, no vehicles are permitted in the movement area that are not in direct support of the LVO/SMGCS plan.
6.0 AIR TRAFFIC CONTROL PROCEDURES

6.1 Background and Operating Concept. The LVO/SMGCS plan provides guidance and control of aircraft between various apron locations and the runways in a safe and efficient manner during low visibility conditions. The coordinated efforts of ATC and airport operations are all focused on assuring safe movement and avoiding inadvertent or unauthorized entry onto the movement area during low visibility conditions. When one portion of the airport is in a low visibility condition (i.e., visibility less than RVR 1200), the entire airport is considered to be in low visibility conditions and LVO/SMGCS procedures and restrictions are placed in effect. The concept for accomplishing these objectives is to only use the north–south runways in a northerly flow direction only. The principal arrival runway is Runway 35R, while Runway 35L is predominately used for departures. In certain instances, both runways may be used for arriving and departing aircraft.

6.2 Visibility Reporting. ATC will coordinate with airport operations when lowering ceiling and visibility conditions indicate that visibility less than RVR 1200 is imminent and LVO/SMGCS procedures are going into effect. Airport operations will in turn advise the airlines, service companies, other airport tenants, and air cargo operators by telephone. Individual airlines will notify service companies or vendors, which are not notified by airport operations, that the LVO/SMGCS plan is in effect. These procedures are terminated by ATC when no longer deemed necessary due to prevailing weather conditions. ATC will also advise airport operations when the LVO/SMGCS plan is no longer required, and airport operations will advise the airport tenants and other organizations noted above that the LVO/SMGCS plan is no longer in effect. The airlines will make appropriate notifications when the LVO/SMGCS plan has been terminated.

6.3 Departures. Each airline or aircraft operator is responsible for positioning aircraft at the movement area boundary. This may be accomplished with a tug, signalman, follow-me vehicle, or other appropriate means, including unassisted taxi, if visibility on the apron permits. When established at the movement area boundary, the aircraft will contact ATC ground control for taxi instructions. ATC may provide RVR readings to pilots prior to taxiing in the movement area. When visibility is less than RVR 1200, down to and including RVR 1200, all taxiway lighting may be illuminated. Taxiway edge lights, without centerline lighting, may be illuminated at various times for snow removal or other operational reasons. The FAA ground controller may use ASDE or pilot position reports to monitor the aircraft position prior to its entry into the movement area. The controller will then provide taxi instructions and traffic advisories appropriate to the route. The north–south parallel taxiways in the movement area are operated in opposing directions, with Taxiways G and L used as the primary departures taxiways to Runways 35L and 35R, respectively.

6.4 Departure Routings. Aircraft routings for departure will vary depending on the initial location of the aircraft and whether deicing is required prior to departure. Aircraft must have ATC clearance prior to entering Taxiway G, Taxiway L, or Taxiway M.

(1) Runway 35L Departures.
a. Aircraft departing on Runway 35L from the concourse apron proceed west on the lighted apron taxiways to Taxiway G, and continue north on Taxiway G to Taxiway CN. Aircraft proceed west on Taxiway CN and continue west onto Taxiway F1 to reach Runway 35L. ATC may require aircraft taxiing on Taxiway G to hold at the intersection of Taxiway CN. If deicing is required from a concourse deicing pad prior to departure, aircraft will proceed west on the apron taxiway to Taxiway H and turn north or south on Taxiway H to the assigned deicing pad. Upon completion of deicing, the aircraft must contact ATC for clearance to proceed onto Taxiway G.

b. Aircraft departing on Runway 35L from the south air cargo apron proceed east on the cargo Taxiway SC to Taxiway SA, and south on Taxiway SA to Taxiway A. Aircraft then proceed east on Taxiway A to the Runway 35R holding position movement area boundary marking, where contact is established with ATC. Aircraft continue east on Taxiway A to Taxiway M, north on Taxiway M to Taxiway CN, west on Taxiway CN, then onto Taxiway F1 to reach Runway 35L. ATC may require periodic position reports along the taxi route to confirm or supplement ASDE-III information. If deicing is required prior to departure, aircraft proceed east on Taxiway SC to Taxiway SA, south on Taxiway SA to Taxiway A, then east on Taxiway A to the south deicing pad. Upon completion of deicing, aircraft exit the pad at the intersection with Taxiway M and proceed as described in subparagraph 6.4(1)a. Should the aircraft require secondary deicing from a concourse deicing pad prior to departure, the pilot should advise ATC and request clearance to the concourse deicing pad area. Coordination between aircraft on the south air cargo apron and ATC is required to insure that conflicting (i.e., opposite direction traffic flows) do not occur on Taxiway M. Aircraft on the south cargo area should advise ATC prior to taxi.

c. Aircraft departing on Runway 35L from the general aviation area proceed north on Taxiway M to Taxiway CN, west on Taxiway CN onto Taxiway F1 to reach Runway 35L. Departures must contact ATC for taxi clearance before leaving the general aviation ramp. ATC may require aircraft to hold on the ramp prior to entering Taxiway M, when exiting on Taxiway M, or when reporting clear of the Runway 35R approach area located between Taxiway M5 and Taxiway M6. If deicing is required prior to departure, the pilot should request ATC clearance to the concourse apron deicing area.

(2) Runway 35R Departures.

a. Aircraft departing on Runway 35R from the concourse apron proceed east on lighted apron taxiways to the Taxiway L holding position (movement area boundary) marking. Prior to entering the movement area, the aircraft should contact ATC for taxi instructions. Aircraft will proceed southbound on Taxiway L. ATC may require aircraft taxiing on Taxiway L to hold at apron taxiway intersections for sequencing. Aircraft will continue south on Taxiway L to its intersection with Taxiway AA, east on Taxiway AA to Taxiway M, and then south on Taxiway M to Taxiway A, continuing east on Taxiway A to reach Runway 35R. If deicing is required at the south deicing pad, the aircraft proceeds south on Taxiway M to Taxiway SC, then west on Taxiway SC, south on Taxiway SA, and east on Taxiway A into the south deicing pad. Upon completion of deicing, ATC clearance is required prior to reentering the movement area at Taxiway M. Aircraft exit the deicing pad on Taxiway M, proceed north
on Taxiway M to its intersection with Taxiway A, and turn eastbound on Taxiway A, continuing east on Taxiway A to reach Runway 35R.

b. Aircraft departing on Runway 35R from the south air cargo apron proceed east on taxiway SC to Taxiway SA, and south on Taxiway SA to Taxiway A. Aircraft then proceed eastbound on Taxiway A to the Taxiway M holding position (movement area boundary) marking where contact is established with ATC. Aircraft continue east on Taxiway A to reach Runway 35R. If deicing is required prior to departure, aircraft will follow the same routing on Taxiway A into the south deicing pad. Upon completion of deicing, aircraft exit the deicing pad and immediately contact ATC prior to entering Taxiway M for clearance on Taxiway A to Runway 35R.

c. Aircraft departing on Runway 35R from the general aviation area proceed south on Taxiway M and follow the same routing as described in paragraph 6.4(2)a. Departures must contact ATC for taxi clearance before leaving the general aviation ramp. ATC may require aircraft to hold on the ramp prior to entering Taxiway M. If deicing is required prior to departure, aircraft will follow the same routing on Taxiway M into and out of the south deicing pad as described in paragraph 6.4(2)a.

d. When departure and arrival operations are conducted on Runway 35R, Taxiway CN is used in a westbound direction favoring arrivals. Departures going to Runway 35R from the north side of Concourse C proceed west on Taxiway CN to Taxiway H, south on Taxiway H to the apron taxiway designated by ATC for transition east to Taxiway L, and then south on Taxiway L as described in paragraph 6.4(2)a.

6.5 Arrivals. Landings may be conducted on Runway 35L or Runway 35R. The apron taxiways are operated in an alternating east and west flow pattern to minimize taxi time to the gate. Taxiways F and M are used as the primary arrival taxiways. When visibility is less than RVR 1200, down to and including RVR 600, all taxiway lighting may be illuminated. Taxiway edge lights without centerline lighting may be illuminated at various times for snow removal or other operational reasons. At various times, ATC may ask arriving aircraft to report “clear” of the runway or ILS-critical area.

6.6 Arrival Routings. Aircraft arrival routings vary depending on the particular runway used for arrival, the airfield-operating configuration and the destination of the aircraft on the airport.

(1) Runway 35R Arrivals.

a. Aircraft arriving on Runway 35R will use mid-field Taxiways M6 or M7 to exit the runway, or continue to roll out to the end of the runway (Taxiway M10). Upon exiting the runway, aircraft will use Taxiway M to go north to the assigned apron taxiway to access the concourse apron, or to access Taxiway L to go south to the general aviation area or the south cargo area. ATC may require aircraft taxiing south on Taxiway L to hold at apron taxiway intersections. Aircraft exiting at the end (Taxiway M10) and going to the general aviation area or the south cargo area, will continue south on Taxiway L to Taxiway AA, proceed east on Taxiway AA to Taxiway M and southbound on Taxiway M. ATC may require aircraft taxiing on Taxiway L to hold at apron taxiway intersections. Aircraft accessing the south cargo area
will use cargo Taxiway SC west from the intersection with Taxiway M. ATC may require aircraft taxiing west on Taxiway SC to report “clear” of Taxiway L. Upon receipt of an appropriate ATC clearance, aircraft exiting on Taxiways M6 and M7 may immediately turn south on Taxiway M to access the south air cargo apron or general aviation area. The taxiway routing from Taxiways M6 and M7 south to the south air cargo apron or general aviation area is as described above.

(2) Runway 35L Arrivals.

a. Aircraft arriving on Runway 35L will use mid-field Taxiway F9 to exit the runway, or continue to roll out to the end of the runway (Taxiway F12). Upon exiting the runway, aircraft will use Taxiway F to go south to Taxiway Z. Aircraft proceed east on Taxiway Z to Taxiway L. Access to the concourse apron, general aviation, and south cargo area on Taxiways L and M is conducted as described above. ATC may require aircraft taxiing southbound on Taxiway L to hold at intersecting apron taxiways.

6.7 Mixed operations. Effective air traffic management (ATM) coordination is essential when departures are conducted on Runway 35R in mixed operations. ATC should ensure that arrivals and departures originating and terminating in the south cargo area are managed to prevent congestion (i.e., “nose-to-nose operation”) on Taxiway M. All aircraft departing the south cargo area should contact ATC prior to entering the movement area on Taxiways A or SC. When mixed operations are being conducted on Runway 35L, aircraft arriving or departing Runway 35L will use the routings as described above.

7.0 AIRLINE PROCEDURES DURING LOW VISIBILITY CONDITIONS

7.1 General. Pilots conducting low visibility operations at ____ are required to have a copy of the low visibility taxi route chart. Low visibility taxi routes are depicted on the appropriate National Ocean Service (NOS) and Jeppesen charts. The airport apron controller will resolve aircraft and vehicle movement conflicts in the nonmovement area. This will be accomplished through the use of two-way radio communication, ground movement control procedures, follow-me vehicles, and ground marshalling. ATC will monitor and control aircraft in the movement area.

7.2 Departures. Departing aircraft will follow company procedures for pushback, engine start, and initial taxi to the movement area boundary at the apron taxiway holding position. If appropriate, the pilot should request from the ground-handling agency taxiing assistance such as signalman and wing walkers, follow-me service, or towing to the apron taxiway holding position. In all cases, aircraft must have ATC clearance prior to entering the movement area.

7.3 Arrivals. Arriving aircraft will follow company procedures for taxi to the gate on the apron concourse or to other parking areas as appropriate. The airline assumes control of the aircraft in the vicinity of the gate and provides aircraft docking by the use of signalman and wing walkers, follow-me service, towing or other appropriate means as set out in the airline’s operating instructions.
7.4 Taxi Routing. The principal taxi flow direction on the parallel taxiways between concourses in the concourse apron area is from east to west. This direction is established on the basis that Runway 35R is predominately an arrival runway in low visibility conditions while Runway 35L is predominately used for departures. The westbound flow provides for arrivals on the east airfield to flow into the concourses to the aircraft parking position and out the other side to the west airfield for departure. When Runway 35L is used for mixed operations or as an arrivals-only runway, aircraft are routed east on Taxiway Z to the east north–south taxiway complex and enter the concourse apron area from the east, thereby retaining the westbound direction of flow between adjacent concourses. During the limited periods when Runway 35R is used for departures, an adjustment is made to the westbound flow direction so that all aircraft exiting the concourse apron area can more readily access Runway 35R for departure. The southern taxiway of the two taxiways between parallel concourses is routed in an eastbound direction. This routing effects the flow direction of Taxiway AA, Taxiway AN, and Taxiway BN, which are used to access Taxiway L. All other taxiways in the concourse apron area maintain the westbound flow direction.

8.0 RESPONSIBILITIES

8.1 Airport Operator.

(1) Serve as the point of contact (POC) for the LVO/SMGCS plan, hold meetings of the Airport LVO/SMGCS Working Group, and maintain documentation of proceedings.

(2) Coordinate a review of the LVO/SMGCS plan and airfield activities on at least an annual basis, and amend, publish, and distribute the initial and revised LVO/SMGCS plan.

(3) Monitor adherence to the sections of the LVO/SMGCS plan that are under the airport’s control and take action to correct deficiencies.

(4) Conduct inspections, report failures, and provide maintenance of lighting aids associated with the LVO/SMGCS plan.

8.2 Air Traffic Control Tower (ATCT).

(1) Initiate and terminate the LVO/SMGCS procedures specified in paragraph 6, Air Traffic Control Procedures.

(2) Coordinate with the airport operations department prior to implementing the LVO/SMGCS plan.

(3) Provide directional assistance to ARFF units and other emergency equipment responding during an emergency in low visibility conditions.

(4) Monitor and control aircraft and vehicles in the movement areas.
(5) Develop and coordinate the low visibility taxi route(s) chart(s) with the regional Air Traffic Organization (ATO) division and the Flight Technologies and Procedures Division and Aeronautical Information Services (AJV).

8.3 Airport Tenants.

(1) Participate in the Airport LVO/SMGCS Working Group and disseminate low visibility procedures to company employees.

(2) Train personnel in low visibility procedures.

(3) Enforce LVO/SMGCS plan driving procedures and, if authorized, conduct driver training.

(4) Assure adherence to the sections of the LVO/SMGCS plan that are under airport tenant control, and take action to correct deficiencies.

8.4 Military Tenants.

(1) If required, request follow-me service from airport operations when the LVO/SMGCS plan has been implemented.

9.0 PLANS AND MILESTONES

9.1 Near-Term.

(1) Install RGLs at all runway/taxiway intersections.

(2) Ensure complete training of all personnel involved with the LVO/SMGCS plan.

(3) Coordinate and publish a low visibility taxi route chart.

9.2 Long-Term. Consider the application of new ARFF technology and snow removal equipment to operate in low visibility conditions.

10.0 REVISION PAGE CONTROL CHART

Remove Pages Dated/Insert Pages Dated

11.0 DISTRIBUTION LIST

Name/Address/Organization/Phone/Fax

RESERVED. Paragraphs 4-247 through 4-266.