



U.S. Department
of Transportation

Federal Aviation
Administration

Advisory Circular

Subject: BUILDINGS FOR STORAGE AND
MAINTENANCE OF AIRPORT SNOW AND ICE
CONTROL EQUIPMENT AND MATERIALS

Date: September 14, 2007

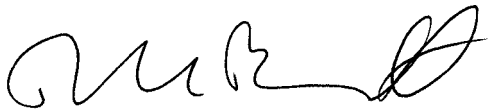
AC No: 150/5220-18A

Initiated by: AAS-100

Change:

1. **PURPOSE.** This advisory circular (AC) provides guidance for the site selection and design of buildings used to store and maintain airport snow and ice control equipment, store approved materials, and provide personnel areas required to support the requirements under the airport operator's winter storm management plan.
2. **CANCELLATION.** AC 150/5220-18, *Buildings for Storage and Maintenance of Airport Snow and Ice Control Equipment and Materials*, dated October 15, 1992, is cancelled.
3. **APPLICATION.** The Federal Aviation Administration (FAA) recommends the guidelines and standards in this AC for the design of airport snow and ice control equipment and materials storage buildings at public-used airports. This AC does not constitute a regulation and in general is not mandatory. However, use of these guidelines is mandatory for aircraft deicing facilities funded under Federal grant assistance programs. Mandatory terms such as "must" used herein apply only to those who establish aircraft deicing facilities using Airport Improvement Program (AIP) or Passenger Facility Charge Program (PFC) funds.
4. **PRINCIPAL CHANGES.** The following principal changes are incorporated:
 - a. Expanded the definition of "building" to include those personnel areas necessary to support the requirements under an airport operator's winter storm management plan. For airport operators certificated under Title 14 Code of Federal Regulations, part 139, *Certification of Airports*, the written plan is referred to as the *Snow and Ice Control Plan* (see 14 CFR section 139.313, *Snow and Ice Control*).
 - b. Added a new definition of airport size classification according to the total paved runway area at the airport, which in turn determines the sizing of the building.
 - c. Provided more guidance about determining the total space allocation of buildings according to a methodology that uses three defined areas: Storage Areas, Support Areas, and Special Equipment Areas.
 - d. Added the concept of an Equipment Safety Zone (ESZ) surrounding equipment to account for the vast variability of widths and lengths available with today's snow and ice control equipment.
 - e. Deleted "combined facilities" paragraph for joint use with aircraft rescue and fire fighting service.
 - f. Updated guidance, via tables of square footages, for Storage Areas, Support Areas, and Special Equipment Areas.

- g.** Added an overhead crane requirement (Table 3-4).
- h.** Updated typical building layout configurations (Figures 3-1, 3-2, and 3-3).

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Director of Airport Safety and Standards

CHAPTER 1. INTRODUCTION

1-1. BACKGROUND. Airport operators use costly pieces of complex and technologically advanced equipment for the control of snow, slush, and ice on the Nation's airports. To protect and service this expensive investment, specifically designed maintenance buildings with adequate storage areas are needed.

a. These buildings, in addition to providing a protective environment for equipment, are designed for the storage of supportive materials, such as de/anti-icing materials and sand, and for equipment parts inventories.

b. Airport operators frequently find it advantageous to include additional space within such buildings to store non-winter type equipment, such as airfield lighting equipment, grass cutting equipment, rubber removal devices, or bird patrol vehicles. The additional space is not necessarily eligible for Federal assistance under the Airport Improvement Program and the Passenger Facility Charge Program.

c. These buildings are to be located on an airport to provide easy responses by snow clearing crews to control snow, slush, and ice conditions, as well as a convenient location for repairing, servicing, and fueling equipment.

d. All buildings should be designed by an architect and/or engineer that is familiar with the airport operational needs to ensure efficient winter clearing operations and equipment repairs and service.

1-2. EXPLANATION OF TERMS.

a. Airport Size. The term refers to a classification of airports according to the total paved runway area *identified* by the airport operator's winter storm management plan that will be cleared of snow, ice, and/or slush. This definition takes into account the practice where an airport operator closes a smaller runway, such as a GA runway, to *focus its equipment fleet on the identified runway(s)*. In other words, airport size relates only to opened runways. The total paved area in turn determines the sizing of the building. The values provided below exclude paved taxiways and aprons/gate areas. *Note: Landside operation areas do not contribute to the airport size definitions listed below.*

(1) Small Airport. Airport having less than 420,000 square feet (39,040 m²) of total paved runway.

(2) Medium Airport. Airport having at least 420,000 but less than 700,000 square feet (39,040 – 65,060 m²) of total paved runway.

(3) Large Airport. Airport having at least 700,000 but less than 1,000,000 square feet (65,060 – 92950 m²) of total paved runway.

(4) Very Large Airport. Airport having at least 1,000,000 square feet (92,950 m²) of total paved runway.

b. Building. The term refers to the structure(s) designed and constructed specifically for the storage and maintenance of snow and ice control equipment, approved materials, and

personnel areas that support the requirements under the airport operator's winter storm management plan.

c. Building Space. The term refers to the total building space allocation, which consists of three defined areas as follows:

(1) Storage Area. The term refers to designated areas leading to and including the parking areas for snow removal and friction measuring equipment and for storing snow and ice control materials (e.g., de/anti-icers and heated sand) and equipment parts (e.g., bristles, neoprene blades, and brushes). Some of these items, such as chemicals and sand, could be stored in separate buildings.

(2) Support Areas. The term refers to administrative and equipment maintenance areas. Administrative areas include a supervisor's office, a mechanic's/clerk's office, separate or joint-use training/lunch room, lockers, and lavatories. Equipment maintenance areas include repair bays, steam cleaning bays, and a welding area.

(3) Special Equipment Areas. The term refers to rooms or areas for heating, ventilation, and air conditioning (HVAC) equipment, steam generation, emergency power, and air compressor equipment as well as the machine room(s).

d. Equipment. The term refers to all devices used by airport operators to control and remove snow and ice from aircraft operational areas. Equipment includes displacement and rotary snowplows, sweepers/brooms, material and chemical spreaders, carrier vehicles, multipurpose vehicles, friction measuring equipment, and accessory equipment (e.g., front end loaders, scrapers, and hitches).

e. Landside. The term refers to pavement areas located away from the airfield, that is, non-aircraft operational areas.

f. Materials. The term refers to all approved materials used by airport operators to control and remove snow and ice from aircraft operational areas. It includes solid and liquid de/anti-icers and sand to enhance the frictional characteristics of pavements.

g. Snow and Ice Control Plan. A plan required under 14 CFR section 139.313, *Snow and Ice Control*, that is written by the airport operators at airports where snow and ice conditions exist. AC 150/5200-30, *Airport Winter Safety and Operations*, and AC 150/5210-22, *Airport Certification Manual*, provide information about the development of such plans.

1-3. PLANNING FACTORS. Although the information contained in this AC is recommended for civil airports, not all of its content may be appropriate for the airport because of airport's size (such as general aviation airports), characteristics, site location, joint use, and other conditions or limitations. Conditions and requirements at each airport, in particular the *severity of storm events* encountered by the airport, are usually unique and must be clearly understood before building dimensions and interior space allocations are determined. The FAA encourages airports lacking an engineering department to use a consulting firm when determining appropriate layouts and size of various building components.

CHAPTER 2. BUILDING SITING REQUIREMENTS

2-1. LOCATION.

a. **Siting Factors.** The location of the building must address, at a minimum, the following safety details.

(1) The building must be sited in such a manner that activities associated with the facility—in particular, egress/ingress by snow clearing crews, employees, and deliveries—do not interfere with fire lanes used by the airport rescue and fire fighting (ARFF) service or hamper aircraft taxiing operations.

(2) In order to reduce wear and tear of equipment and slow responses, the site must provide snow clearing crews with direct access to taxiways and runways instead of using perimeter roads or circuitous routes to reach runways and taxiways. Figure 2-1 suggests several preferred sites.

(3) The site must emphasize the mitigation of runway incursions by eliminating the need for employee, private and service vehicles to cross runways or taxiways to reach the building.

(4) The site must take into consideration its affect on other existing facilities, such as cargo facilities and fueling areas. When the operating efficiency of the snow crews is not impaired, the building location should avoid existing and future revenue-producing areas, such as ramps and hangar areas.

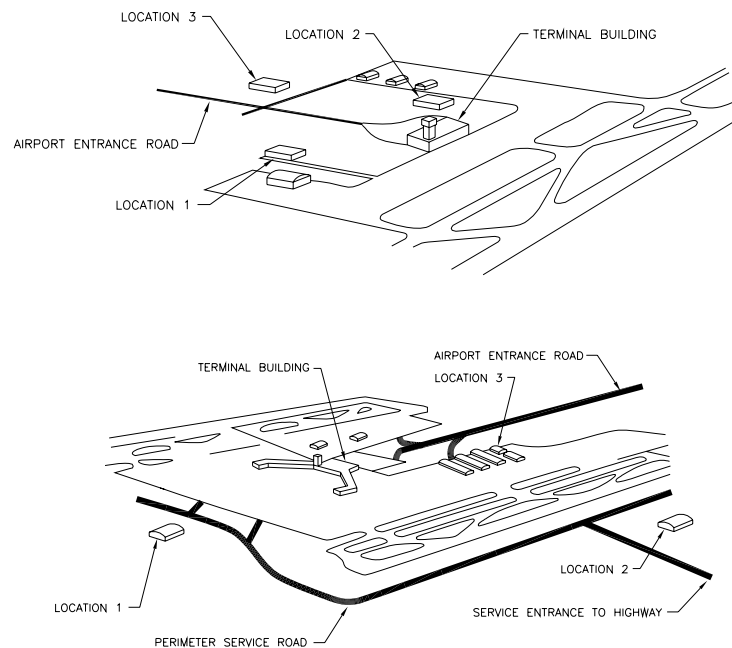


Figure 2-1. Building Locations for Storage and Maintenance of Airport Snow and Ice Control Equipment

b. Expansion Capabilities – Land Tract and Building. The land tract designated for the building should be large enough to accommodate future building expansions and employee parking. Furthermore, the design of the building should anticipate a 10- to 15-percent future growth with respect to personnel space and snow equipment parking. For example, an increase to the total airfield paved area may result in more snow equipment or larger pieces of equipment. In turn, the airport operator may deem it necessary to add more or enlarge equipment parking slots, convert a common eating/training room into two separate rooms, add new offices for operational managers and administrative functions, or add or enlarge sleeping quarters, locker rooms, and bathrooms. When planning these buildings, airports should keep in mind two frequent factors triggering the need for building expansion: new or extended runways and taxiways (paved areas) and operational changes that require larger equipment and/or larger snow clearing crew and supporting staff.

c. FAA Regulations on Location.

(1) The height and configuration of the building must not constitute a hazard or obstruction to airspace criteria contained in AC 150/5300-13, *Airport Design*.

(2) The height and configuration of the building must not interfere with navigational and surveillance aids.

(3) The height and configuration of the building must not block airfield surveillance to any portion of any runway, taxiway or terminal areas by the ARFF service and by the airport traffic control tower (direct line of sight).

(4) Chemical runoffs, such as by de/anti-icing chemicals, oils, fuel, and greases common to such buildings, must be mitigated in accordance with Federal or State Environmental Protection Agency (EPA) regulations for storm water discharges.

(5) All building construction or expansion on public-use airports requires an advance notice to the appropriate FAA regional Airports Division.

(6) For Federally assisted airports, the building and associated support areas must be shown on the approved Airport Layout Plan (ALP).

2-2. BUILDING ORIENTATION.

a. Siting. In those instances where options for building orientation are available, it is preferable for buildings having all entrances for snow equipment on one side to have the entrance(s) parallel and downwind (leeward side) to the prevailing winter winds. This orientation allows the prevailing winds to sweep snow away from the entrance(s). Buildings with entrances on two or more faces should be orientated to minimize the accumulation of drifting snow at the entrance doors to the building. Where such orientations are not an option, the airport should consider whether incorporating fences or vegetation onto the site will help reduce the amount of snow accumulation at the entrances.

b. Fueling Facilities. Fueling facilities should be located on the leeward side of the building to minimize the risk of wind-born fuel vapors and fuel spills entering the building. Provisions for dealing with fuel spills must be in accordance with Federal EPA, State, and local environmental regulations.

2-3. EXTERIOR APPEARANCE AND LANDSCAPING. The exterior finish, landscaping, and overall appearance of the building should blend in with the rest of the airport. It is recommended that snow clearing management consult with a landscape architect and other design professionals during the early planning stages to determine the best design options.

a. Exterior Finish. The recommended materials for the exterior are those that offer long life with little or no maintenance. Metal siding, however, should not be used at locations where it could create interference with communications and electronic navigational aids.

b. Landscaping. The landscaping design should avoid large trees and fences that could impede equipment movement, disrupt line of sight to the airfield, violate air space obstruction criteria (mature tree height), or require excessive care and maintenance. The selected landscaping plan should not become a wildlife hazard attractant. If the airport operator has a wildlife hazard management plan, then the landscaping should be in accordance with the plan.

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CHAPTER 3. BUILDING CONFIGURATION AND SPACE REQUIREMENTS

3-1. GENERAL. The internal configuration of the building with its storage, support, and special equipment areas should lend itself to support the airport operator's operational requirements identified in its winter storm management plan. For airports certificated under 14 CFR part 139, the written plan is referred to as the *Snow and Ice Control Plan* (see section 139.313, *Snow and Ice Control*). The building should be designed so noise levels generated in the equipment and maintenance areas are reduced sufficiently so adjacent offices/sleeping quarters meet the criteria of paragraph 3-4(c) below or local building noise codes, whichever are more stringent. All buildings must comply with local fire building codes and ordinances.

3-2. BUILDING CONFIGURATION. The configuration of the building must take into account two distinct functions: one related to people and the other related to equipment. The first function focuses on administrative and operational functions, in particular, a "*Snow Desk*," and personnel needs, such as a kitchen and eating area, training room, restrooms, and possibly sleeping/rest area. Experience shows that worker morale and efficiency are directly related to environmentally friendly working conditions.

The second function focuses on the size and type of equipment needed to maintain winter clearing operations at an airport, together with areas for the storage, support, and special equipment needs. In other words, the design goal of the configuration is to facilitate the duties of personnel, expedite the movement of equipment, and provide ready access to materials and supplies. Figures 3-1, 3-2, and 3-3 offer general building configurations based on the various maneuvering sizes of equipment fleets. These figures are *only for illustration purposes* and can easily change in terms of room location and size and deletion/addition of areas.

a. Design Layouts for the Movement and Care of Equipment.

(1) **Drive-through Design.** One efficient building design for airports with small to medium equipment fleets is the drive-through design where a separate entrance and parking stall is provided for each type of equipment or similar types of equipment (see Figure 3-1). This design generally requires maneuvering equipment outside the facility prior to driving through. Thus, the design option requires a larger apron area. Depending on the size of the equipment fleet, this approach does conserve the total space needed for the building, thus lowering building costs. Personnel access doors are installed where needed.

(2) **Center-aisle Design.** One efficient building design for airports with medium to large equipment fleets is a center-aisle design where equipment back into equipment stalls (see Figures 3-2 and 3-3). While providing central access to all parking stalls, this design may require fewer doors than other design combinations. Usually the building will have one or two large door (drive-through) for equipment ingress and egress and one or more smaller doors for personnel access.

(3) **Back-in Design.** An efficient building design for airports with small equipment fleets is the design that provides a single door with a parking stall for each piece of equipment. This design usually consists of one to three equipment bays. Personnel access doors are installed where needed.

(4) **Modified Design.** This design combines features from the above configurations.

b. Specific Features.

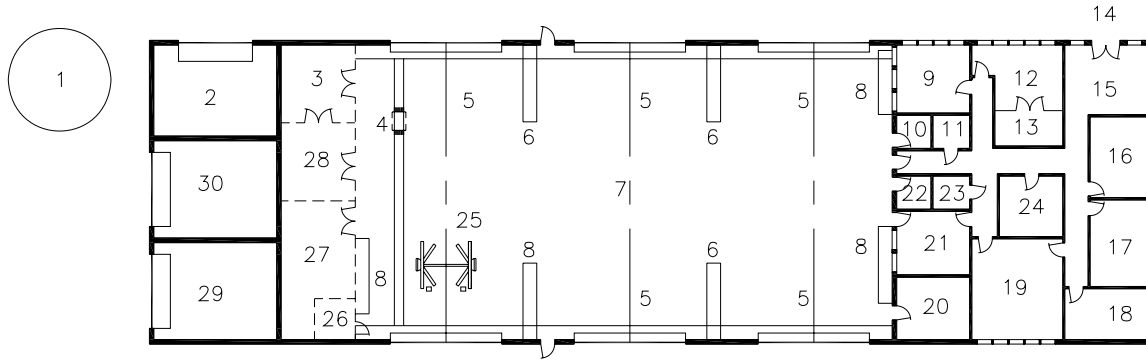
(1) **General Storage Areas.** Areas should be provided to store oil, grease, tires, recycled oil, used oil and antifreeze, and equipment components, such as bristles, sweeper wafers, plow blades, hitches, and spreader boxes. For efficient space allocation, consider the use of mezzanine storage areas or multiple heavy-duty bins placed along major wall areas.

(2) **Deicer and Sand Material Storage Designs.** Evidence has shown that sand and solid de/anti-icing chemicals stored outdoors deteriorate or change composition, thereby altering their handling properties and/or effectiveness. To prevent deterioration, dry materials must be stored in a sheltered structure, either within the main building or a separate facility that offers a “conditioned” environment. “Conditioned” in this context means the ability of the structure to maintain solid deicers and sand in a dry condition to eliminate “caking.” It is recommended that sand storage areas offer the ability to heat sand to improve its adhesion to ice/snow-covered pavements when applied. Liquid deicers, whether stored within the main building or outside, must be stored in tanks with delivery systems as recommended by the deicer manufacturer. For environmental reasons, the use of above-ground liquid deicer storage tanks instead of underground storage tanks is preferred. All tanks should meet local building codes governing electrical wiring, grounding, and lightning protection (outside installations).

All tanks and solid material storage areas must comply with applicable Federal, state, and local environmental runoff and ground water regulations. Adequately sized storage areas are those in which (1) the loading of solid materials onto spreader trucks is not restricted or difficult and (2) solid material does not spill outside the limits of the storage floor area during delivery. Additionally, manufacturers of solid deicers may recommend that their product(s) be stored in an area that is dehumidified to avoid “caking.” These storage conditions are required in order for solid deicers to maintain their material consistencies as indicated by material specifications during wet and cold conditions.

(3) **Welding Area.** As preferred by airport operators, this area should be open or adjacent to a repair bay. Such a configuration allows large-sized equipment to be easily accessible for welding and metal retrofitting work. Regardless of location of the welding area, proper exhaust and ventilation in accordance with local building codes must be incorporated into the building design to mitigate harmful fumes within the building.

(4) **Wash and Steam Cleaning Bay.** Evidence has shown not only that unsheltered equipment deterioration accelerates year round, but that further deterioration occurs when accumulated dirt and chemical contamination remains on unwashed equipment. Dirt and chemical contamination should be removed from equipment after storm events. Therefore, to extend the life and proper functioning of snow control equipment, the building must have a vehicle wash and steam cleaning bay (area) or the airport operator must have access to a site that offers self-service or paid washing and steam cleaning services. One bay should be sufficient for most airports except those with very large equipment fleets. It is not unusual to find the wash and steam cleaning bay located adjacent to the main building in smaller-sized facilities. Regardless of location, the runoff waste must be caught by basins or in some other fashion to comply with EPA, State, and local storm water regulations.



LEGEND

- | | |
|---|---|
| 1. LIQUID DEICER TANK | 16. AIRPORT OPERATIONS MANAGER |
| 2. HEATED SAND STORAGE | 17. MEN'S REST ROOM/LOCKERS/SHOWERS |
| 3. PARTS CLEANING/DEGREASER/
BLAST CABINET/PAINT BOOTH | 18. WOMEN'S REST ROOM/LOCKERS/SHOWERS |
| 4. BRIDGE CRANE | 19. CONFERENCE/BREAK ROOM & KITCHEN |
| 5. EQUIPMENT PARKING | 20. SPECIAL TOOLS |
| 6. SNOW REMOVAL EQUIPMENT STORAGE | 21. GARAGE SUPERVISOR'S OFFICE |
| 7. VEHICLE WASH/STEAM BAY | 22. WOMEN'S REST ROOM |
| 8. MECHANIC'S WORK BENCHES | 23. MECHANICAL ROOM (PHONE, ELECTRICAL) |
| 9. SNOW DESK | 24. REFERENCE LIBRARY |
| 10. MEN'S REST ROOM | 25. MAINTENANCE AREA |
| 11. MECHANICAL ROOM (HVAC) | 26. USED AUTOMOTIVE FLUID STORAGE |
| 12. ELECTRICAL EQUIPMENT REPAIR | 27. LARGE/SMALL PARTS STORAGE |
| 13. ELECTRICAL PARTS STORAGE | 28. MACHINE SHOP/WELDING AREA |
| 14. BUILDING ENTRANCE | 29. DRY DEICER STORAGE AREA |
| 15. ADMINISTRATION/RECEPTION AREA | 30. UREA STORAGE AREA |

GRAPHIC SCALE (FEET)



Figure 3-1. Small- to Medium-Sized Fleet – Typical Building Layout for Drive-through Design

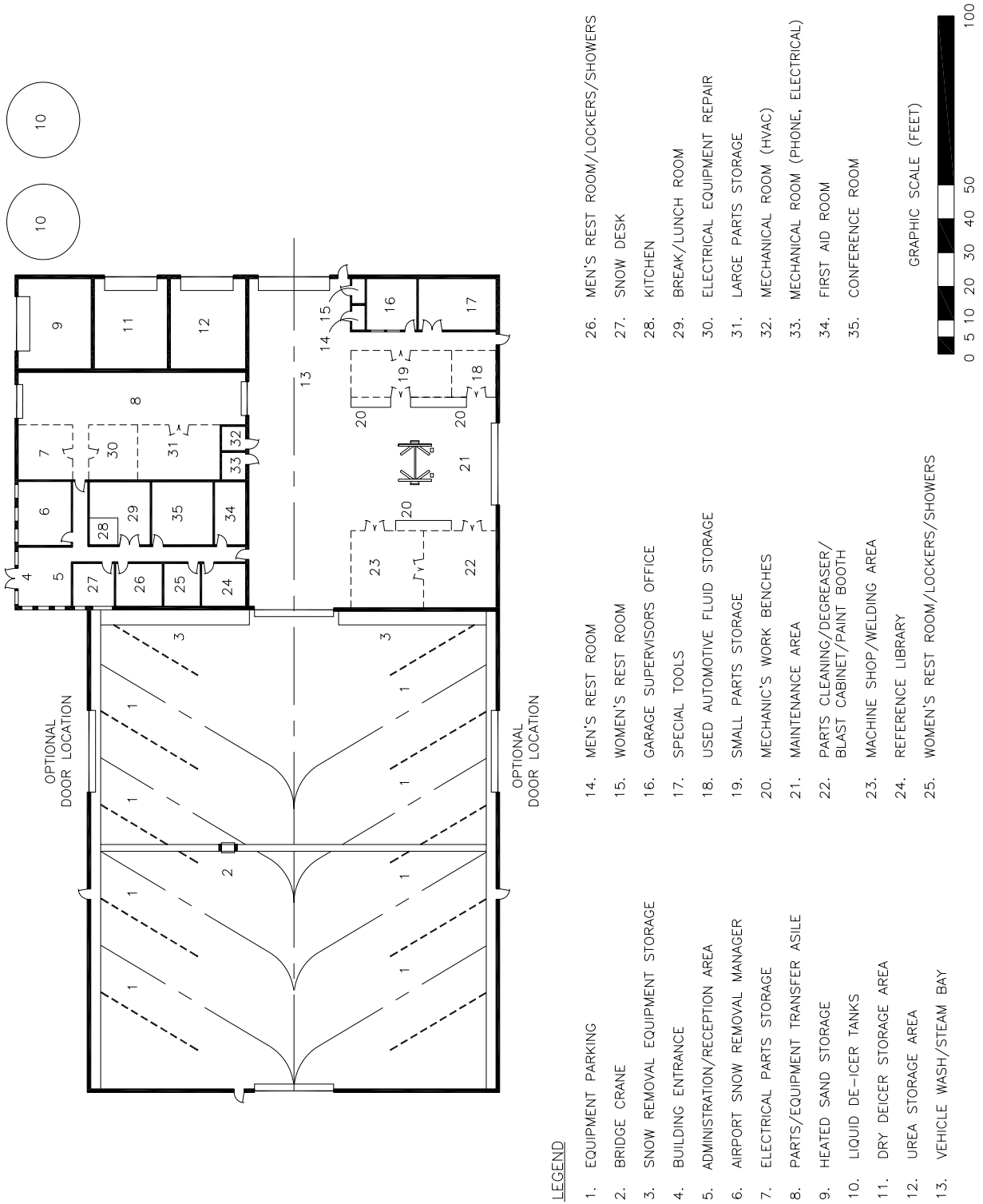


Figure 3-2. Medium- to Large-Sized Fleet – Typical Building Layout for Central-Aisle Design

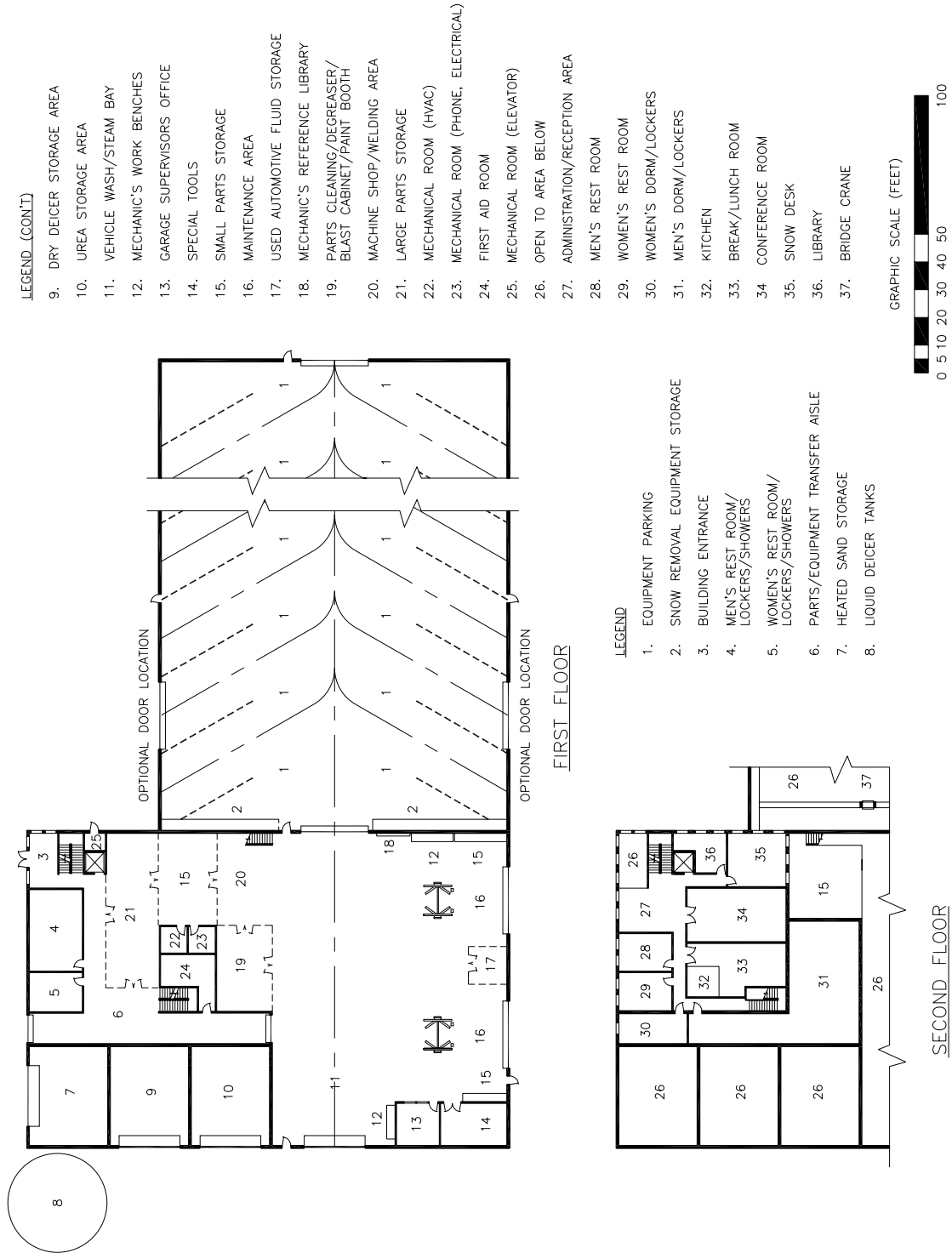


Figure 3-3. Large- to Very Large-Sized Fleet – Typical Building Layout for Central-Aisle Design

3-3. TOTAL SPACE ALLOCATIONS. The total space allocation for the building is based on the sum of the individual areas determined necessary to meet three functionally defined purposes: (1) *Storage Areas*, (2) *Support Areas*, and (3) *Special Equipment Areas*. Space allocations for each of these areas are determined by provided tables, equipment clearance values, or local building codes and ordinances. When the individual space recommendations of this advisory circular are less than local building codes or ordinances, the latter must govern the total space allocation requirement.

a. Storage Areas. This area is basically divided into three components: (1) an area for equipment to enter the building, park, and exit the building; (2) an area for the storage of snow and ice control materials, namely, fluid/dry de/anti-icers and/or sand; and (3) an area for storing equipment parts, accessories, and related materials.

(1) Equipment Clearances and Parking Areas. Space allocation for equipment is based on the number and type of equipment comprising the fleet as recommended by AC 150/5200-30, *Airport Winter Safety and Operations*, and AC 150/5220-20, *Airport Snow and Ice Control Equipment*. In general, the fleet is established by a “trigger” (the depth of snow fall, icing conditions) selected by the airport operator that commences clearing operations for an *identified* total airside pavement surface within a specified time, i.e., compliance with the airport operator’s snow management plan or, for 14 CFR part 139 certificated airports, the *Snow and Ice Control Plan*. Once the number and types of equipment are determined, the following methodology yields general space allocations for fleet parking and maneuvering. First, since available equipment varies widely in widths and lengths, the concept of an *Equipment Safety Zone (ESZ)* surrounding the equipment is employed. Table 3-1 provides ESZ clearance standards in accordance with equipment location and fixed or moving objects.

(2) Snow and Ice Control Materials. The space allocations for solid de/anti-icers and sand should be determined by the airport operator’s operational requirements and historical usage amounts. It is recommended the final value represent sufficient material on hand to last several storm events (two to three events). Storage tanks for fluid de/anti-icers are recommended to hold at a minimum 120 percent of the amount of fluid used for a single storm (a “single” storm event may represent several closely spaced storm events in a given week). Table 3-2 provides a range for floor areas based on the amount of product used and stored by airport operators located in the northeast region of the United States. Caution should be taken when determining floor areas to consider the approach used by the airport operator to combat the type of winter storms encountered at the airport and the difficulty in receiving new material deliveries and their replenishment during storms.

(i) Sand and Solid De/Anti-icers. Sand and solid de/anti-icers must be stored separately and kept dry to maintain the materials in a friable (loose) condition. Separation walls should be constructed of concrete with storage areas located on the leeward side of the building (downwind) whenever possible to minimize the introduction of moisture. Floors and walls should have sufficient strength to take the abuse, weight, rough loading, and unloading of product from heavy dump trucks and other type of loading equipment. Moisture must be reduced to maintain products in a friable condition throughout the material (bottom to top of pile) by (1) applying waterproofing, in case of partial underground wall exposure, (2) maintaining a dry storage area, (3) having floors sloping a minimum of ¼ inch per foot toward the main access door, and (4) installing a drainage channel that run continuously along the inside of the main access door(s) in order to collect excess water thereby reducing moisture accumulations along the lower wall sections in the storage area. Some airports have taken the measure to provide heated concrete floors.

Table 3-1. Minimum Equipment Space Allocations Using the Equipment Safety Zone Concept

	Minimum Clearances for Equipment Safety Zone (ESZ)			
Parked Equipment <i>Use the parked vehicle without attachments</i>	5 feet (1.5 m) When next to side walls or other stationary objects.	4 feet (1.2 m) When rear of parked equipment faces a wall or other stationary objects.	10 feet (3 m) Parallel to other parked equipment (parallel parking)	10 feet (3 m) From door opening.
Moving Equipment On Single or Dual Drive-Through Lane <i>Assumes a 7-ft (2.1 m) carrier vehicle width with attachments at 30-degree perpendicular to vehicle body</i>	15 feet (5 m) From parked equipment that includes a safe walk around zone in front of at least 3 feet (0.9 m).	Between moving equipment on <i>dual drive-through lanes</i>		
		10 feet (3 m) Small Plows ¹ 10 ft or less (3 m)	14 feet (4.3 m) Intermediate Plows and Small Sweepers ¹ Over 10 ft up to 15 ft (3 – 4.6 m)	20 feet (6.1 m) Large Plows and Large Sweepers ¹ Over 15 ft up to 22 ft (4.6 – 6.7 m)

Note 1. - Sizes as defined per AC 150/5220-20, *Airport Snow and Ice Control Equipment*. Attachments over 22 ft (6.7 m) are attached outside the building.

(ii) Liquid De/Anti-icing Fluids. Bulk liquid de/anti-icing fluids may be stored in either above- or underground storage tanks within or outside of the building. (See figures 3-1, 3-2, and 3-3). Inside storage may be considered for small quantities of deicer fluid in drums. Locations that normally experience severe weather conditions should consider insulation of above-ground tanks to prevent the fluids from turning slushy. All underground storage tanks, together with their service lines, must conform to EPA’s underground storage tank requirements. All tanks should be located in such a manner as to provide clear ramp areas for the movement of equipment.

(iii) Salt. *Salt must be used only on non-airside areas, such as roadways, sidewalks, and parking lots, located outside the aircraft operational area.* Because it is highly corrosive to aircraft and airfield facilities, it must be separately stored away, not adjacent to, storage areas housing sand and solid de/anti-icing materials that are approved for the use on the airport’s operational areas. Salt storage must be labeled to alert or prevent personnel from inadvertently mixing the salt with airside-approved materials.

(3) Equipment Parts and Accessories. The floor allocations for these items should be determined by the airport operator, which bases the final value on the types of equipment used and their accessories, maintenance products, and parts to replace worn or damaged parts. Table 3-2 provides typical space allocations for parts.

b. Support Areas. Support areas fall into two basic areas: (1) an area dedicated to administrative duties, an operational area or “snow desk,” employee areas, such as a kitchen, eating area, training/conference room, restrooms, and sleeping areas; and (2) an area dedicated to the maintenance and repair of equipment. Table 3-3 offers typical space allocations for items that fall under the category of Support Areas.

c. Special Equipment Area. Table 3-4 offers typical space allocations for items that fall under the category of Special Equipment Area. Local building and ordinances may require larger areas than stated in Table 3-4. In such cases, local building and ordinances must be followed.

Table 3-2. Typical Storage Allocations for Material Storage Items

Snow and Ice Control Material Types	Range ^{1,2} Square Feet (square meters)
Sand Storage	150 - 500 (14 - 46)
Bagged or Bulk Solid Deicer Storage	100 - 400 (9 - 37)
Salt Storage ³	100 - 300 (9 - 28)

Notes:

1. Sizing needs are highly influenced by the approach used and the quantity of material or combination of materials applied to combat the type of winter storms encountered at the airport.
2. Difficulty in the delivery of materials during actual winter storms and cost of delivery throughout the winter season play a substantial role in determining additional storage area requirements.
3. ***Salt is only for landside use.*** Federal funding for salt storage areas is not allowed under the ***Airport Improvement Program or Passenger Facility Charge Program.***

Table 3-3. Typical Storage Space Allocations for Support Items

Items under Support Area	Airport Size ¹		
	Small-Sized Airport ²	Medium-Sized Airport	Large and Very Large-Sized Airports
	Square feet (m)	Square feet (m)	Square feet (m)
Snow Desk ⁴	100 (9)	144 (13)	200 - 400 (19 - 37)
Supervisor's Office ⁴	120 (11)	140 (13)	140 (13)
Mechanic's Office	100* (9)	150 (14)	150 (14)
Administrative Area ⁴	200* (19)	200 (19)	400 (37)
Training Room ⁴	300 (28)	400 (37)	400 (37)
Lunch Room ⁴	Combine with training room	300 (28)	600 (56)
Kitchen ⁴	Combine with training room	Combine with lunch room	200 (19)
Rest Room/Lavatory for Men and Women (or local building code) ⁴	300 (28)	500 (46)	700 (65)
Lockers ⁴	Combine with Rest Rooms	500 (46)	700 (65)
Sleeping Quarters ³ Bunk area per person	56 (5)	56 (5)	56 (5)
Parts Area associated with snow removal operation	600* (56)	800 (74)	1000 (93)
Parts Area associated directly to snow vehicles	200 (19)	300 (28)	400 (37)
Lubrication, Oil, Grease Storage	100-150 (9 - 14)	150 - 200 (14 - 19)	150 - 200 (14 - 19)
Welding Area	200* (19)	200 (19)	400 (37)
Recycled Oil and Used Anti-freeze	150 (14)	200 (19)	200 (19)
Mechanic's Bench Area (along walls)	100 (10)	200 (19)	400 (37)
Repair Bay – Number of Bays and square footage per repair bay	1* 600 (56)	1 1000 (93)	2 1000 (93)
Cleaning Bay	600* (56)	1000 (93)	1000 (93)
Emergency First Aid Room ⁴	Combine with lunch room	Combine with training room	75 (7)

Notes:

1. See paragraph 1-2 of Chapter 1 for definition of airport sizes.
2. Airports with less than 225,000 square feet (20,910 m²) of total paved runway will not necessarily need items marked with an asterisk (*).
3. Certain airport operators may deem it necessary to have sleeping quarters.
4. Small airports may have a separate building that houses and services equipment, chemicals while another building, such as the terminal, houses administrative functions and crew facilities.

Table 3-4. Typical Storage Allocations for Special Equipment Items

Items under Special Equipment Area	Range Square Feet (square meters)
HVAC Area	300 - 800 (28 - 75)
Recycled Oil and Used Anti-freeze	150 - 300 (14 - 28)
Emergency Power Generation	100 - 300 (9 - 28)
Hydraulic Lift, Vacuum Pumps, and Air Compressor	100 - 200 (9 - 19)
Steam Generation	100 - 150 (9 - 14)
Major/Large Power Tools	100 - 200 (9 - 19)
Overhead Crane	<i>One per building with very large-sized airports having two</i>

3-4. DESIGN AND CONSTRUCTION STANDARDS.

a. Local, State, and National Codes and Ordinances. All applicable local, State, and national codes and ordinances must be followed in the design, construction, or modification of a building. Special attention should be given to buildings situated in areas that experience severe weather conditions or natural phenomena, such as earthquakes or tornadoes.

b. U.S. Environmental Protection Agency (EPA) Regulations. Airports are subject to the EPA's Clean Water Act, which includes Storm Water Discharge Regulations. These regulations set limits on the amount of specific pollutants generated at the building that can be discharged directly into the surface waters of the United States. All building drains and conduits must comply with the airport's overall discharge permit to ensure that limits established under EPA regulations or by the State/locality are not exceeded. Guidance on handling potential surface water may be found in AC 150/5320-15, *Management of Airport Industrial Waste*.

c. Noise Reduction. If the building is located within an airport's day-night average sound level (*24-hour average sound level*) DNL 65 dB to 75 dB noise contours, acoustic insulation should be considered for certain areas of the building, such as the eating area and training room. The internal noise level of administrative areas and, if provided, sleeping areas of the building, should achieve an outdoor-to-indoor noise level reduction to 45 dB through appropriate noise level reduction (NLRs) means, as described in Table 1, *Land Use Compatibility with Yearly Day-Night Average Sound Levels*, in Appendix A of 14 CFR part 150, *Airport Noise Compatibility Planning*.

d. Ceiling Height or Vertical Clearances. Vertical clearances must accommodate the maximum height of any piece of equipment that is either budgeted for or currently in use. These clearances should be a maximum of 22 feet (6.7 m) as measured from the floor to ceiling in the service area. This door opening height will permit high profile vehicles to negotiate within the building as well as allow material spreader trucks to elevate their beds for maintenance.

e. Roof. Roof structural load capacity should also take into account loads due to light and heavy storage of snow related materials, parts, and supplies and general support service

equipment hung from or stored between roof support structures, such as equipment stored in/from deep trusses.

f. Floors. The building must have a high-strength, reinforced concrete floor system with sufficient bearing capacity to support both live loads exerted by heavy equipment (stationary or mobile) and for the materials being stored.

g. Floor Drainage. Floor drains with slotted cast steel covers should be provided in all areas of the building where melting snow and other contaminants may drop from equipment. The floor should be gently sloped to these drains to ensure against water puddles. Threshold drains are recommended to handle the drainage from melted snow, aid in routine cleaning of the building, and prevent water from collecting at the thresholds or in front of door openings where the melt may turn into ice. Service and storage areas should have appropriate drainage with covers suitable for the area. All floor drains should connect to a separate drainage system designed to collect, separate, or treat materials and industrial waste and comply with the EPA Clean Water Act and Storm Water Discharge Regulations.

h. Employee Exterior Doors. Exterior doors should be selected according to their primary function. For example, exterior doors for the reception area normally contain some glass, while side doors may or may not contain a look-through glass panel. Regardless, exterior doors should offer some security against unlawful entry and offer a level of noise reduction of airfield-generated noises. One important design feature for exterior doors that receive “high personnel traffic” is the prevention of interior building heat loss. In those cases, a double door design or special space heaters, situated above the exterior doors, should be designed into the building to minimize interior building heat loss.

i. Equipment Ingress/Egress Overhead Doors. Equipment should enter the building through an overhead industrial-type door that is of either roller or counterweight design. The doors should be made of heavy-duty, weather-resistant material (flexible or non-flexible) that is easily repaired in the event of minor accidents. Besides selecting equipment doors that incur low maintenance costs, the equipment door system should help against interior building heat loss. For example, as equipment exits or enters, the overhead door system closes automatically (manual override is included).

(1) Door Clearance. Airport runway sweepers, deicer spreaders, displacement snowplows, and rotary snowplows, which are normally much wider than highway-type vehicles, often operate with bulky projections not necessarily visible from the operator’s position. Besides bulkiness, airport operators have a wide selection of equipment to meet their operational requirements. For these reasons, door sizes must be based on providing an object-to-door frame clear zone (CZ). The CZ standard is 5 feet (1.52 m) for side clearances with a 4-foot (1.22 m) overhead clearance. The final door clearance will normally be decided by the plow moldboards or sweepers on the vehicle carrier (width of door) and rotary plows (height of door). In regards to determining door widths using CZs, the plows, sweepers, etc., are to be rotated 30 degrees to reduce door widths. For example, 15-foot (4.6 m) plows rotated to 30 degrees need a door clearance of 23 feet (7 m) [5 ft + 13 ft + 5 ft.] Extra large plows as defined in *AC 150/5220-20, Airport Snow and Ice Control Equipment*, which include ramp dozer plows and other special purpose plows, that measure 22 feet and above should not be used to size doors, i.e., maximum single door width is 30 feet (9.2 m). Finally, at least the following three considerations in determining the CZ for the building should be evaluated, namely (1) future equipment purchases or upgrades to existing equipment, such as attachments; (2) size of the fleet where, in some cases, simultaneous use of the door by two pieces of equipment are necessary;

and (3) extra-wide/tall equipment, such as plow trucks that carry wing plows in the folded position or deicer fluid spraying trucks with extra-wide spraying bars again in the folded position.

(2) **Weatherproofing.** All overhead doors and exits should be weather-stripped to prevent the infiltration of cold air, moisture, and snow.

(3) **Thresholds.** At door openings, from jamb to jamb, a heavy-duty perforated steel covered drain should be installed. Airports located in extremely cold climates may require heated door thresholds to prevent melt, snow, or ice accumulations on the lower portions of exterior door(s) from freezing to the threshold. The heated threshold will help reduce any difficulties in opening the door(s).

(4) **Door Operators.** Electric door operators should be installed on overhead doors that are used on a regular basis. For such doors, the design should include a manual override capability. Emergency electric generation, if part of the overall building design, should support these doors. To protect employees and equipment, all overhead door designs, whether electric or mechanical, should incorporate a safety device, for example, an electric eye, so that the bottom edge of the door automatically reopens before it touches a person or equipment.

(5) **Door Frame Protection.** Airport operators should consider two areas of protection. First, outside entryways, where equipment passes, should be protected by freestanding guard posts and/or other impact-resistant devices located at either side of the door opening. Second, interior door frames, where equipment passes, should be protected by freestanding guard posts and/or other impact-resistant devices located at either side of the door opening or in the door frame itself.

(6) **Safety Doorway Glass Panels.** At least one glass panel, located at the driver's eye level, should be installed in the door for safety reasons and to help with traffic control. Airport operators that operate a wide mix of equipment types having several driver eye levels should consider extra glass panels. All glass panels should be clear and tempered.

j. Mechanical.

(1) **Heat.** Airport operators should equip the building with heating units that can maintain a 40° F (4°C) temperature in the equipment service area and, if no local codes exists, a 60° F (16°C) temperature in the maintenance and office areas. There are several types of heating arrangements that can provide acceptable service. Overhead systems in the equipment service area that include gas or oil-fired unit heaters or gas or electrically energized infrared radiation systems are recommended. Baseboard or forced air heating systems are more appropriate for maintenance and personnel offices and areas. It is highly recommended that a heated floor system be installed in the storage areas where sand and dry deicers are stored, so materials are dry and friable and, therefore, ready for use when needed.

(2) **Ventilation.** Interior areas of the building, which are subject to vapor accumulation, must be ventilated in accordance with local building codes and regulations.

(3) **Air Compressor.** If compressed air is provided, the air compressor and tank system should deliver air at a minimum of 100 psi and provide a minimum of 60 cubic feet (1.7 cubic meters) of tank storage. Multiple quick disconnect outlets should be provided in the shop where compressed air may be needed.

(4) **Engine Exhaust Discharge.** A flexible duct system, with an assisted discharge system, should be provided to remove engine exhaust from the equipment service area.

k. Lighting and Electrical.

(1) **Emergency Backup.** The building should be provided with an emergency power backup generator to power essential administrative and equipment functions and services.

(2) **Lights.** Interior lights should be energy efficient yet provide clear bright light especially for task areas in service areas and the machine shop. A motion-activated (turn off/on) system is recommended to conserve energy. Exterior lighting in areas adjacent to exterior door entrances should be provided at personnel entrances for safety and at equipment entrances to aid in equipment movements during low visibility conditions and nighttime operations.

3. **Receptacles.** All storage, repair, and office/locker areas should have appropriate electrical receptacles. Workbench areas should have receptacles at bench level. Weatherproof receptacles with appropriate “amperage” ratings should be provided along the exterior of the building to assist in engine block warm-ups for geographical areas where extreme-weather conditions are a normal occurrence.

l. Fire Protection.

(1) **Heat and Smoke Detectors.** Heat-activated fire detectors and smoke detectors must be placed at strategic locations throughout the building in accordance with the latest National Fire Protection Association (NFPA) regulations and local codes and ordinances.

(2) **Fire Extinguishers.** Fire extinguishers must be provided in accordance with building codes and ordinances, at least in the kitchen and battery, workbench, oil, and grease storage areas. Guidance for this type of protection can be found in the NFPA-10 standards for portable fire extinguishers.

3-5. INTERIOR FINISHES.

a. **Interior Walls.** Interior walls may be constructed of masonry, wood, or metal framing covered with metal sheeting, gypsum rock where appropriate, or comparable noncombustible materials.

b. **Floors.** The high-strength, reinforced concrete floor must receive a concrete sealer to extend the life of the floor system. The floor surface should be finished in a manner that allows for safe movement of personnel while servicing equipment. Floors should be painted where deemed necessary by the airport operator to demarcate floor areas, e.g., walkways, safety zones, danger zones, and areas with restricted clearances.

c. **Roof.** Steel beams, joists, lateral supports, air ducts, and the underside of the roof decks prone to rusting should be painted if needed to protect against the corrosive environment of the building.

3-6. PROVISIONS FOR INDIVIDUALS WITH DISABILITIES. The American with Disabilities Act (ADA), Public Law 101-336, requires that any public or private entity that provides public accommodations must (1) ensure that new buildings and facilities are designed and constructed to be free of architectural and communication barriers that restrict access or use by individuals with

disabilities, (2) ensure that existing buildings and facilities be altered to be readily accessible by individuals with disabilities, to the maximum extent feasible, and (3) furnish auxiliary aids, services, and/or telecommunication devices to afford communication by the disabled. Therefore, snow and ice control equipment and buildings and other support facilities should meet applicable ADA regulations pertinent to employed individuals and building areas that may receive visitors.

a. Supporting Guidance. Guidance relative to the implementation of the above requirements may be found in the following documents:

(1) The ADA Accessibility Guidelines for Buildings and Facilities (28 CFR part 36, Appendix A) provide overall requirements needed for the design and construction or alteration of buildings and facilities.

(2) The Department of Transportation rules governing transportation for individuals with disabilities (49 CFR parts 27, 37, and 38) provide additional guidelines specific to airports.

For more information about ADA requirements, contact the Architectural and Transportation Barriers Compliance Board at (800) USA-ABLE.

b. Additional Guidance. Other information is provided in AC 150/5360-14, *Access to Airports by Individuals with Disabilities (1999)*, that can assist airports in complying with the laws and regulations governing individuals with disabilities.