Bi-SC Directive 85-5
NATO APPROVED CRITERIA AND STANDARDS FOR AIRFIELDS

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BI-SC DIRECTIVE 85-5

NATO APPROVED CRITERIA AND STANDARDS FOR AIRFIELDS

REFERENCES:

A. Bi-MNCD 85-5, NATO Approved Criteria & Standards for Airfields, 6100/SHRIM/036/99, dated Oct 1999
B. IC AC/4-DS(l 999)32, dated 27 Oct 99
C.MC445 (Military Decision), dated 31 Aug 1999
D. 6100/SHRIX/094/99, dated 23 Apr 99
E. 6100/SHRIM/015/9S, dated 4 May 98
F. NATO Approved Criteria and Standards for Tactical and Transport Airfields, 6th Edition Amendment 3 (Jul 90)
G. NATO Recommended Criteria and Standards for Maritime Patrol, dated 31 May 1998
H. NATO Recommended Criteria and Standards for NAEW Airfields, dated Jul 1989

1. **Status.** This directive supersedes Allied Command Operations (ACO) Directive 85-5, dated December 1999.

2.Purpose. The standards are designed to ensure that aircraft of different nations can operate together as a multi-national force and also provide guidance to NATO Minimum Military Requirement determined by the SCs.

3. Applicability. This directive is applicable to all headquarters and units.

4. **Supplementation.** Supplementation is not authorized. Any headquarters wishing to modify or amplify this directive is to notify the lead proponent at SHAPE or HQ SACT.

5. **Publication Updates.** Updates are authorized when approved by COS SHAPE and COS HQ SACT.

6. **Proponent.** The proponent for this directive is ACT Integrated Resource Management, NSIP Branch.

FOR THE SUPREME ALLIED COMMANDERS, EUROPE AND TRANSFORMATION:

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PART I - INTRODUCTION

1-1. Authority

a.These Criteria & Standards cover facilities for all airfields to be used by NATO fixed and/or rotary wing aircraft. This document was developed and recommended by the Bi-Strategic Commands (Bi-SC) and NATO Office of Resources (NOR), noted by the Military Committee and approved by the Investment Committee (IC).

b.Although these Criteria & Standards apply to all new construction, modification and restoration of airfield facilities, they do not by themselves, establish a requirement to construct new facilities or modify existing infrastructure. The standards are designed to ensure that aircraft of different nations can operate together as a multi-national force. They also provide guidance to NATO Minimum Military Requirement (MMR)[1] determined by the SCs.

c.For national use, the level of provision should at least satisfy the basic requirement of the most critical national aircraft as reflected in the Aircraft Data Sheets. Within this provision, the general guidance in the preambles, and the Military and Technical Characteristics of the NATO Approved Criteria & Standards for Airfields should be met.

1-2. General Layout

a. "Items" of the main text have been written in four parts; Military Criteria (Part One-Part Three), co-ordinated by ACO and ACT and Technical Standards (Part Four), co-ordinated by NOR.

b. The Military and Technical Preamble support the respective parts of the document and have been written by the same authorities.

c. Annex A, the Glossary of Terms supports the whole of the document.

d. Annex B includes Aircraft Data Sheets.

e. Annex C encompasses the List of requirements according to Alliance's Operations and Missions (AOM) phases (Tiers) and Minimum Essential Facilities

1-3. Updates

a.Supplementation is not authorised. Any headquarters wishing to modify or amplify this directive is to notify the proponents at ACT (NSIP Branch), ACO (LogDir ENG) and NATO HQ (NOR).

b.It is the responsibility of ACT (NSIP Branch) to review this document and update it as necessary. Changes will be approved by the Chief of Staffs ACO/ACT and provided to the NOR.

[1] MMR will be replaced by Minimum Capability Requirement (MCR) in the future.

PART II - MILITARY PREAMBLE

2-1. General Guidance

a.The criteria and standards reflect infrastructure requirements for support to NATO forces. They should not be deviated from without strong justification, but do not provide ready-made solutions to all problems that may arise. In each case, operational considerations, foresight and sound engineering principles must be applied to ensure that the facilities meet the MMR as effectively, efficiently and economically as possible.

b.All infrastructure requirements must be linked to a NATO required capability and an acknowledged NATO role for the airfield. The National Military Authorities (NMAs) will make the selection of airfields where facilities are to be supported, and determine the number of aircraft to be accommodated at each airfield. This must take into account the overall air reinforcement capability required in each region and the likelihood of simultaneous deployments of different forces. The criteria and standards give a general indication of the infrastructure required to achieve the NATO MMR.

c.Highly flexible and deployable forces, such as the NATO Response Force (NRF), are the foundation for NATO capabilities. A strong focus is required on enhancing NATO essential capabilities to include key areas such as effective deployment, engagement, sustainment and re-deployment. Airfields must support appropriate air capabilities that are required to accomplish the mission.

d.For Alliance Operations and Missions (AOM), the application of criteria and standards is based on the deployment duration. Phases or tiers were identified to provide guidance on the parameters to be adopted when defining MMR for NSIP funded infrastructure and CIS projects. Phases and tiers are not compulsory elements for MMR and the usage will depend on theatre formation commanders' missions and other local factors. The phases are defined in the Glossary of Terms and the tiered approach to the military criteria is provided at Annex C.

e.To ensure that the best military value is achieved, maximum use and adaptation of existing NATO and national assets must be made. Austere standards must be enforced to enable the effective use of facilities and infrastructure.

f.To ensure long-term interoperability, and to allow multi-national tasking of (deployable) forces, standardisation should be considered for aircraft deployed to established Operating Bases. When calculating requirement shortfalls for deployable forces consisting of tactical aircraft, a standard NATO squadron size of 16 4th-generation tactical aircraft should be considered unless a larger number is specified in operational planning. Similarly, 18 Rotary Wing Aircraft (RWA), 12 Air-to-Air Refuelling (AAR), 6 Maritime Patrol Aircraft (MPA), 5 Airborne Early Warning (AEW) or 4 Alliance Ground Surveillance (AGS) aircraft should be considered as the standard squadron size.

g.In this document the terms Wing and Squadron are used as the basic unit nomenclature. Equivalent terms for Rotary Wing Aircraft or any other national units apply.

h.The criteria and standards are to be applied in a consistent manner commensurate with Required Capability defined in the Capability Package or in the Crisis Response

Operation Urgent Requirement (CUR) for AOMs. In particular, operational requirements may result in upward or downward deviation from these criteria and standards. These deviations do not set precedents. Each exception is to be considered on its own merits, on a case-by-case basis.

i. A statement in a STANAG does not, by itself, justify a MMR. Essential requirements identified in the military criteria of this document take precedence over a STANAG.

2-2. Aircraft Characteristics

a. Requirements are determined on the basis of aircraft operational characteristics. Appended to this document are aircraft data sheets for all relevant aircraft providing capabilities to NATO. Specific requirements may be derived from these sheets.

b. This directive only applies to aircraft requiring an airfield for take off and landing. It is also applicable to UAVs requiring airfield support for launch and recovery. UAV requirements shall be derived from UAV specifications, in case relevant aircraft data sheets are not provided.

c. To ensure long-term interoperability and to allow multi-national tasking, the generic aircraft of the current Defence Requirements Review (DRR)[2] should be used for the calculation of deployed forces requirements (see Appendix 1 to Annex B). This generic data should be used in conjunction with the relevant criteria to define capability shortfalls, unless direction is given to plan for specific aircraft.

2-3. Shortfalls

a.It is the responsibility of the NMAs to identify required NATO military capabilities, and to analyze the forces and resources needed. Existing infrastructure at each airfield site must be assessed against national and NATO requirements, in order to identify capability shortfalls.

b.NATO Security Investment Programme (NSIP) procedures govern the conception of the capabilities through requirement definition, resource analysis, investment proposal, implementation, acceptance and management to deletion and removal from the NATO inventory. Procedures and responsibilities are detailed in Bi-SC 85-1.

[2] DRR will be replaced by Capability Requirement Review (CRR) in the future.

2-4. **Exceptional Considerations.** Exceptional considerations are acceptable to meet the MMR as determined by the NMAs. While the basic function intended for the item should be provided, in a very limited number of cases, some degree of shortfall or an alternate solution not described in this directive may be acceptable where the operation or site circumstances dictate.

2-5. **Deployable Assets.** Where practicable and cost effective, deployable assets versus fixed infrastructure should be considered as an option to satisfy deploying forces required capability shortfalls. Annex C provides a foundation for considerations of deployable assets versus fixed infrastructure.

2-6. **Force Protection Measures.** Force protection measures such as splinter protection, hardening, overpressure (CBRN defence systems) and dispersed parking are not general requirements. However based on a local threat level, some or all of the mentioned force protection measures may be required. The decision is to be taken by the NMAs on a case by case basis.

2-7. **Security Measures.** Based on the requirements of NATO Security Policy, each airfield should take the appropriate physical security measures to counter espionage and subversion, as well as terrorist and sabotage threats.
The security of the airfields should be built upon a system of defence in depth, using an appropriate combination of complementary physical security measures. The protection provided by these security measures should meet both the NATO minimum standards and the requirements associated with the criticality and vulnerability of the installation.

PART III TECHNICAL PREAMBLE

3-1. Introduction

a.Technical Standards are complementary to the Military Criteria. Their purpose is to provide technical guidance for the implementation of the various infrastructure projects required. The universal application of these Technical Standards will ensure that the facilities constructed for NATO use, although designed and built according to the various host nations standards, will continue to meet a common NATO standard.

b.Military Criteria and Technical Standards are not instruments for establishing the eligibility of a project for NSIP funding. However, the present Military Criteria and Technical Standards are to be followed irrespective of the funding source.

c.Where military infrastructure is to be provided in proximity/alongside a civil airfield, reference should be made to International Civil Aviation Organization (ICAO) Standards to ensure compatibility.

3-2. General Guidance

a. The correction of any infrastructure shortfall(s) may be achieved by:

(1) the construction of a new facility,

(2) the modification of an existing facility,

(3) the restoration of an existing facility to return it to its original function,

(4) the restoration of an existing facility by replacement,

(5) the leasing of commercially available buildings and installations,

(6) the provision of deployable assets or

(7) a combination of the above.

b.Infrastructure provided to meet NATO's MMR should, at the same time, satisfy sound engineering principles and assure life cycle cost effectiveness. All construction should be simple, functional and practical; it must respect the host nation's approved construction standards and observe local environmental requirements. National health and safety standards must also be taken into consideration. Where national standards cannot be applied or are significantly lower than the minimum standards of NATO nations, e.g. in countries outside NATO territory, design and construction must follow the minimum standards as recommended by the NOR.

c.The application of these technical standards should not adversely affect the user's ability to maintain the infrastructure at reasonable cost.

d.Fixed equipment installed inside buildings (e.g. electrical transformers, panels, CIS installations) are considered infrastructure items and are part of the initial provision of the facility. Portable equipment, required for functional reasons at various buildings (e.g.

Workshop equipment, presses, test benches, warehouse shelves), are considered equipment items and are a national responsibility.

e.The landscaping in and around airfields and their support facilities should be designed and maintained to minimize the risk of bird strikes, promote flight and ground safety and prevent structural damage.

f.Signage and ornamental landscaping, not contained in items, are a national responsibility.

g.Addressing encroachment issues by the surrounding community is a national responsibility.

3-3. Maintenance / Restoration / Service Life

a. After construction, facilities need to be properly maintained during their service life. The maintenance of NATO facilities on an airfield is the responsibility of the user in accordance with C-M(56)60.

b.When continued maintenance is no longer cost-effective or inadequate (normally at the end of the expected service life of the facility), restoration works may be required to bring the facility back to the operational standards to which it was originally built, thus extending its service life for another service period fulfilling current standards at the time of the restoration works.

c.Service life of a facility is defined as the period between its beneficial occupancy by the user (after its construction or restoration) and the date when its further maintenance ceases being cost effective. Service life varies in accordance with the operational requirement for the facility, its nature, extreme environmental conditions and the usage of the facilities. Based on empiric data, facilities are grouped in four broad categories: pavements, buildings, major electro-mechanical installations and utilities. The expected service life for tier 4 / peacetime infrastructure for each of these categories is shown below:

(1)	**Pavements**		20 years
	Flexible (aircraft)	:	
	Flexible (roads)	:	15 years
	Rigid (aircraft)	:	20 years
	Rigid (roads)	:	20 years
(2)	**Buildings**		
	Structural	:	30 years
	Internal installations[3]	:	20 years
(3)	**Electro-mechanical Installations**		
	Standby power generators	:	30 years

[3] Including electrical, plumbing, etc.

Airfield lighting	:	25 years
Uninterrupted power supply:		10 years

(4) **Utilities**

Water distribution	:	30 years
Electr. Distribution	:	30 years
Drainage/Sewage	:	30 years
HVAC	:	20 years

(5) **Others**

Fuel Installations	:	30 years
Arrestor gear	:	25 years
Communications	:	20 years
IT Systems	:	10 years
Fences	:	25 years

d. The required service life for operational infrastructure (Tier 2 and 3) depends on the operational requirement set up in the current Operational Plan. ACO is responsible to define the required service life of operational facilities as part of the Minimum Military Requirement.

3-4. **Extreme Weather Conditions.** All facilities should be suitable for the prevailing weather conditions of the area. In exceptional cases, where these conditions are extreme, the construction will be adapted accordingly. An example of extreme weather conditions is provided below:

a.Extreme and prolonged cold. The maximum daily temperature stays **below 0 ºC** for a minimum of 30 consecutive days, every year.

b. Extreme and prolonged heat. The maximum daily temperature stays **above +30 ºC** for a minimum of 30 consecutive days, every year.

c.Extreme and prolonged temperature variations. The difference between the maximum and the minimum daily temperature is **more than 30 ºC** for a minimum of 30 consecutive days, every year.

d.Extreme wind. Wind conditions are considered extreme at airfields where the wind velocity is at right angle to the direction of the main runway and **exceeds 30 knots** for more than 20% of the year.

e.Other extreme weather conditions, such as frequent poor visibility, intensive dust or corrosive environment, may be considered on a case-by-case basis.

3-5. **Pavements**

a. **General**. Pavements or paved surfaces (see Glossary of Terms) shall be designed to accommodate the most demanding mix of operating aircraft that is planned by the NMAs. Detailed requirements are set out in the specific criteria items and in the aircraft

data sheets. National rules and regulations should be taken into consideration.

b.Aircraft Pavement Surface Friction. Newly constructed or restored pavement surfaces must incorporate sufficient friction properties through the use of mix design and not through use of surface treatments in accordance with STANAG 3634. If the surface friction characteristic should drop below an acceptable limit during the service life of the pavement, a friction course may be applied in such a manner to extend the functional life until the next overlay. If a friction course is applied, it should be stable and not create a Foreign Object Damage (FOD) hazard.

c.Grouping of Aircraft (A/C) Load Demand on Pavements in accordance with their support requirements grouped into Aircraft Classification Number (ACN) Groups. The load demand requirements on aircraft pavements are classified, in accordance with aircraft types which will use the pavements, in distinctive Aircraft Operating Surfaces (AOS) groups as specified in Glossary of Terms:

AOS Group	Rigid pavement subgrades				Flexible pavement subgrades				Former LCN[4]
	A	B	C	D	A	B	C	D	
RWA to include AGS[5]	17 15	18 15	19 15	19 15	15 14	16 14	18 14	18 14	35
TFA	31	31	32	32	27	28	29	31	50
TTA, MPA	32	35	38	40	30	33	35	39	50
AEW	43	50	58	66	47	52	62	79	65
STA	51	50	54	66	51	58	69	90	80
SBA	96	106	120	128	76	82	93	111	Up to 120

Note: These are demand requirements by AOS group and not the pavement load bearing characteristics expressed as Pavement Classification Numbers (PCN) values. For details on subgrade groups see AEP-46(B).

d.Grouping of A/C Pavements in Accordance with their Construction. Aircraft pavements are classified, in accordance with the method and material used for their construction, in three types. Any of these types may be used for each particular case, with cost effectiveness determining the final choice. New technical developments should always be taken into consideration.

(1)Flexible Pavement. A pavement constructed with bituminous cement binder, which distributes the load primarily through the shear strength of the materials; it is surfaced with a bitumen/aggregate mixture. This type of surfacing is vulnerable to fuel spills, therefore it should be covered with a fuel resistant coating if it is used in areas where there is an increased probability of such spills, e.g. Aircraft parking aprons (see each individual criteria item for details).

(2)Rigid Pavement. A pavement which distributes the load by means of its high flexural stiffness; it is surfaced with a high quality Portland Cement Concrete

[4] Load Classification Number (LCN).
[5] For Global Hawk type UAVs the ACN is considered to be similar to RWA, and may vary for other UAV types.

slab, which is divided, by construction and contraction joints, into slabs to confine shrinkage to predetermined lines. Expansion joints are also required. All joints shall be sealed. To simplify maintenance and future partial slab replacement, steel reinforced concrete is not normally used.

(3) **Composite Pavement**. A combination of flexible and rigid pavement. This is normally the case when an existing rigid pavement is re-surfaced with one or more bituminous mixture layers.

e. **Shoulders**. Shoulders are areas adjacent to the edge of an aircraft pavement so prepared as to provide a transition between the pavement and the adjacent surface helps to reduce FOD. Preparation of the shoulder, as a minimum requires land clearance and subgrade grading to maintain the necessary longitudinal and transverse grades in the clearance zone area. Pavements normally used by aircraft at high speeds (e.g. Runway), a 3 m wide, paved transition strip is required.

3-6. Buildings

a.General. Buildings shall be constructed in accordance with host nation laws, seismic codes, other national building regulations and operational considerations. The size of a building depends on its function and is detailed, for each individual item, in the military criteria. The usable area should normally be at least 75% of the gross interior area. Each facility requires a clear, visible and individual identifier (e.g. Building number).

b.Occupied Facilities. A facility is considered occupied when its function requires the continuous presence of personnel inside it. This differs from the term “Inhabited Building” used in the context of explosive safety distances. Individual criteria items indicate whether a facility is considered occupied. Non-occupied facilities do not require toilets but may require other installations, depending on their function.

c.Types of Construction. In general, the following types of construction (for conventional, non-protective structures) are acceptable and should be followed with comparatively minor adjustment, utilising local materials and construction practices:

(1)Foundations. As required according to soil bearing conditions, type of superstructure and climatic conditions.

(2)Floor Construction. Floors will normally be of concrete, either reinforced carried on concrete joists or a waterproofed concrete slab directly on a well drained, consolidated, base. They should have sufficient strength to carry the design loads. At warehouses, workshops and other facilities where truck, forklift or other heavy equipment traffic is expected, floors should be designed for the heaviest vehicle likely to use the facility; a single wheel load of 2.50 t will be the minimum design load.

(3) Structure:

(a)Office Type Buildings. Building should be of conventional construction, austere and appropriate to local conditions.

(b) **Aircraft Hangars, Workshops and Storage Buildings**. Suggested construction is a steel or concrete column structure supporting a light steel roof truss. Where practical, provision should be made for the maximum amount of natural lighting. Thermal insulation is required.

(4)Roof (For Office Type and Workshop/Storage Buildings). Roofs may be flat**,** sloped or pitched, with pitched roof preferred. Surface material for pitched roofs will depend largely on local production. Thermal insulation is required.

(5)Floor Finishes. Floors should generally have a hard, durable and level concrete finish. Heavy-duty, non-slip, industrial floor coating is required in aircraft hangars and workshops. Floors in offices and precision workshops (e.g. Avionics) may require special treatment. Where technically required raised floors shall be installed.

(6)False Ceilings. Normally required only in office type buildings and precision workshops. These ceilings should be of fireproof materials. Plaster board, fibrous ceiling tiles or equivalent materials of local practice are suggested. Ceiling heights should be kept to the minimum compatible with the function of the building and acceptable by the local practice.

(7)Internal Installations. All **occupied** facilities will have lighting, HVAC (to the extent required), potable water, toilets and sewage installations.

(a)Lighting. The minimum scales of illumination normally required for the various functions of the buildings (or parts of buildings) are detailed in the table below. Localized, high intensity illumination requirements should be met by local light sources (normally transportable, then they are considered equipment items):

Function	**Lux**
Administration / Office type Building	500
Aircraft hangar	300
General purpose workshops	300
Workshops (precision work)	500
Warehouse	150

(b) Heating, Ventilation, Air Conditioning (HVAC).

1/ **Heating**. Heating will be provided to all occupied areas of buildings. Unoccupied vehicle garages, aircraft shelters and similar facilities that provide weather protection to equipment without personnel working inside, will only be heated in exceptional cases, when the extremely low temperatures will have an adverse effect on the equipment parked or stored inside. The heating will be designed to raise the average room temperature to a **maximum** of: 18 ºC for general purpose workshops, 22 ºC for office type buildings or precision work workshops and 5 ºC for non-occupied garages, warehouses and general utility areas such as heating plant rooms.

2/ **Ventilation**. As a minimum, general area ventilation will be provided in accordance with the national standards of health and safety. Local ventilation may be required for workshop and other areas of high concentration of fumes or gases.

3/ **Cooling (without humidity control)**. Will only be provided in geographical areas of extreme and prolonged heat (see definition in sub-para 1-14.b, above).

4/ **Air Conditioning**. Required in specific workshops, when the heat produced from the various equipment in operation would reach unacceptable levels for the reliable - and safe - function of this equipment. IT rooms (e.g. server rooms, simulators) require temperature and humidity control within small limits set by equipment specifications. Temperature and humidity control may also be required in storage compartments of warehouses to store specific spare parts susceptible to corrosion or deterioration (tires, metal spare parts, electronic equipment, medical supplies etc.) and in specified laboratories.

(c)Sanitary Facilities. Toilets are required in occupied buildings. Showers may be required in some aircraft maintenance workshops and are described, where necessary, in the individual items.

(d)Personnel Safety. Fences prohibiting close proximity of personnel to hazardous areas (e.g. Hydrazine, LOX) and personnel safety related measures are normally a national responsibility and should be in accordance with Host Nation regulations.

d.Fire Detection, Warning and Suppression. In general, occupied facilities require fire detection, warning and suppression systems to be provided in accordance with the applicable national fire standards. Certain measures may be required for unoccupied buildings and for other facilities under these national regulations. Because no common standards have been agreed for the use throughout NATO before, these systems are normally provided as part of Host Nation responsibilities or under bilateral arrangements.

e.Vehicle Parking. Vehicle parking is considered a functional part of the facility; it should be sized to accommodate only the average maximum number of duty vehicles expected to park simultaneously outside a building. A large truck needs 35 m for parking, while an area of 17.50 m can accommodate all other types of duty vehicles. These dimensions include clearances, access, etc. Two separate points of access may be required if 10 or more vehicles are accommodated in one area.

3-7. 30 Days Spare Parts

a. For some critical items (see term), the initial supply of non-consumable spare parts, sufficient to maintain the installation for a period of 30 days, is provided with the construction or restoration of the facility. Subsequently, the user nation is responsible to maintain/re-supply at least this stock of spares, after the equipment is put into operation.

b.The 30 days spare parts are normally spare parts related to machinery and electro-mechanical equipment and installations. They are extra to the spare parts used for normal peacetime maintenance, which is a national responsibility. Account must be taken of the following variable factors in determining the scale of provision of these spare parts:

(1)the time required to obtain delivery of items;

(2)the probable rate of use of equipment in times of crisis or war, not taking into account damage from enemy action;

(3)the need to supply spare units or assemblies for equipment which has been specially manufactured;

(4) technical recommendations from the manufacturer of the equipment.

c. The total cost for 30-days spare parts are limited to 1% of the equipment cost.

d. Criteria items that are considered **critical** in this context are identified in the Function of the Military Criteria Items.

3-8. **Utilities**

a. **Host Nation Agreements on Utilities**.

(1)Local utilities are governed by prior NATO agreements that require certain portions of the utility network to be provided by the host nation. These are detailed in NATO documents C-M(56)59 in combination with AC/4-R/1388.

(2)There are, however, a number of exceptions to this general arrangement, which have been agreed over the years and which should be considered in consultation with NATO and national authorities.

(3)Host nation provided portions of the utility systems are described under each sub-item in Item 30 under "Utilities".

b.Cost Effectiveness. The utility scheme should be chosen to serve a group of facilities or the entire network based on cost effectiveness, although consideration should be given to reliability and maintainability as well as minimising disruption to the military operation in the event of a failure to part of the system.

c. Quality of Construction.

(1)Construction to be permanent with service life as per sub-para 1-13.c. (4). above for peacetime and Tier 4 infrastructure. For operational infrastructure (Tier 2 and 3) the required service life is defined in the specific OPlan.

(2)Construction to comply with relevant national construction codes, or in case of operational infrastructure to comply with the commonly acknowledged rules of construction in NATO nations.

d. **Future Expansion**. Utility systems that are sized on utility demand should deal with all existing and currently planned facilities as well as making an allowance for unforeseen future requirements not to exceed 20% of the present requirements.

e. Utility Routings and Crossings.

(1)Avoid utility routing which passes under operational airfield pavements wherever possible. In the case where this is not possible, all utility crossing should be done in duct, in pair to allow for ease of repair/replacement.

(2)Where a utility crossing cannot be avoided under a pavement or other area which is likely to be subject to heavy vehicle loading, encase utility line in a protective duct.

(3)Across fields, utility lines do not require additional ducting or other special protection. Utility route surface markers may be required.

3-9. **Ammunitions Facilities.** Detailed technical standards, planning principles and requirements are provided in the Allied Ammunition Storage and Transport Publications (AASTP-1 through 3). National rules and regulations should be taken into consideration.

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PART IV

ITEM 1A – Runway (Military Criteria)

1. **Function.** To provide an aircraft pavement suitable for the use of aircraft at maximum weight to land and take-off at an airfield.

2. **Characteristics**

a. **Load Bearing Capacity**

(1)The runway must provide sufficient strength to meet the designated role(s) of the airfield in accordance with the AOS group. Representative ACNs of each of the groups are shown in the table of the Technical Preamble 1-15.c. The ACNs of individual aircraft are shown in the Aircraft Data Sheets and in AEP-46(B).

(2)A pavement supporting an AOS Group may be required to support infrequent use by individual aircraft belonging to a higher Group. Normally, ACN values for an individual aircraft of another Group up to 10% in excess of those listed can be considered to be met by the provision for that listed Group. However, frequent use at moderate overloads or infrequent use at more severe overload levels may shorten the service life of the pavement. In these cases, provision for a higher AOS Group may be necessary to meet the requirement, which should be determined on a case by case basis.

b. **Construction**

(1)Pavement. The runway pavement may be either of rigid or flexible type, except for the 150 m at each end of the runway, which shall be rigid to combat the effects of jet engine efflux. Braking Conditions/Skid Coefficient required in accordance with STANAG 3634.

(2)Shoulders. Anti-FOD shoulders are required on each side of the runway. Within each shoulder, a transition strip adjacent to the runway is required to provide 50% of the runway load bearing capacity. The remaining width of the shoulder is non load bearing. The transition drop-off from pavement to dirt shall not exceed 40mm.

(3)Overruns. The overrun pavement is required to provide 30% of the runway load bearing capacity.

(4)Cleared End Zone. This area should have a graded and stable non load bearing surface.

c. Dimensions

(1)Runway. The required length of the runway, defined as the distance between thresholds, is shown in the table below. Adjustment to the length required will only be considered where the elevation exceeds 200 m, and/or the highest average daily temperature for the hottest months exceeds 35 ºC. For existing runways, length to be restored will be determined on a case by case basis.

AOS Groups	Length (m)	Width (m)
RWA	490[6]	22.5
TFA, to include UAV[7]	2,440	30[7]
TTA , to include MPA	2,440	30[8]
AGS	2,440	45
AEW	3,000	45
STA, to include AAR	3,000	45
SBA	3,500	60

(2)Shoulders. Standard width of 30 m (7.5 m for RWA only), including the 3 m paved strip for fixed wing and 7.5 m for rotary wing aircraft abutting against the runway pavement (see Figure 1).

(3)Overruns. 150 m long (100 m for MPA, 22.5 m for RWA) from the threshold, with the width of the runway plus the paved shoulders (see Figure 1).

(4)Cleared End Zones. 275 m (125 m for RWA) long from the threshold with a width that includes the width of the runway plus the shoulders (see Figure 1).

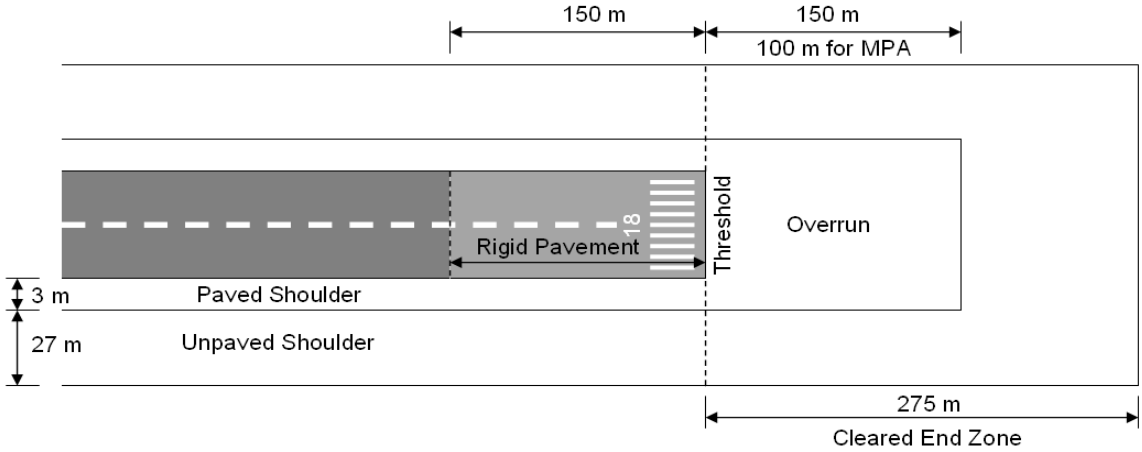


Figure 1 – Shoulders, Overrun and Cleared End Zone Dimensions.

[6] For airfields used by rotary wing aircraft only, the length will be enlarged to 610 m for airfields higher than 1200 m above sea level. Add 4% for each 5 ºC over 15 ºC average maximum daily temperature in the hottest month.
[7] UAVs may require less runway length and width.
[8] At MPA airfields the width required is:
- MOB/DOB : 45.0 m;
- FEB : 22.5 m.

(5) **Hammerhead**[9]. At airfields where there is no possibility of providing an adequate taxiway (see Item 3 for details) and the runway is not wide enough for transport aircraft turnaround, hammerheads (limited widening of the runway to provide a minimum turning circle) may be required.

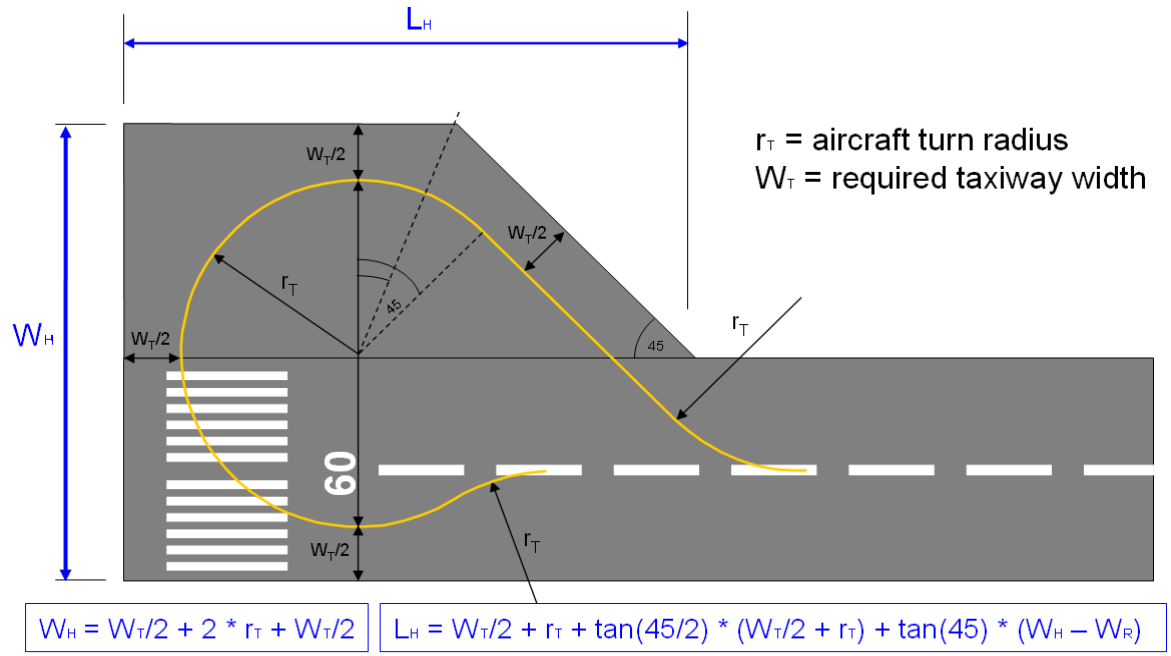


Figure 2 – Hammerhead Design.

[9] Also referred as “runway turn pads”.

d. Clearances

(1)Longitudinal. No obstruction should protrude through the approach surface, starting 60 m before the threshold and extending beyond it at a slope of one to fifty (1:50). At its start this surface has a width of 300 m (150 m either side of the runway centreline, conforming to the lateral safety zone) and it thereafter flares outwards to meet the projection of the lateral safety zone.

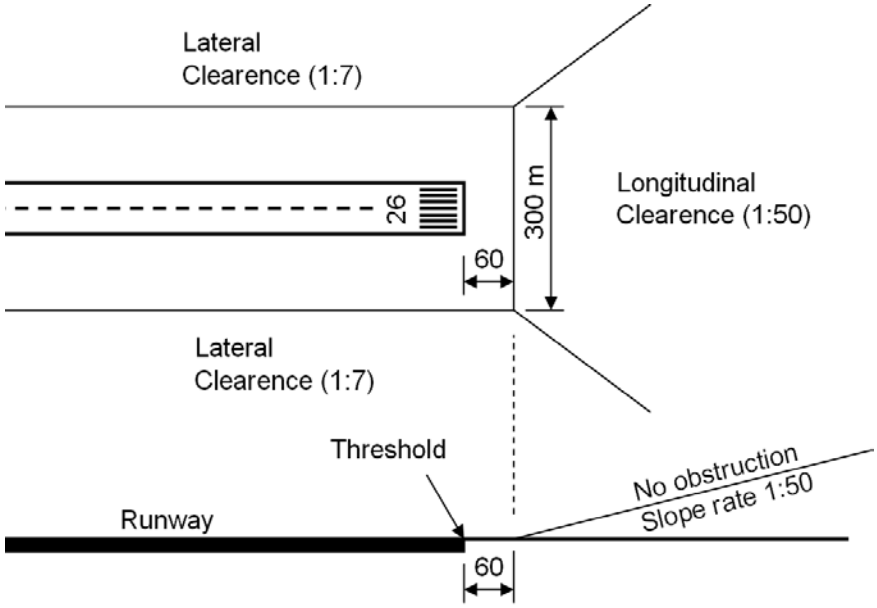


Figure 3 – Longitudinal Clearances.

(2) **Lateral**. A lateral safety zone (LSZ) is required for a distance of 150 m on each side of the runway centre line. With the exception of essential navigation and landing aids, there should be no obstructions within this zone (including parked aircraft). From its outer edge, no obstruction should protrude through a surface sloping upward and outward at the rate of one to seven (1:7).

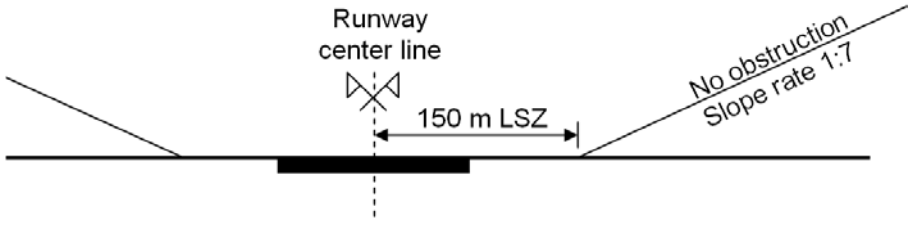


Figure 4 – Lateral Clearances.

e. Grades

(1) Runway

(a)Longitudinal. The longitudinal gradient of the runway will not exceed 1%. The distance between two successive changes of grade (distance between tangent points) will not be less than 300m. The rate of longitudinal change of grade will not be greater than 0.167% per 30 m. Line of sight

distances between any two points will not be less than 1800 m at 3 m height above the runway, and 900 m at 1.5 m height above the runway.

(b) **Transverse**. The transverse gradient should not exceed 1.5%. Minimum gradient shall be governed by drainage requirements.

(2)Shoulders. The transverse gradient shall not exceed 4%, sloped away from the pavement. Minimum gradient shall be governed by drainage requirements (min. 2% for RWA). The transverse gradient may vary along the length of the runway to conform to natural gradients.

(3)Overruns. Longitudinal grades shall not exceed 1.5% up or down. Transverse grades shall not exceed 3%. Minimum grades shall be governed by drainage requirements.

(4)Lateral Safety Zone and Cleared End Zones. Gradients shall not exceed 10%. Minimum grades shall be governed by drainage requirements.

f. **Lighting**. Runway lighting required as per Item 8.

g. **Day Marking**. Mandatory items for runway marking of STANAG 3158 – Day Marking of Airfield Runways and Taxiways – are required.

3. **Requirements**

a. **Runway**. One runway required.

b. **Cross-wind runway**. At locations with extreme wind conditions (see Extreme Weather Conditions – Technical Preamble), a crosswind runway may be required. It should meet the requirements of Item 2.

ITEM 1A- Runway (Technical Standards)

1. Characteristics

a.Construction

(1)Rigid or flexible pavement and accompanying shoulder pavement as per Technical Preamble – Pavements.

(2)Anti-skid treatments may be considered to meet the service life of an existing pavement.

b.Shoulders. The full width shoulder should be a levelled and graded area adjacent to the runway edges and stabilised by grass or other suitable vegetation. Except for the paved transition strip shoulder surfaces do not require any treatment to provide a load bearing capacity beyond that of the natural terrain. See Figure 1 on page 25.

c. Pavement Drainage

(1)In addition to the general requirements to drain the area adjacent to the runway, specialised drainage associated with the pavement structure is required.

(2)Runoff water from paved areas should be captured at or near the paved edge in dedicated drainage to prevent scouring of the adjacent natural terrain or the washing of silt onto paved surfaces. These drainage systems should have a cover to avoid damage to an aircraft undercarriage or to service vehicles.

(3)In certain soils of low permeability, sub-drains may be necessary to remove water from the underlying foundation of the pavement structure.

d. **Markings**. Markings should meet the requirements of STANAG 3158 - Day Markings of Airfield Runways and Taxiways.

e. **Ramping Down and Feathering**

(1)Ramping Down to match an overlay with existing paved surface gradients should not exceed the maximum longitudinal gradients given under the Military Criteria.

(2)Feathering strips are the tapered edges of an overlay and the transverse gradient of such strips should not exceed 3% although a maximum of 5% may be acceptable to avoid the need to raise the airfield lighting at the time of an overlay.

ITEM 1B - Arrestor Gear (Military Criteria)

1. **Function**

a. To bring a tactical fighter aircraft safely to a stop, within the confines of the paved surface of runway in the event of some abnormality that prevents normal take-off or landing.

b. This is a critical item, as described in the Glossary of Terms.

2. **Characteristics**

a. Arresting parameters (typical)

(1) Maximum Runout : 365 m.

(2) Speed : Up to 180 knots.

(3) Aircraft Weight : Max. normal take-off weight.

(4) Deceleration Force : ≤ 2G

b. **Arrestor Gear type**.

(1)Hook Type. Most common type; in use by the majority of aircraft; preferred type for flexibility of use. The ability to recess the cable system so that it is elevated to its normal arresting clearance from the runway surface only when needed is not a required characteristic. A remote control cable from an alternative location is not considered to be a required characteristic.

(2)Net Type. Required by some aircraft; erection time must not exceed three seconds. A remote control to raise and lower the net from alternative location is considered to be a required characteristic.

c. **Location**. A distance of 400 m should be provided between the Hook type Arrestor gear location and the threshold (see Figure 5). Net type arrestor gear will be installed in the overrun.

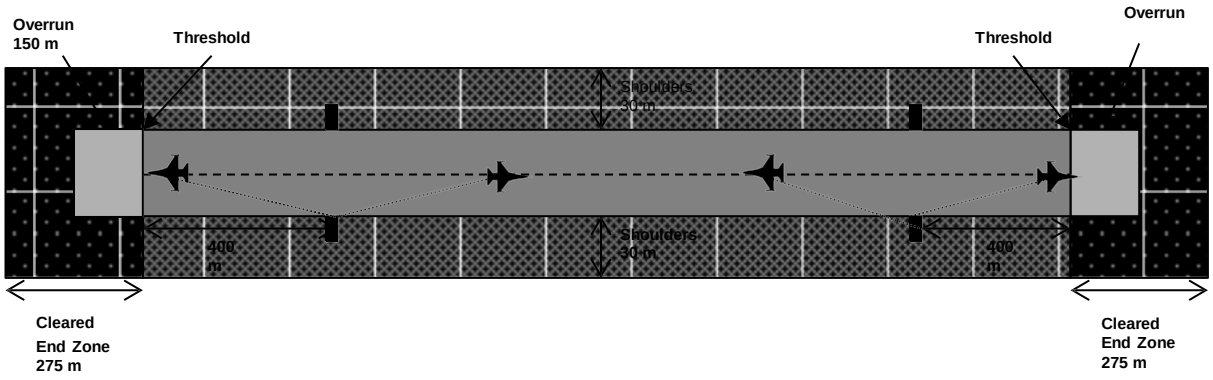


Figure 5 – Arresting System Location.

d. The asset may be fixed or mobile (deployable).

3. Requirements. Arrestor gears for tactical fighter aircraft are required at:

a. MOB. Two gears, fixed preferred, one at each runway end.

b. DOB. Two gears, one at each runway end; asset may be deployable.

ITEM 1B - Arrestor Gear (Technical Standards)

1. Characteristics

a.Where net type arrestor gear is used, the maximum allowable erection time (from fully down to ready for engagement position) will be determined on a case by case basis, dependent upon the actual runway length, the elevation of the airfield, the average highest daily temperature for the hottest month, and the performance characteristics of the aircraft using the airfield[10]. It should not, however, exceed the time stated in the Military Criteria for this Item.

b.A hook type system consists of a pendant cable across the runway, kept at the necessary clearance from the surface by means of rubber rings.

c.An existing, in good operating condition, arrestor gear with lesser capacity is not required to be modified or replaced (in order to meet the above characteristics) if its capacity is more than 80% of the energy requirement determined from aircraft weight, speed and deceleration.

2. Requirement

a. The arrestor gear is to be located according to Military Criteria. Precise siting should be decided by the user nation, in consultation with the host nation.

b. The requirement will be considered to have been met with the initial positioning of the arrestor gear when installed in accordance with the User Nation's advice. Any subsequent re-positioning will not be considered to be a requirement.

c.Where cables are installed across the runway surface, no changes in pavement type must occur within the centre 23 m of the runway for a longitudinal distance of 60 m in either direction from the cable. Additionally, longitudinal surface deviations within this area shall not exceed 3 mm in 4 meters.

d.Aircraft arresting system location signs or pavement markings shall not be provided for systems located in overruns. Such markings could cause a pilot to engage a unidirectional system from the wrong direction.

e.Consider installing cable tie down anchors beneath operational systems to limit cable bounce and potential aircraft damage during aircraft rollover.

[10] See Aircraft Data Sheets.

ITEM 1C – Helipads and Landing Lanes (Military Criteria)

1. **Function**. To provide an aircraft pavement suitable for the use of rotary wing aircraft at maximum weight to land and take-off at an airfield.

2. **Characteristics**

a. **Load Bearing Capacity**. Same as Item 1A for rotary wing aircraft

b. **Construction**

(1)Pavement. The pavement may be either of rigid or flexible type

(2)Shoulders. Anti-FOD shoulders, 7.5 m wide, are required on each side of the pavement. For helipads the load bearing requirement for loading equipment shall be considered.

(3)Cleared End Zone. This area should have a graded and stable non load bearing surface.

c. **Dimensions**

(1)Helipad. The standard size is 30 30 m. For VFR limited use 15 15 m is acceptable. Further details contained in STANAG 7114.

(2)Landing Lane. A landing lane consists of a series of at least 4 helipads. The length is based on the number of touchdown points, evenly spaced along the landing lane. The distance between touchdown points shall be not less than 120 m, with the first and last points 60 m in from the ends. The width is 22.5 m. Longitudinal grade should be maximum 1%; transverse grade should be maximum 1.5%. The maximum longitudinal grade change shall be 0.167% per 30 m with an allowable exception of 0.4% per 30m for the edge of landing lanes at intersections. See Figure 6 below.

(a)Overruns. 22.5 m from the end of the landing lane with the width of 37.5m. Longitudinal grades shall not exceed 1%. Transverse grades shall not exceed 3%.

(b)Cleared Zone. 125 m long from the ends and the centre line of the landing lane. The gradients will not be greater than 5%, minimum gradient 2%.

d. **Clearances**.

(1)Helipads. Details in STANAG 7114.

(2)Landing Lanes. The Landing Lane lateral clearance zone corresponds to the half width of primary surface area: VFR 45.72 m/ IFR 114.3 m. See Figure 6.

e. **Shoulders**. The transverse gradient will not be greater than 4%, minimum gradient 2%.

f. **Lateral Safety Zone**. Gradients shall be between 2% and 5%.

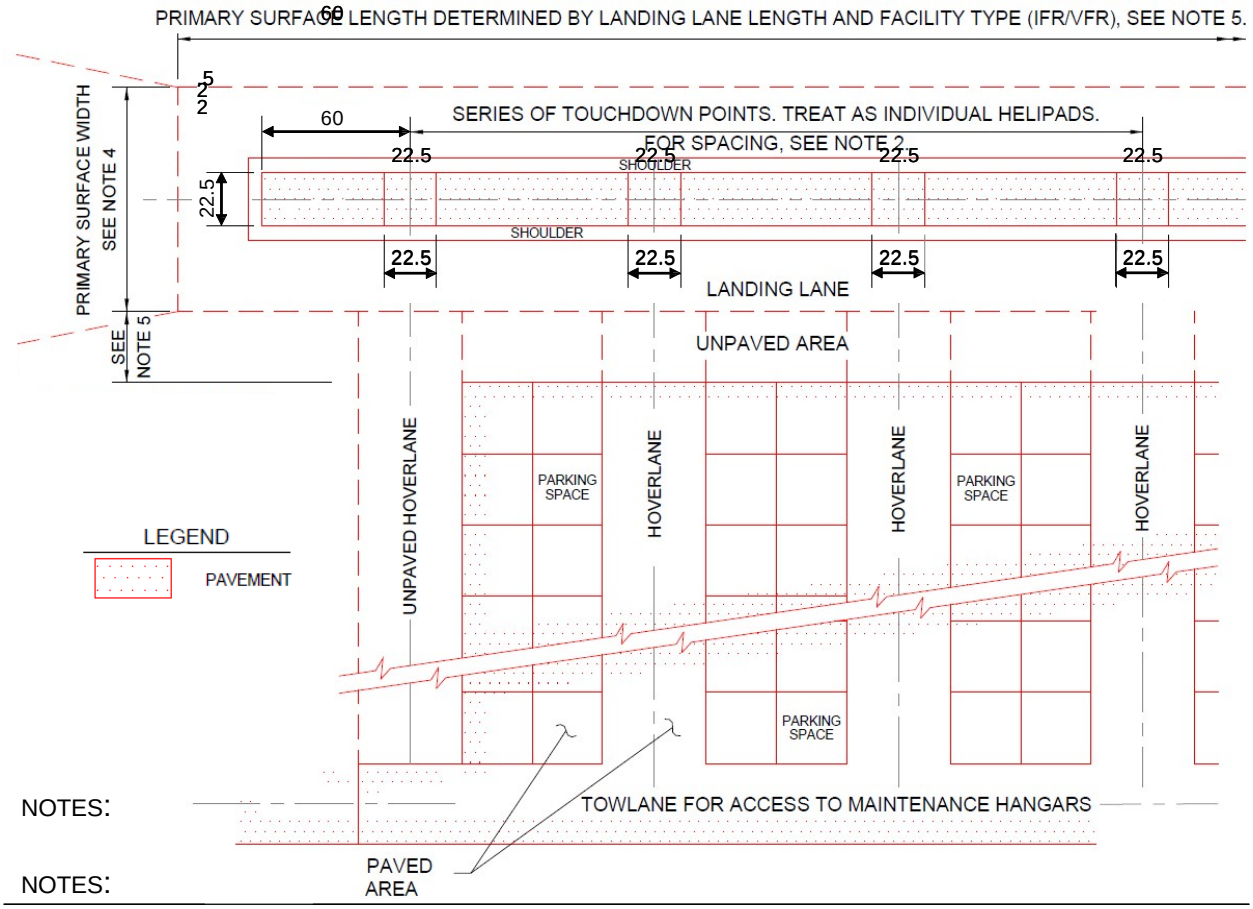
g. **Lighting**. Required in accordance with STANAG 3619.

h. **Day Marking**. Required in accordance with STANAG 3619.

3. Requirements

a. **Helipad**. Provided for RWA take off / landing operations where no runway or landing lane exists.

b. **Landing lane**. Required as determined by the NMAs, where no runway is provided or where approach procedures for the existing runway conflict with numerous RWA rapid take off/landing operations (See Figure 6).



1. Width of hover lanes and parking spaces are determined by the type of helicopter used and the clearances required.
2. The distance between the touchdown points is determined by the distance between hover lane centerlines and is usually not less than 120 m centre-to-centre.
3. Size and layout of the parking apron varies with the type of helicopter used and the mission requirements.
4. Primary surface width is 91.44 m for VFR facilities and 228.60 m for IFR facilities.
5. Primary surface length is the landing lane length plus 68.60 m for Air Force, Navy, and Marine Corps VFR landing lanes. For Army landing lanes, and Air Force, Navy, and Marine Corps IFR landing lanes, the primary surface length is the landing lane length plus 121.92 m or 510.54 m, whichever is greater.
6. Minimum distance between the primary surface and the apron is determined by the transitional surface clearance to parked aircraft.

Figure 6 – Rotary Wing Landing Lane.

ITEM 1C- Helipads and Landing Lanes (Technical Standards)

1. **Characteristics**

a. **Construction**. Rigid or flexible pavement and accompanying shoulder pavement as per Technical Preamble, Pavements. Helipads require rigid pavement.

b. **Shoulders**. The full width shoulder should be a levelled and graded fully paved, non load bearing area adjacent to the helipads or landing lanes edges.

c. Pavement Drainage

(1)In addition to the general requirements to drain the area adjacent to the helipads or landing lanes, specialised drainage associated with the pavement structure is required.

(2)Runoff water from paved areas should be captured at or near the paved edge in dedicated drainage channels to prevent scouring of the adjacent natural terrain or the washing of silt onto paved surfaces. These channels should be covered to avoid damage to an aircraft undercarriage or to service vehicles.

(3)In certain soils of low permeability, sub-drains may be necessary to remove water from the underlying foundation of the pavement structure.

d. **Markings**. Markings should meet the requirements of STANAG 3158.

e. **Ramping Down and Feathering**

(1)Ramping Down to match an overlay with existing paved surface gradients should not exceed the maximum longitudinal gradients given under the Military Criteria.

(2)Feathering strips are the tapered edges of an overlay and the transverse gradient of such strips should not exceed 5%.

ITEM 2 - Parallel Taxiway/Emergency Runway (Military Criteria)

1.Function. To provide an aircraft pavement suitable for the dual function of transit to/from the runway and to provide an emergency runway for operational redundancy. This facility will not have the complete characteristics of a fully operational runway. Exceptional considerations may apply to this Item as defined in the Military Preamble.

2. Characteristics

a.Load Bearing Capacity. The parallel taxiway/emergency runway must provide sufficient strength to meet the designated role(s) of the airfield. The assessment of the required strength is the same as for the runway, Item 1A.

b. Construction

(1) Pavements. Same as Item 1A.

(2) Shoulders. Same as Item 1A.

(3) Overruns. Not required.

(4) Cleared End Zones. Same as Item 1A.

(5) Hammerhead. Not required.

c. **Dimensions**

(1)Parallel taxiway/Emergency runway. The length of the parallel taxiway/emergency runway should be similar to that of the runway, except for MPA which should be 2,000 m. The width required is 22.5 m.

(2) Shoulders. Same as Item 1A.

(3)Cleared End Zones. Same as Item 1A. These cleared end zones shall not extend beyond those provided for Item 1A.

d. **Clearances**

(1)Longitudinal. Same as Item 1A.

(2)Lateral. The centre-line shall be not less than 150 m from the runway centre-line. In addition there will be a minimum of 100 m separation between the centre-line and:

(a) Centre-line of any taxiway

(b) Aircraft parking platform (except arm/disarm pads).

(c) Nearest edge of building, facility, tree or aboveground obstacle unless such an object is specifically sited as a part of this criteria (e.g. GCA radar).

e. **Grades**

(1) **Parallel Taxiway/Emergency Runway**. Same as Item 1A.

(2) **Shoulders**. Same as Item 1A.

(3) **Cleared End Zone**. Same as Item 1A.

(4) **Lateral Safety Zone**. Same as Item 1A.

f. **Lighting**. Required as per Item 8. The lights should use removable colour filters so their colour can be changed to white when functioning as an emergency runway.

g. **Day Marking**. Taxiway centre-line marking is required.

3. **Requirements**. One parallel taxiway/emergency runway is required for:

a. MOBs and DOBs for TFA with more than 48 tactical fighter aircraft.

b. MOBs and DOBs for MPA on a case by case basis. However, if a crosswind runway is provided under Item 1A, such a runway may be considered to meet the requirement for this item.

ITEM 2- Parallel Taxiway/Emergency Runway (Technical Standards)

1. Characteristics

a. Construction

(1)Rigid or flexible pavement and accompanying shoulder pavement as per Technical Preamble, Pavements.

(2)Anti-skid treatments on flexible surfaces may be considered to prolong the service life of an existing pavement and should follow STANAG 3634 and not be likely to produce FOD before a new overlay can be placed. Anti-skid treatments on new surfaces will require special justification.

b. Shoulders

(1)The full width shoulder should be a levelled and graded area adjacent to the runway edges and stabilised by grass or other suitable vegetation. Shoulder surfaces do not require any treatment to provide a load bearing capacity beyond that of the natural terrain.

(2)The transition strip immediately adjacent to the parallel taxiway edge should be constructed as a pavement structure with sufficient surface thickness to prevent break-up and hazard from FOD.

c. Pavement Drainage.

Same as Item 1A.

d. Markings

Same as Item 1A.

e. Ramping Down and Feathering.

Same as Item 1A.

ITEM 3 – Taxiway (Military Criteria)

1. **Function**. To provide suitable pavement for the ground movement of aircraft between the various aircraft operational areas and facilities.

2. **Characteristics**

a. **Load Bearing Capacity**. The load bearing capacity should normally be that of the runway. If, however, aircraft from different AOS Groups use the airfield, the taxiways dedicated to the exclusive use of the lighter group of aircraft (e.g. taxiways leading to tactical fighter aircraft dispersal areas) should be constructed to fulfil exclusively the requirements of that group.

b. Construction

(1)Pavements. Taxiway pavement may be either rigid or flexible. However, the last 150 m of taxiway leading to the ends of the runway shall be of rigid pavement to combat the effects of jet engine efflux and fuel spillage.

(2)Shoulders. To minimise FOD problems, non-load-bearing shoulders must be provided.

c. **Dimensions**

(1) **Pavements**. The width of each individual taxiway is based on the most demanding AOS Group likely to use it:

AOS Group	Width (m)
RWA	12
TFA	12
TTA, MPA	15
AEW, AGS	22.5
STA, AAR	22.5
SBA	22.5(11)

(2) **Shoulders**. Shoulders shall be 3 m wide, 7.5 m for RWA. Where position of engines dictate, shoulder treatment should be provided to a line 3 m beyond the outboard jet engines or propeller tips when aircraft are centred on the taxiway.

[11] Aircraft with a larger wheel track will require wider taxiways, e.g. B-52G

(3) **Curve and Fillet Radii**. Radii of curves and fillets of taxiway pavement will be as follows:

Curve or Fillet	Radius (m)	
	RWA, TFA, TTA (except MPA)	AEW, AGS, STA, SBA (and MPA)
All curves (Minimum centre-line radius)	75	100
Intersection with Runway or Parallel Taxiway/ /Emergency Runway (Minimum Edge (fillet) radius)	30	45
Intersection with Taxiway, Platform or Apron (Minimum Edge (fillet) radius)	10	30

d. **Clearances**. The following clearances[12], as measured from the taxiway centre-line to any above-ground obstacle, including aircraft, stationary or parked, are required:

AOS Group	Clearance (m)
RWA	30
TFA	15
TTA, MPA	35
AEW, AGS	35
STA , AAR	45
SBA	45

e. **Grades**

(1)Pavements. The longitudinal gradient should not exceed 3%. Effect of jet blast due to engine run-up should be considered. The transverse gradient shall be between 1% and 2%.

(2)Shoulders. Longitudinal grades will follow those of the pavement. Transverse gradient should not exceed 4%, while its minimum will be governed by drainage requirements.

Note:
Where existing taxiways, wider than the NATO requirement, are to be overlaid, the full strength overlay can be limited to the required NATO width and then feathered down to the existing pavement level at a maximum gradient of 4%.

f. **Lighting**. Edge lighting is normally required, as per Item 8. Where necessary (see Item 8), inset lights may be installed in the structure of the pavement.

g. **Day Markings**. Required as per STANAG 3158 but limited to centre line and taxi-holding position markings.

[12] Exceptions may be applied for flight safety, physical and force protection facilities.

3. **Requirements**. The minimum necessary length of taxiways should be provided to meet operational requirements for the ground movement of aircraft. The following guidance should be observed:

a.Link Taxiway. Taxiways linking the ends of the runway with the ends of the parallel taxiway/emergency runway are required. Two further link taxiways are required, normally at the 1/3-runway length positions, if the runway exceeds 2,440 m. Only one intermediate link taxiway is normally required when the parallel taxiway/emergency runway is less than or equal to 2,440 m long. However, another link taxiway is necessary if rapid access to and from tactical aircraft dispersal areas is required.

b. Connections to Dispersed Platforms

(1)Tactical Aircraft. Each dispersed parking platform is to be connected, either directly or via a stub taxiway, to a taxiway with two means of access to the runway.

(2)Transport and MPA Aircraft. Each dispersed parking platform is to be connected by a stub taxiway to a taxiway system providing separate access to either end of the runway.

c. **Dispersed platforms grouped into dispersal areas**. The following standards will be observed:

(1)10 aircraft or less. Connecting taxiway to the runway end nearest to the centre of the area and one further taxiway connection to an intermediate point on the runway.

(2) 11 to 16 aircraft. Taxiway connecting to both ends of the runway.

(3)17 to 32 aircraft. Taxiway connections to both ends and one additional intermediate link taxiway to the runway.

(4)33 aircraft or more. Taxiway connections to both ends and two additional intermediate link taxiways to the runway.

d.Connections to Mass Parking Platforms for Tactical and Transport Aircraft. Mass parking platforms should have two separate taxiway access routes to the runway. Based on aircraft deployments in times of tension, crisis or war, taxiway connections are required:

(1)16 aircraft or less. To the runway end nearest the centre of the dispersal area with one further connection to an intermediate point of the runway.

(2) 17 aircraft or more. To both ends of the runway.

e.Connections to Aircraft Maintenance Aprons. Access between maintenance aprons and runway should be integrated, to the maximum extent possible, with taxiway serving aircraft parking platforms.

f. Connections to In-Transit Aircraft Parking Platforms

(1)At TFA airfields, where there is no permanent basing of transport aircraft, taxiway capable of use by such aircraft in-transit (including strategic transport aircraft), should normally provide access to one end of the runway only. The remaining taxiway requirements for these aircraft may be met by backtracking along the runway.

(2)At all other airfields except where strategic transport aircraft are based, the requirements of paragraphs 3.c. and 3.d. are applicable.

ITEM 3 – Taxiway (Technical Standards)

1. **Characteristics**

Same as Item 1A.

ITEM 4 - Aircraft Parking Platforms (Military Criteria)

1.Function. To provide platforms for aircraft parking and preparation for their operational tasks. The platform may have the secondary function of providing aircraft de-icing (under power) or loading and unloading explosives and other hazardous cargo from aircraft.

2. Characteristics

a. Load Bearing Capacity. Same as in Item 1A.

b. Construction

(1)Platforms. Parking platforms should be of rigid pavement.

(2)Shoulders. Shoulders shall provide anti-FOD protection. No bearing capacity required.

c. **Dimensions**

(1)Platforms. Platform sizes are dictated by the type of aircraft to be deployed, its movement pattern on the platform and the necessary clearances. Mass parking should provide adequate separation between stationary aircraft occupying adjacent spaces, and take into consideration the requirement for any adjacent through taxiways and the necessary space for servicing of the aircraft.

(2)Shoulders. To minimize FOD problems, 3 m wide for fixed wing, 7.5 m wide for rotary wing, shoulders must be provided. Where used by transport aircraft, shoulders should extend to a line 3 m beyond the outboard jet engine or propeller tips, taking in consideration the manoeuvring pattern.

d. **Clearances**

(1) Provide a minimum clearance between the free edge of the apron and above ground obstacles equal to the greater of:

(a)	0.5 x Wingspan		15 m
(b)	TFA	:	
	TTA, MPA	:	20 m
	AEW, AGS	:	20 m
	STA	:	35 m
	SBA	:	35 m
(c)	RWA	:	1x rotor diameter

Exceptions may be applied for flight safety, physical and force protection facilities.

(2) For unimpeded movement of aircraft on aprons in relation to other parked aircraft and any cargo handling, provide the following clearances from any part of the moving aircraft:

AOS Group	Clearance (m)
RWA	1x rotor diameter
TFA	6
TTA, MPA (wingspan ≤ 30m)	9
TTA, MPA (wingspan > 30m)	15
AEW, AGS	15
STA	15
SBA	15

(3) Through taxiway clearances to any parked aircraft must be provided as per Item 3 - Taxiway, para 2.d.

The following sketch illustrates the clearances defined in this paragraph:

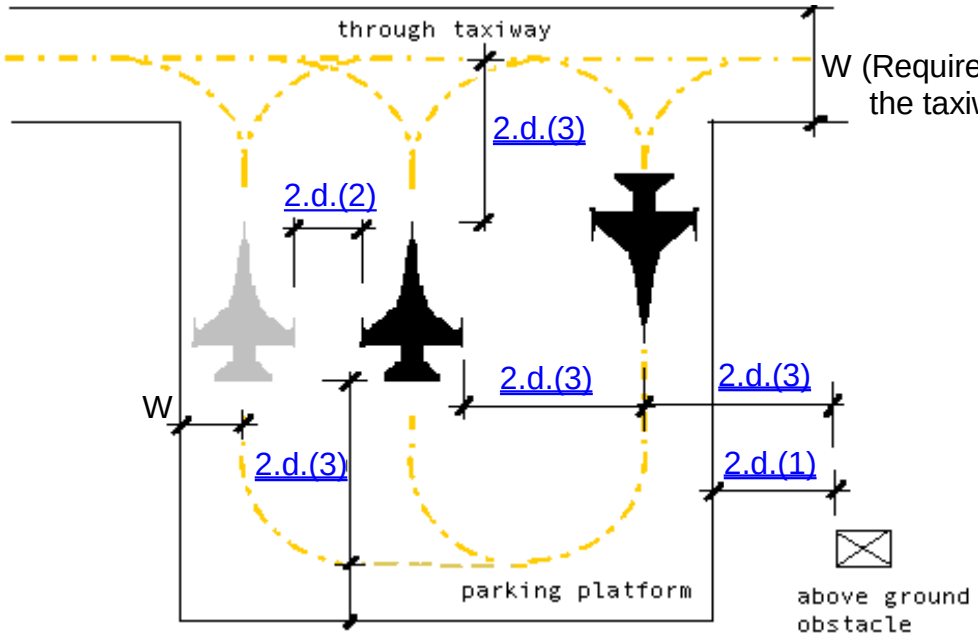


Figure 7 – Aircraft Parking Platforms Clearances.

e. **Access**. Two access points are required for mass parking and one point for an individual parking platform.

f. Lighting

(1)Airfield Lighting. Edge lighting (as per Item 8) is required.

(2)Apron Floodlighting. Required for cargo handling purposes. Standard should be considered as an equipment item (see definition in Technical Preamble), except permanently used apron for cargo handling.

g. **Grounding Points**. A minimum of one grounding point is required for each parking space.

h. **Mooring Points**. Required for RWA, for fixed wing aircraft on a case by case basis (e.g. extreme wind conditions)

i. **Day Marking**. Taxiing guidance to parking positions shall be provided. These markings shall have the same characteristics as taxiway centre lines.

j. **Utilities**. At the apron used for de-icing drainage should be provided as appropriate.

k. **Security Fencing**. Required for QRA areas, NAEW and AGS.

3. **Requirements**

a.Assigned Aircraft. Parking space is required for 100% of assigned aircraft of all categories, taking into account space provided in aircraft hangars (Item 19A) and on maintenance aprons (Item 6A). This is achieved by providing 15% inside the Hangar (rounded down at DOB and rounded up at MOB), 15% on maintenance aprons (rounded up at DOB and rounded down at MOB) and the remaining 70 % under this item. Available spaces in or in front of A/C shelters, under Item 19B, will be considered to meet part of the requirement. For AGS aircraft parking 15% are accounted in the Maintenance Hangar and 85% in Weather Shelters.

b.Mass parking is acceptable. For air bases with a higher threat level (identified by the NMAs) dispersed parking is required.

c.In-Transit Transport Aircraft. Based on the number of operational aircraft, spaces for in-transit transport aircraft are required as shown in the table below. Siting considerations to allow use as hazardous cargo apron must be made. The area to be provided for each space, including cargo handling allowance but excluding manoeuvring requirements, is:

(1) Tactical Transport A/C = (Wingspan + 6 m) x (Length + 15 m)

(2) Strategic Transport A/C = (Wingspan + 12 m) x (Length + 25 m)

Assigned aircraft	**Number of spaces**	
	STA	**TTA**
≤ 32 (tactical / to include UAV)	1	2
≤ 6 (MPA)		
> 32 but < 64 (tactical)	2	4
> 6 (MPA)		
NAEW MOBs	1 at each runway end	
In excess of above	case by case	

Notes:

a. The NMA will direct whether spaces for strategic and/or tactical transport aircraft should be provided.

b. Available paved areas such as second parallel taxiway or unused taxiway loops may be considered to meet part of the requirement.

c. At RWA airfields that lack a full runway the in-transit requirement does not apply.

d. Hazardous Cargo Apron. They require explosive site planning in accordance with AASTP-1. Hazardous Cargo Aprons are required at facilities where the existing aprons cannot be used for loading and unloading hazardous cargo. For apron size, see 3.c above.

ITEM 4 - Parking Platforms for Aircraft (Technical Standards)

1. **Characteristics**

a. **General**. The General Characteristics of Rigid and Flexible Pavements and Shoulders are given in the Technical Preamble, 1-15. Pavements.

b. Access

(1)Access standards as per Item 3, Taxiway.

(2)Access to mass parking aprons normally provided by siting massed parking alongside and parallel to the adjacent taxiway. Two points of access required.
(3). Additional space is to be provided on the mass parking platform to permit taxiing by aircraft around the perimeter to ensure independent movement to and around individual parking spaces.

c. **Space on the Apron for Massed Parking**. For parking space sizes refer to Military Criteria.

d.Space on the Apron for Individual Platforms. For Individual Platforms, provide an area based on a circle of a radius equal to the turning radius of the aircraft, wheels not locked plus 3 m. Where a rectangular pad is provided, this should contain the circle described.

e.Drainage. Surface drainage and collection is required. Appropriate containment or treatment devices (e.g. de-icing chemicals, fuel etc.) must be considered. These devices should be located downstream from any probable area of spill.

f. Grounding Points

(1)Ensure adequate grounding by driving a non-corrosive conductive rod sufficiently deep into underlying soil to establish electrical grounding.

(2)Provide a surface grounding point connected to the above grounding rod able to accept a grounding cable from the aircraft. Each grounding point shall have a maximum resistance of 10 K Ohms.

g. **Mooring Points**

(1)Ensure tie down of aircraft in accordance with aircraft technical orders.

(2)Where the mooring points are to be constructed in rigid pavement, the rods may be installed without bottom anchors. Mooring points should be a minimum of 0.6 m from any pavement edge or joint. Where flexible pavement is constructed the tiedowns shall be designed for adequate structural capacity.

h. **Shoulders - Additional Measures**. Additional surface stabilisation or deflectors only required in exceptional cases beyond shoulder to prevent FOD.

i. Gradients

(1)Provide minimum 1% and a maximum 1.5% paved surface gradient.

(2)Provide minimum 2% gradient on non-paved surface sloping toward drainage catchment points.

j. **Airfield Lighting**. Airfield and Area Lighting details are given under Item 8 - Airfield Lighting.

ITEM 5 - Arm/Disarm Pad (Military Criteria)

1. **Function**. To provide an apron suitable for the safe arming/disarming of weapons.

2. **Characteristics**

a. **Location**. Arm/Disarm pads should be located near the runway ends.

b. **Load Bearing Capacity**. As in Item 1A, as required for the relevant aircraft.

c. **Construction**. Same as in Item 4.

d. **Dimensions**.

(1)Platforms. Platform dimensions are dictated by the type of aircraft. They should allow independent access to and exit from each arm/disarm space, under their own power.

(2) Shoulders. Same as in Item 4.

e.Clearances. To guarantee unimpeded use of the pad, and in addition to the clearances defined under Item 4, a clearance of 75 m should be provided between any part of an aircraft using the pad and the runway centre line.

f.Safe Heading. If safe headings are not achievable, revetments may be required to protect exposed occupied facilities.

g.Lighting. The edge lighting of the adjacent taxiway should be extended to the outside edge of pad.

3. **Requirements**

a. **TFA/UAV(armed)**. Two Arm/Disarm pads, each to accommodate two tactical aircraft, are required on MOBs and DOBs, one at each end of the runway.

b. **MPA**. A single Arm/Disarm pad to accommodate one aircraft is required at MPA MOBs and DOBs that have no more than 6 aircraft. Where that number is exceeded, consideration should be given to constructing a pad to accommodate two aircraft.

c. **Attack/Antitank Helicopter**. A single Arm/Disarm pad, located off a taxiway, near the end of the runway

d. Suitable existing platforms may fulfil this requirement.

ITEM 5 - Arm/Disarm Pad (Technical Standards)

1. **Characteristics**

a. **General**. Rigid pavement and accompanying shoulder as per Technical Preamble, 1-15. Pavements.

b. Access

(1) Access normally provided by siting directly alongside the adjacent taxiway.

(2) Exceptional access as per Item 3 - Taxiway.

c. **Space on the Pad**. Pad to be sized according to Military requirements. Allow each aircraft to taxi into position, to turn out and exit, wheels unlocked, without conflict with other aircraft using the pad.

d. Revetments

(1)The requirement for revetments, its length as well as their exact positioning will be determined case by case. Use of revetments should be minimised and optimised to that strictly necessary to protect exposed occupied facilities or valuable assets from an accidental misfire.

(2)Bermed revetment height must provide protection 1 m above the calculated impact point of the aircraft weapon of the aircraft occupying the pad. Revetment must have a minimum crown thickness of 1 m.

(3) Revetment to meet all clearance requirements.

(4)All necessary clearances shall be measured from the foot or base of the revetment, i.e. from the widest point of its construction.

(5)Where space restrictions or other clearance requirements do not allow a bermed revetment to be constructed, gabions or similar reinforced earth construction may be utilised.

e. **Shoulders - Additional Measures**. Additional surface stabilisation beyond shoulder only required in exceptional cases to prevent FOD.

f. Gradients

(1)Paved Surfaces. Minimum 1%, maximum 1.5%. Shoulders may have increased gradients to meet drainage conditions.

(2) **Non-paved Surfaces**. Minimum 2% gradient.

g. **Airfield lighting**. As per Technical Standards, Item 8 - Airfield Lighting.

h. **Markings**. Provide day markings to define the taxiing and manoeuvring path on the pad for each of the two aircraft to optimise the use of the pad.

ITEM 6A - Apron for Maintenance and Inspection of Aircraft (Military Criteria)

1.Function. To provide an apron for first and second echelon maintenance and for periodic inspection of aircraft (under towing). The apron has the secondary functions of providing aircraft parking and washing.

2. Characteristics

a. **Location**. Maintenance aprons should be sited adjacent to aircraft maintenance facilities.

b. **Load Bearing Capacity**. Same as in Item 1A, as required for the relevant aircraft.

c. **Construction**. Same as in Item 4. Tie-downs should be provided, as required by aircraft technical orders.

d. Dimensions

(1) Same as in Item 4, with a minimum free space of:

- TFA: (Wingspan + 5 m) (Length + 10 m)
- All other: (Wingspan + 5 m) (Length + 5 m)

(2) Additional space for specific maintenance purposes needs to be justified on a case by case basis.

e. **Clearances**

(1) For unimpeded movement of towed aircraft on the apron, provide the following clearances to other parked aircraft, any cargo handling / maintenance equipment, or maintenance hangars:

AOS Group	Clearance (m)
RWA	6
TFA	6
TTA, MPA	9
AEW	9
STA, AAR	9
SBA	9

(2) Through taxiway clearances to any parked aircraft must be provided as per Item 3, para 2.d.

f. **Lighting**

(1) Airfield Lighting. Edge lighting (as per Item 8) is required.

(2) Apron Floodlighting. Is required (see definition in Technical Preamble).

g. **Grounding Points**. Required for each parking space as per aircraft technical orders.

h. **Mooring Points**. Required for RWA, for fixed wing aircraft on a case by case basis (e.g. extreme wind conditions)

i. Utilities

(1)At the apron used for washing water and drainage should be provided as appropriate.

(2) At NAEW airfields, one installed frequency converter and one dehumidifier unit are required per each two parking spaces, adjacent to the pavement.

j. **A/C Engine Blast Deflection**. Engine Blast deflectors are required where buildings or installed facilities are endangered. This will be identified on a case by case basis.

3. **Requirements**

a.General. Maintenance aprons are required to accommodate for 15% of assigned aircraft (rounded up or down as per Item 4), subject to a minimum of one apron adjacent to each required maintenance hangar. One of the aprons should be provided with washing utilities for one aircraft. At NAEW airfields security fence is required.

b. NAEW FOBs/FOL. Space is limited to a maximum of five aircraft.

ITEM 6B/C - Apron for Aircraft Engine Testing – Engine Installed/Not Installed (Military Criteria)

1. **Function**. To provide a suitable apron for testing jet aircraft engines installed or not installed in aircraft.

2. **Characteristics**

a. **Item 6B - Engine Installed**

(1)Location. Site to minimize noise nuisance to the remainder of the airfield and surrounding areas, and to minimize the distance between the apron and aircraft maintenance areas. Whenever possible, the apron should be orientated so that the aircraft, when tested, may be headed into the direction of the prevailing wind.

(2)Load Bearing Capacity. Same as in Item 1A, as required for the relevant aircraft.

(3)Construction. Rigid pavement with tie-downs and anchor block(s) as required by aircraft technical orders. Shoulders shall provide anti-FOD protection only.

(4) Dimensions

(a)Pavements. Unless expressly specified in the aircraft datasheet, the apron should have the following dimensions:

(Wingspan + 5 m) (Length + 10 m)

(b) Shoulders. Same as in Item 4.

(1) Clearances. Same as in Item 4.

(2)Grounding Points. To be provided as per aircraft technical orders with a minimum of one grounding point per apron.

(3)A/C Engine Blast Deflection. Engine blast deflectors may be required on a case by case basis.

b. **Item 6C - Engine Not Installed**

(1)Location. As per paragraph 2.a.(1) above.

(2)Construction. Pavement with suitable hold-down anchorage and capable of supporting a single wheel load of 2,500 kg. Shoulders are not required.

(3) Dimensions. An area of 400 m is required.

(4)Support Facilities. One 5 m light structure for observation purposes, one 20 m fuel tank and electrical power, are required.

(5) **A/C Engine Blast Deflection**. Engine blast deflectors may be required on a case by case basis.

3. Requirements

a. Item 6B - Engine Installed

(1) Aprons are required at MOBs and DOBs as follows:

Number of A/C	Aprons required
1 - 48	1
49 - 96	2
more than 96	3

(2) **NAEW**. Minimum of two aprons, one with noise suppression facility to meet Host Nation regulations, are required at MOB. Security fence required on a case-by-case basis.

b. **Item 6C - Engine Not Installed**. One apron provided with the support facilities is required only at MOBs that have an aircraft engine workshop.

c. **Equipment**. Except for NAEW /AGS, noise suppression installation and floodlighting are considered as equipment items (see Technical Preamble 1-12 d).

ITEM 6D - Apron for Aircraft Compass Calibration (Military Criteria)

1. **Function**. To provide a suitable apron for the calibration of aircraft navigation systems.

2. **Characteristics**

a.Location. Siting will be governed by the technical requirements of the system to be calibrated. To avoid magnetic interference, the apron should be sited in a distance of at least 100 m from power and communication cables, and other objects containing ferrous materials. The minimum distance of 200 m should be applied from large steel frame buildings, high voltage lines and railway tracks.

b. Load Bearing Capacity. Same as in Item 1A, as required for the relevant aircraft.

c. Construction. Same as in Item 4.

d. Dimensions. Same as in Item 6B.

e.Clearances. Same as in Item 4, and any additional clearances necessary for this specific function.

3. **Requirements**. This Item is required at MOBs and DOBs on a case by case basis. Where practical, existing aircraft pavements should be used to provide this function.

ITEM 6 A, B, C & D - Aircraft Aprons (Technical Standards)

1. **Characteristics**

a. **General**. Rigid pavement and accompanying Shoulder pavement as per Technical Preamble, 1-15. Pavements.

b. Access

(1)For aprons occupied by aircraft (6A, 6B) as per Item 3 - Taxiway.

(2)For aprons for engines not installed (6C) single lane road as per Item 7 - Roads & Parking Areas.

c. **Space on the Apron**. For parking space sizes refer to Military Criteria.

d. **Noise Exposure**.

(1)For engine testing aprons (6B, 6C), give consideration to orientating the apron to minimise noise exposure to occupied facilities or the surrounding community.

(2)Noise abatement baffles or hush houses should be considered to be an equipment item. Where this equipment is provided nationally, some additional paved area may be considered case by case.

e. **Drainage**. Surface drainage and collection is required. Appropriate containment or treatment devices (e.g. washing chemicals, fuel etc.) shall meet the applicable environmental regulations. These devices should be located downstream from any probable area of spill.

f. Grounding Points

(1)Ensure adequate grounding such as driving a non-corrosive rod sufficiently deep into underlying soil to establish electrical grounding. A grounding point shall have a maximum resistance of 10 K Ohms.

(2)Provide surface grounding point connected to the grounding rod above able to accept a grounding cable from the aircraft.

g. **Washing Water Outlet (6A only)**

(1)A single outlet source of washing water is required, suitable for hose or other portable equipment connection.

(2)Washing devices are equipment items to be provided separately as required.

(3) Non-potable water may be acceptable for washing purposes.

h. **Shoulders - Additional Measures**. Additional surface stabilisation or blast

deflectors only required in exceptional cases beyond shoulder to prevent FOD.

i. **Gradients**

(1)Provide minimum 1% and maximum 1.5% paved surface gradient. Gradients on shoulders may be increased to suit area drainage scheme.

(2) Provide minimum 2% gradient on non-paved surfaces.

j. **Electrical Power (6C only)**

(1) Provide 4 outlets.

(2) Supply should be 120/240/400 V AC.

(3) Voltage converters and DC converters are equipment items to be provided separately if required.

k. **Fuel (6C only)**

(1)If required, provide 20 m fuel tank sited to meet clearance requirements.

(2)An above ground tank with weather protection is acceptable. Tanks should be double-walled.

l. **Engine Support Structure (6C only)**. If a light structure capable of holding the non-installed engine under test is required, including the necessary anchoring to the apron, this is considered to be an equipment item.

m. **For 6D - Aircraft Compass Calibration only**. The apron will be designed and located only after a proper magnetic survey is completed and certified for this purpose. Pavement shall be constructed with materials that will not cause magnetic interference.

ITEM 7 - Roads and Parking Areas (Military Criteria)

1.Function: To provide internal and access roads to and between facilities and to provide parking at individual facilities. Exceptional considerations may apply to this item as defined in the Military Preamble.

2. Characteristics

a.Load Bearing Capacity. Roads shall be designed for the heaviest vehicle likely to use the network, up to a single wheel load of 5 tonnes. A single wheel load of 2.5 tonnes will be the minimum design load.

b.Construction. The pavement shall be of flexible or rigid pavement. Anti-FOD measures are required at junctions with aircraft operating surfaces.

c. Dimensions. The width of the roads should be as follows:

(1) Double lane – 6 m (normal).

(2) Single lane – 3.50 m. Passing bays are required at 250 m intervals.

d.Clearances. The nearest edge of a road should be at least 15 m away from any part of an aircraft operating on an adjacent aircraft surface. Exceptional considerations may apply.

e.Markings & Signs. Road markings and signs are required in accordance with national regulations.

3. **Requirements**

a. Access roads to link NATO facilities and parking areas are required.

b. Direct access between aircraft dispersal areas and ammunition, POL and LOX storage facilities is required.

c. The requirement for access to aircraft movement areas by ground support and utility vehicles and equipment may be satisfied by existing provisions under Item 3.

d.At reception airfields, the requirements of wide track loading/unloading equipment should be considered in the design of specific sections of the road network. Direct access between APOD/APOE airfield facilities and the national road system is required.

e.Single lane roads will only be used in areas with minimum military traffic, or when one way traffic system can be easily established i.e. such as to ammunition areas.

f.Exceptional consideration may be given to providing roads to and between facilities required to support NAEW and AGS operations.

g.Parking spaces for military vehicles and cars used for official business are required under each specific criteria Item.

ITEM 7 - Roads and Parking Areas (Technical Standards)

1. **Characteristics**

a. **General**. The Airfield Road System consists of the following:

(1)Access road, connecting the airfield to the local area road network.

(2)Connecting roads between on-base and off-base military areas such as Ammo Storage, etc., used exclusively for military traffic.

(3) Internal roads.

b. **Width**. In accordance with Military Criteria.

c.Curves. Horizontal radii will correspond to the maximum vehicular traffic speed allowed at any section of the road. The widths of the pavement will be increased where necessary, depending upon the degree of curvature.

d.Shoulders. Shoulders should be constructed to protect pavement edges and to carry occasional traffic without excessive rutting. Curbs may be constructed where there is not enough space to build shoulders or where drainage requirements dictate. Width between the edge of pavement and the nearer edge of the ditch or fill alongside should be:

(1)1.00 m for the double lane roads,

(2) 1.50 m for the single lane roads, and

(3)The first 0.50 m adjacent to the pavement should be capable of carrying a single wheel load of 2.5 tonnes.

e. **Load Bearing Capacity**. In accordance with Military Criteria.

f. **Construction Type**. Normally flexible pavement. Where dictated by nature of use (e.g. fuel dispensing areas, etc.) rigid pavement should be used. Day marking of road surface (e.g. centreline paint strip), in accordance with local traffic rules and regulations is required.

g. Anti-FOD Considerations.

(1)Anti-FOD measures such as grating shall be provided at each intersection of road pavement and taxiways or parking platforms.

(2) Any road connections to airfield pavements shall be paved.

h. **Drainage**. As required.

ITEM 8 - Airfield Lighting (Military Criteria)

1. **Function**

a. To provide visual aid to aircrew in both darkness and poor visibility.

b. Airfield lighting is considered to be a Critical Item, as described in the Glossary of Terms.

2. **Characteristics**

a. The design of the system should allow effective airfield damage repair both rapidly and with technical ease.

b. Airfield lighting shall be in accordance with the minimum provision of mandatory requirements in STANAG 3316. It consists of but is not limited to:

(1)Runway Lighting

(a) Runway edge lights,

(b) Threshold Lighting,

(c) Runway End Lights.

The Runway lighting should be connected alternately to two electrical circuits to ensure continuous operation of at least half of the total number of lights.

(2) Approach Lighting

(a)An approach lighting system is required on the main runway approach. It will consist of three parts:

1/ The centre lights;

2/ The bar lights; and

3/ The VASI/PAPI lights.

(b)Centre and bar lights will be alternated between two circuits (interleaved), both powered from the same (nearest) lighting vault.

(c)At airfields where there are frequent poor visibility conditions, a secondary approach lighting and sequence flashing lights may be considered on a case by case basis.

(2)Airfield Lighting for Parallel Taxiway, Taxiways, Aprons, Pads and Platforms. Edge lighting for all above aircraft pavements is required. In areas where elevated lights are not suitable for use (e.g. likely to be damaged), a minimum number of inset lights should be used.

(4)Apron Floodlighting. Aprons with A/C maintenance or cargo handling activities should be provided with lighting (see Items 4 & 6A). Security lighting will be considered on a case-by-case basis.

(5)Obstruction Lighting. Obstruction lighting is required on all fixed facilities penetrating the clearance surfaces of the runway (STANAG 3346).

(6)Airfield Lighting Controls and Control Cables. Control switches and regulators for Item 8-2.b.(1) to (3) should be located in substations (airfield lighting vaults). Switches should be on/off with five progressive stages of brilliancy for Item 8-2.b.(1) & b.(2) and only on/off for Item 8-2.b.(3). A basic computerised monitoring and control system is acceptable, however monitoring of single lamp failure is not required.

c.Runways are normally required to operate in precision instrument category I. When two or more options are available for achieving Cat I, the most economical should be adopted.

d.Lighting Cables Protection. Where power cables cross under A/C movement areas, appropriate ducts will be used for protection and ease of repairs. Such crossings will be kept to a minimum.

e.Stand-by Power. Stand-by power is required to carry the full airfield lighting load. See Item 9.

3. **Requirements**

a. The lighting installations as described above at MOBs shall and at DOBs and APODs/APOEs should be permanently installed.

b. A control panel in the control tower is required at MOBs/DOBs.

c. For NAEW training purposes at the MOB secondary approach lighting and sequence flashing lights in both directions are required.

ITEM 8 - Airfield Lighting (Technical Standards)

1. **Characteristics**

a. **General**. The operational requirements for this item are described in the Military Criteria. STANAG 3316 (Airfield Lighting) describes all technical requirements. Participating nations have agreed to adhere to the minimum requirements detailed in STANAG 3316 as Mandatory Items.

b. Construction. Details on construction standards are in STANAG 3316.

(1)Cable. Cable protection is normally achieved with light material ducting.

(2)Circuits. Provide two circuits for approach lighting and two circuits for runway lighting. The number of other circuits should be kept to a minimum.

ITEM 9 – Standby Electrical Power (Military Criteria)

1. **Function**

a. To provide standby electrical power to the facilities where continued operation is essential to the mission.

b. This is a critical item as described in the Glossary of Terms.

2. **Characteristics**

a. Types of stand-by electrical power are:

(1)Electrical Uninterrupted Power Supply (UPS). Battery backup with no break in power supply for specific users.

(2) Short Break. Generator with maximum break = 10 seconds to full load.

(3) Non-Critical. Generator with maximum break = 60 seconds to full load.

b. **Fuel Tank Capacity**. Fuel tanks are required for a capacity calculated for 24 hrs of operations of stand-by generator.

c. **Stand-by Power Installation**. Standby power installations are required for the facilities shown below. The indicated capacities are for planning purposes only and should be verified by calculations.

(1) Airfield Lighting (Item 8). Appx. 125 kVA.

(a) Runway. Short Break

(b) Approach Lighting. Short Break

(c) Taxiway and Aprons. Short Break

(2) Aircraft Fuel Storage and Dispensing Facilities (Item 10).

(a) Truck Dispensing per JFSI. Case by Case, Non-Critical.

(b) Hydrant System. Capacity case by case, Non-Critical.

(3)Ammunition Facilities (Item 14E/F). Case by Case. Non-Critical.

(4)Control Tower, Including Ground / Air Communication Equipment (Item 15). Appx. 10 kVA. Short Break. CIS equipment should have additional UPS. Consideration should also be given to critical HVAC operations.

(5)Wing Operations Facility (Item 16A). Appx. 30 kVA. Non-Critical Short Break. Communication and ADP Equipment should have UPS. Considerations should be given to critical HVAC operations.

(6)Squadron Operations Facility (Item 16C). Appx. 35 kVA. Non-Critical. Communication and ADP Equipment should have UPS. Considerations should be given to critical HVAC operations.

(7)Air Reconnaissance Facility (Item 16D). Capacity case by case. Non- Critical. Communication and ADP Equipment requires UPS. Considerations should be given to critical HVAC operations.

(8)Aircraft Maintenance Hangar (Item 19A). Appx. 1 kVA per 50 m . Non-Critical.

(9)Aircraft Shelter (Item 19B). Appx. 33 kVA, based on non-concurrent operation of critical functions. Non-Critical. CIS equipment in designated shelters may require additional UPS.

(10)Aircraft Washing and Fuel Cell Repair Hangar (Item 19C). Appx 1kVA per 50 m . Non-critical.

(11) Avionics Workshop (Item 22A). Capacity case by case. Non-Critical.

(12)Maintenance Workshops (Item 22F). Appx. 1 kVA per 50 m . Non-Critical. Manual start.

(13) Crash and Fire Station (Item 24). Non Critical.

(14)CIS and Meteorological Building and System (Item 27 & 28). Capacity case by case. Non-Critical. CIS equipment may require additional UPS.

(15)GCA / Radar / ILS / NAVAIDS (Item 29). Case by case for NAEW only. Non-Critical. CIS equipment may require additional UPS.

(16)Additional Standby Power for Air Cooling Equipment of Critical Items. Capacity case by case. Non-Critical.

d. **Numbers of Start-ups**.

(1)Batteries. Where start-up function is provided by batteries, it should allow for a minimum of 5 cold start-ups before recharging is required.

(2)Compressed Air. Where start-up function is provided by compressed air, it should allow for a minimum of 5 cold start-ups.

3. **Requirements**

a. Required as identified above.

b. **Stand-by Power Combination**. Where stand-by power requirements for a number of facilities are of the same characteristics, these may be combined where economically and operationally feasible.

ITEM 9 – Stand-by Electrical Power (Technical Standards)

1. Characteristics

a. General

(1)Capacity. Fixed or mobile generators are available in a range of commercial "off the shelf" sizes. Choice should be based on the nearest commercially available size if within plus or minus 5% of the required capacity or, if no such unit is commercially available, then the next largest available size should be provided. The required capacity should be based on the anticipated load(s) plus 20%. When dealing with high altitude (above 2,000 m) or extreme temperature, a de-rating factor of 10% should be applied to the generator rating.

(2)Number of Generators. A single generator sized to the essential capacity is considered to meet most requirements. Standby generators for very large capacities may be provided in multiple units if this can be shown to be cost-effective, and for enhanced sustainability.

b. **Installation of the Stand-by Power Equipment**

(1)The space within a facility used to house fixed equipment is considered to be non-usable area.

(2)The installation should include the necessary ventilation, protective screening and fixing requirements.

(3)Mobile generators, where accepted, may not require dedicated space and other features such as ventilation within a facility.

(4)Installation should be in accordance with the manufacturer's instructions. Installation may require a dedicated foundation or pad and anti-vibration measures for some sizes of generators.

c. Fuel Tank

(1)Fixed generators will be provided with a dedicated fuel tank and pump according to the Military Criteria. Standard commercial sizes are preferred (see sub-para 1.a. (1) above).

(2)The space to accommodate the tank inside the facility is considered to be non-usable area.

(3) A fuel level gauge is required.

d. **Durability**. Although the fuel tank is sized to allow a fixed and limited period of continuous operation without refuelling, the generator itself should be capable of 30 days continuous operation without failure in consideration of the durability of its components.

e. **Uninterrupted Power Supply (UPS)**. Where UPS is provided by a battery backup system, the number and location of batteries should be based on cost effectiveness and commercially available sizes/ratings.

f. Mobile Units.

(1)Where accepted, mobile units should be commercially available and able to provide an equal output and meet durability considerations. An additional fuel tank may be required if the self-contained tank does not meet the military requirement.

(2)Mobile units must be configured to allow attachment to and positioning by standard military vehicles and not require a dedicated mode of transport.

ITEM 10 - Aircraft Fuel Storage and Dispensing Facilities (Military Criteria)

1. Function

a.To provide for the bulk fuel storage and dispensing of aircraft fuel. This is a "non-occupied facility", including the personnel shelter. This item includes only on-base storage under the following headings:

(1) Item 10B - Jet Fuel Storage Installation (JFSI).

(2) Item 10C - On-base Interconnecting Pipeline.

(3) Item 10D - Supply pipeline (Spurline).

b.Off-base POL storage requirements are detailed in SCs approved stockpile guidance.

c. This is a critical item as described in the Glossary of Terms.

d.Exceptional Considerations may apply to this Item as defined in the Military Preamble.

2. Characteristics

a. Fuel Installations General

(1)Location. The siting of bulk fuel installations on an airfield should be optimised to achieve the best possible balance amongst the following considerations:

(a)To limit loss of runway use in the case of explosion or fire.

(b)Maximum dispersal, with a minimum spacing of 500 m between installations and normally 150 m between aircraft fuel storage tanks of 50 m or larger and any facility.

(c) Force protection.

(d)Minimum travel time for refuelling vehicles between installations and aircraft dispersal areas.

(e) Minimum length of interconnecting pipelines.

(f) Avoid pipeline crossing aircraft pavements.

(2) Construction

(a) Stand-by Power. Stand-by power is required.

(b) Security Fencing. Security fencing is required.

(c)Access Roads. Access roads are required.

(d) Dispensing Apron. Dispensing apron, in rigid pavement, is required.

(e)Drainage. Drainage of the dispensing apron, in particular, is required.

(f)Design. Design to be in accordance with NATO Approved Criteria and Standards for POL Facilities, AC/4-M(96)001, supplemented by STANAG 3784 - Technical Guidance for the Design and Construction of Aviation and Ground Fuel Installation on NATO Airfields. Should there be any contradiction on Military Requirements, between this Item and any technical document, the Military Criteria detailed in this document should take precedence.

b. **Item 10B - JFSI**

(1)General. Bulk fuel storage at an airfield should be dispersed into separate installations (tank groups) except for FOB/FEBs where one installation is considered acceptable. The normally recommended number of installations on each airfield is two; however the number of installations may vary under exceptional circumstances.

(2)Tank Size. The size of any individual storage tank should not exceed 25% of the total on-base storage capacity (NATO & National) or 5,000 m , whichever is less.

(3) Filling & Dispensing

(a)Each installation is to have the capability of being filled both by fuel truck and by on-base interconnecting pipeline. The latter requirement may be relaxed for small, isolated JFSIs.

(b)Two separate dispensing points are required at each JFSI. An additional point may be required where the number of installations is less than two, and where required for operational requirements.

(c)Dispensing points for aircraft refuelling tankers may terminate in either a flexible hose or a pantograph. The simultaneous dispensing capacity at each point is to be a minimum of 1,000 l/min, typically 2,000 l/min are required.

(d)Dispensing points for RWA only airfields may terminate in either a flexible hose or a pantograph. The simultaneous dispensing capacity at each point is to be up to 500 l/min.

(4)Hydrant Refuelling Systems. Hydrant refuelling systems should be considered where the fuel capacity of the aircraft regularly operating from the base exceeds 80 m . Each airfield should be considered on a case by case basis.

c. Item 10C - On-base Interconnecting Pipeline

(1)An interconnecting pipeline is required to permit the transfer of fuel between JFSIs. It should also provide a connection between point of delivery (terminal point off-base pipeline system or a rail/road/ship unloading station) and the on-base storage and dispensing system.

(2)All interconnecting pipelines should be designed for a fuel delivery rate of 2,000 l/min. For RWA only airfields a delivery rate of 500 l/min is sufficient.

(3)As an exception to the above, where an existing installation is both small (e.g. holds 10% or less of the on base requirement) and in a remote location on the airfield, a pipeline connection to the remaining installations is not required.

(4)When pipelines cross the runway, they should have two spurs in separate conduits under the pavement, which are joined outside the shoulders. Single runway crossing may be acceptable if the pipeline is laid at minimum depth of 10 m under the runway with the use of the directional drilling technique.

d. **Item 10 D - Spurline connection to off-base depot**

(1)A spurline connection to an off-base depot or pipeline system should normally have a delivery rate of 2,000 l/min. It can be high or low pressure design. If the latter option is used, it will generally have a minimum diameter of 6 inches.

(2)The detailed requirements for these pipelines is contained in the NATO document AC/4-M(96)001.

3. **Requirement**

a.Item 10B - JFSI. At MOBs, DOBs and APODs/APOEs the following storage capacity is required as described below. For MPA FEBs, storage capacity will be determined on a case by case basis, by the specific operational requirements that apply.

(1) On-Base Storage

(a)Seven Day Requirement. Seven Days Of Supply (DOS) of fuel is required to be stored on-base. This can be reduced to 3 DOS with dedicated off-base storage or if supply conditions permit (see sub-para 3.a.(2).(b) below) which can guarantee to provide the remaining 4 DOS. For AAR AC only 3 DOS are required to be stored on-base. All fuel calculations for IPF and deploying HRF aircraft are to be based on the calculation method below.

(b)On-Base Requirement for IPF and Deploying HRF Forces. The following equation is to be used for all calculations:

(See next page).

Daily Fuel Requirements = Number of aircraft Sortie rate/aircraft Fuel required/sortie Attrition Serviceability

Note. For all calculations, the following assumptions are to be made:

1/ The sortie rate per aircraft should be assumed as identified below:

RWA	2 sorties/day (TBC)
TFA	2 sorties/day
All Transport aircraft	1 sortie/day
AAR aircraft	2 sorties/day
AEW	1 sortie/day
AGS	1 sortie/day
MPA	0.7 sorties/day

2/ The average fuel requirements per sortie should be taken as the maximum tank capacity as listed in the Aircraft Data Sheet. If the aircraft type is unknown the generic data as listed below should be used:

RWA	3.8 m
TFA	9.4 m
MPA	42.4 m
TTA	24.0 m
AEW	68.0 m
AGS	9.7 m
STA	96.0 m
AAR	95.0 m

3/ A factor of attrition of one is to be assumed unless specified otherwise.

4/ A factor of serviceability as identified below is to be assumed unless specified otherwise:

RWA	0.7
TFA	0.7
TTA	0.85
MPA	1.0
AEW	0.85
AGS	1.0
AAR	0.85
STA	0.5

Note: The calculation of any on-base storage requirements should ignore the fuel held within any on-base and connecting pipeline systems.

(2) Interface Between On- and Off-Base Storage.

(a)In the case where an off-base pipeline system connected to the base includes a terminal tank (i.e. buffer tank) the capacity of the tank shall not count against the on-base storage requirement specified above. Exceptions will be considered on a case-by-case basis.

(b)In the case where off-base storage is provided for the sole use of the base, a portion of the on-base storage may be combined with it, provided that at least four days of the operational requirement are held on the airfield.

(c)The re-supplying capacity from off-base and rail/road/ship off-loading facilities should be 2,000 l/min, 500 l/min for RWA only airfields. This will therefore match the bulk fuel transfer capabilities of the on-base system.

b. **Item 10C - On-base Interconnecting pipeline**. Interconnecting pipe lines are required at MOBs and DOBs.

c. **Off-base storage requirements**

(1)These facilities are generally required to hold 23 DOS to meet the full requirements of MC 55/4 (30 DOS total for on- and off-base). As described in para 3.a.(1).(a) above, this off-base storage may be increased to 26 DOS.

(2)If the supply conditions permit, (i.e., connection to a pipeline system) the 30 DOS requirement may be relaxed if the supply system is considered to be sufficiently robust by the NATO Military Authorities.

ITEM 10 - Aircraft Fuel Storage and Dispensing Facilities (Technical Standards)

1. **Characteristics**

a. **General**. Storage requirements (number and size of tanks), fuel dispensing flow rate and other performance characteristics are given in the Military Criteria.

b. **Construction**. Technical guidance for POL installations on NATO airfields is provided in NATO document AC/4-M(96)001 supplemented by STANAG 3784 – Technical Guidance for the Design and Construction of Aviation and Ground Fuel Installations on NATO Airfields.

ITEM 11 - Lubricating Oil, Hydrazine and Chemical Fluid Storage Facility (Military Criteria)

1.Function. To provide storage of aircraft lubricants, hydrazine, de-icing fluids, hydraulic fluid, sealing compounds, and adhesives. Exceptional Considerations may apply to this Item as defined in the Military Preamble.

2. Characteristics

a.Construction. Rigid platform with cover as required, with appropriate load bearing capacity consistent with the using equipment and anticipated loads.

b.Location. Sited to minimize the distance between the storage and the maintenance work areas.

c. Access. Vehicle access is needed for loading and unloading.

d. **Drainage**. The storage area must be drained and linked to an oil/water separator.

e. **Hydrazine**. If required, hydrazine is to be stored in a non-occupied building including an emergency shower surrounded by perimeter fencing.

3. **Requirements**

a. **Lubricating Oil**

(1) **Tactical, Transport and MPA**. Required at MOBs and DOBs as identified in the following table:

Total of A/C Engines	**Area (m)**	
	MOB	**DOB**
1 - 48	125	30
> 48	175	60

(2). **AEW/MPA/AAR/AGS**

Total of A/C Engines	**Area (m)**	
	MOB	**DOB**
1 - 80	200	30
> 80	450	30

(2) **Strategic Aircraft**. 100 m .

b. **Shelters**. At MOBs, an enclosed weather shelter of light non-combustible construction over 50% of the area identified above is required.

c. **De-icing Fluids**. Storage is required if justified on climatic factors. A covered, partially enclosed area of 180 m is required with a storage tank of 100 m . Additional capacity should be justified.

d. **Hydrazine**. If the user aircraft needs hydrazine, an additional facility of 65 m is required, as indicated in the Aircraft Data Sheets.

ITEM 11 - Lubricating Oil, Hydrazine and Chemical Fluid Storage Facility (Technical Standards)

1. **Characteristics**

a. **General**. This facility consists of an area of rigid pavement shown in the Military Criteria. The strength of the pavement will be governed by the anticipated loading; however, for most situations, a 0.15 m thickness should be adequate.

b.Hydrazine Facility. If required by the type of aircraft operating from a particular airfield, a hydrazine storage and servicing facility shall be provided. This facility accommodates the servicing, repair and storage of hydrazine fuel tanks. It also provides space for the removal and storage of personal protective equipment used by the maintenance personnel working in the facility. For heating and lighting see Technical Preamble - General Purpose Workshops. Ventilation is also required to extract potentially dangerous fumes before personnel enter the facility. Other personnel safety measures include emergency shower, fence prohibiting close proximity to the facility, etc.

c.De-icing Fluids Facility. A covered, partially enclosed weather shelter of light, non-combustible construction. This structure is non-occupied, and requires no heating.

ITEM 12 - Motor Fuel Storage & Dispensing Facilities (Military Criteria)

1.Function. A single facility to provide storage and dispensing of fuel for all military vehicles and motor driven equipment. Exceptional Considerations may apply to this Item as defined in the Military Preamble.

2. Characteristics

a.Storage. Capable of storing and supplying gasoline and diesel fuel at a single location. The facility is to supply gasoline and diesel in a proportion to be determined by the specific requirement of each airfield.

b. Construction

(1)POL Storage. Tanks can be above or below ground.

(2)Personnel Shelter. Structure will be of light, non-combustible construction up to 6 m of usable area for duty personnel. Located near dispensing facilities.

(3)Pumps location. Located on a rigid pavement with appropriate access and load bearing capacity consistent with the using vehicles.

c. **Utilities**. Electricity is the only utility required.

d. **Drainage**. Ground drainage as required.

3. **Requirements**

a. **MOBs/DOBs**. Required at MOBs and DOBs based on the total number of aircraft, as identified in the table below.

Number of A/C	Total Storage Capacity (m)	No. of Dispensing Pumps
1-16 / 1-12 (MPA)	100	2
> 17 / >12 (MPA)	150	3
> 72	Case by case	
DOB	50	2

b. **Reception Airfields**. Additional requirements of 50 m at Reception airfields with no peacetime user. For existing MOBs/DOBs no additional requirement.

c. **FEBs**. No requirement.

ITEM 12 - Motor Fuel Storage & Dispensing Facilities (Technical Standards)

1. Characteristics

a. **Location**. This facility shall be constructed in one location on each airfield.

b. **Utilities**. All electrical installations must be explosion proof.

c. **Construction**. The facility shall be constructed as a conventional service station.

(1)Pavement. In the refuelling area the pavement needs to be constructed to withstand fuel spills. It will be sloped in such a way as to create a containment area, which will not allow major fuel spills to contaminate the surrounding area. All drainage of the refuelling area will pass through simple fuel/water separators, which will mechanically separate water from fuel. The separated fuel/fuel contaminated water will be collected in a holding tank.

(2)Personnel shelter. Lighting and heating as per Technical Preamble/General Purpose Workshops.

(3)Area Lighting. Exterior site lighting is required to allow for refuelling operations during the hours of darkness or poor visibility.

(4)Fuel Tanks. Above or below ground storage tanks. If above ground, a simple, rigid pavement containment basin is required, sufficient to hold the maximum volume of the fuel that can be stored in the tank.

(5)Dispensing Points/Pumps. These are service station type, electrical pumps.

ITEM 14 – Aircraft Ammunition Storage (Military Criteria)

1.Function. To provide secure storage, maintenance and assembly facilities for aircraft ammunition. This Item includes the following requirements, the functions of which are described in the appropriate sub-paragraphs:

a. Item 14A - Ammunition Storage Magazine (Igloo)

b. Item 14B - Open Revetted Hardstand

c. Item 14C - Multi-bay Segregated Magazine

d. Item 14D - Storage Building

e. Item 14E - Ammunition Maintenance Shop (Occupied facility)

f. Item 14F - Guard Facility (Occupied facility)

g. Item 14G - Missile Checkout and Assembly Facility (Occupied facility)

Exceptional considerations may apply to this Item as defined in the Military Preamble.

2. Characteristics

a.General. Ammunition storage facilities design and siting criteria should take the following factors into consideration:

(1) Types and volume of ammunition to be stored.

(2) Total weight and Net Explosive Quantities (NEQ).

(3) Hazard Division and Storage Compatibility.

(4) Method of ammunition storage and handling.

(5) Available standard designs for storage structures.

(6) Exterior Quantity/Distance (Q/D) limitations.

b.Location. Siting of all facilities should take into consideration their nature, Potential Explosive Site (PES) or Exposed Site (ES), and be in accordance with AASTP[13].

c.Construction. Construction characteristics can be derived from AASTP-1, Part II - Manual of NATO Safety Principles for the Storage of Military Ammunition and Explosives, Chapter 3 - Aboveground Storage, Section II - Storage Buildings and their Construction.

[13] AASTP - Allied Ammunition Storage and Transport Publication

d. Item 14A - Ammunition Storage Magazine (Igloo)

(1)Function. The facility should be designed for permanent storage of ammunition and explosives taking into consideration the requirements of AASTP-1.

(2)Size. The magazine space required for storage of ammunition and weapons should be based on the size of the items to be stored, their explosive content, and handling space requirements.

e. **Item 14B - Open Revetted Hardstand**

(1)Function. The facility is to provide for the interim storage and handling of ammunition. It should be designed in accordance with the local conditions taking into consideration the requirements of AASTP-1. Consideration should be given to a light construction storage shed for active (in-use) ammunition.

(2)Construction. Construction should be with rigid pavement, surface to be sloped to prevent water from ponding.

(3)Size. The required paved area should be based on 30% of the area calculated for Item 14A. The minimum acceptable size is 100 m .

f. **Item 14C - Multi-bay Segregated Magazine**

(1)Function. The facility is to provide storage areas for explosives and ammunition of small total bulk which require segregation.

(2)Construction. Depending on the quantity/distance considerations in accordance with AASTP-1, either a masonry construction with a light roof or a concrete structure with a light roof is required.

(3)Size. The calculation of the size of the individual bays should be based on the type and volume of ammunition stored. The determination of the number of bays required results from the compatibility of the various ammunition/explosives to be stored. The minimum size per bay is 15 m .

g. **Item 14D - Storage Building**

(1) **Function**. The facility is to provide storage for non explosive items and ammunition handling equipment within the ammunition area.

(2) **Construction**. The building is of conventional construction with a light roof.

h. **Item 14E - Ammunition Maintenance Shop**.

(1)Function. The facility is to provide space for the inspection, maintenance assembly and disassembly of ammunition, rockets and explosives, other than missiles.

(2) Construction. Conventional construction with or without protective roof or

concrete construction.

i. **Item 14F - Guard Facility**

(1) **Function**. The facility is to provide an enclosed shelter for the entrance guard to an off-base ammunition facility.

(2) **Construction**. A light construction. .

j. **Item 14G - Missile Checkout and Assembly Facility**

(1)Function. The facility is to provide space for the assembly and checkout of missiles.

(2) Construction. The building should be of concrete construction.

3. **Requirements**. Not all of the sub-Items may be required at every airfield and each airfield should be judged on a case by case basis.

a. **Item 14A - Ammunition Storage Magazine (Igloo)**. At MOBs, and at DOBs on a case by case basis, it is required to accommodate a 7 day stockpile, subject to the equation and minimum provision below:

No. A/C 7 DOS 0.7 (serviceability)

DOS for	**Minimum Provision (m)**
Air Defence	6
Offensive Air	8.5

(1)Tactical Transport Aircraft. One magazine of 100 m .

(2) MPA. One magazine of 100 m .

(3)Minimum Size. The minimum acceptable size of a magazine is 100 m unless otherwise stated.

(4)Hardstand. Each magazine requires a hardstand for loading/unloading operations, between 100 m and 190 m .

Note: As an alternative to the storage of ready-use missiles within Item 14A, additional space under Item 4G may be provided for this purpose. The number of missiles thus stored will be charged against the number used to determine the area required in Item 14A. The total space required for the ready-use facility missiles is subject to operational justification.

b. **Item 14B - Open Revetted Hardstands**. At DOB, it is required to accommodate a 7-day stockpile.

c. **Item 14C - Multi-bay Segregated Magazine**. At MOB/DOB, a 30 m building is

required for Tactical Aircraft, Tactical Transport and MPA.

d. **Item 14D - Storage Building**. At MOB/DOB the size of the facility is based on aircraft numbers:

(1) **Tactical Aircraft and Transport Aircraft**

No. of A/C	Size
≤ 16	100 m
> 16 ≤ 32	200 m
> 32 ≤ 48	300 m
> 48	Case by case

(2) **MPA**

No. of A/C	Size
≤ 12	100 m
> 12	200 m

e. **Item 14E - Ammunition Maintenance Shop**. At MOB/DOB the following areas are required:

(1) **Tactical Aircraft and Transport Aircraft**

No. of A/C	Size
≤ 32	100 m
> 32 ≤ 64	175 m
> 64	Case by case

(2) **MPA**. 500 m .

f. **Item 14F - Guard Facility**. At MOB/DOB a facility of 10 m is required.

g. **Item 14G - Missile Checkout and Assembly Facility**. At MOB/DOB in support of aircraft with missile systems. Size based on the number of types of missiles employed.

Missile Types	Size
1	100 m
2	175 m
> 2	Case by case

Note. Where guided weapons are employed, the space for the checkout of the guidance system may be provided in the electronic workshop under Item 22F, with weapon assembly employed within the space for Item 14E. Alternatively where justified, space for checkout and assembly may be provided under Item 14G and Item 22F in combination. The space required is to be determined on a case by case basis.

h. **FEBs**. Not required.

ITEM 14 - Ammunition Facilities (Technical Standards)

1. **General**

a. This item covers the technical standards for the following facilities:

(1) Item 14A - Ammunition Storage Magazine (Igloo),

(2) Item 14B - Open Storage Aprons,

(3) Item 14C - Multi-bay Segregated Magazine,

(4) Item 14D - Storage Building,

(5) Item 14E - Ammunition Maintenance Shop,

(6) Item 14G - Missile Checkout and Assembly Facility.

b. Technical standards for other facilities also required to provide a functional/usable ammunition storage site (i.e. guard facility, fence, roads, fire fighting installations, utilities, and communications) are covered under the appropriate items elsewhere in these standards.

2. **Item 14A - Ammunition Storage Magazine (Igloo)**

a.Size. The usable areas required are detailed in the Military Criteria. However, if possible use should be made of the nearest standard design facilities as listed for various countries/users in AASTP-1, Annex II-B, Section I - Types of igloos.

b. Construction

(1)Construction characteristics can be derived from AASTP-1, Part II - Manual of NATO Safety Principles for the Storage of Military Ammunition and Explosives, Chapter 3 - Aboveground Storage, Section II - Storage Buildings and their Construction.

(2) Lighting

(a)Internal. Standard for internal lighting is 150 LUX, measured at floor level; provision of explosion-proof illumination is not required since no explosive fumes are expected to be generated within the structure.

(b)External. Illumination should also be provided outside, over the door of the structure. An illumination level of 10 LUX at the base of the door is sufficient.

(3)Interior Paint. Simple interior painting of walls and ceiling is sufficient. Special treatment of concrete floor is not required.

(4)Ventilation. The ventilation of the structure can be provided as explained in AASTP-1, Chapter 3, Section 2. However, provision of dehumidification

equipment to achieve a humidity level between 40% and 60% should be considered. The dehumidification can be achieved by equipment installed inside each magazine or by mobile equipment serving more than one magazine. If the mobile equipment solution is more cost effective, the equipment is not considered "Equipment Item".

(5) **Lightning Protection**. Lightning protection is required for the storage hardstand; the design should be in accordance with the Host Nations regulations but should provide a resistance of maximum 10 Ohms.

c. A **paved area** is required in front of the facility, size depending on the type of equipment used for loading/unloading (e.g. truck, forklift) operations.

3. **Item 14B - Open Revetted Hardstand**

a.General. The open storage hardstand shall be designed in accordance with the military requirements, the local circumstances and the requirements resulting from the application of the AASTP-1.

b.Size. The usable areas required are detailed in the Military Criteria. However, if possible use should be made of the nearest standard design facilities as listed for various countries/users in AASTP-1, Annex II-B, Section I - Types of igloos. The minimum size is 100 m .

c. Construction

(1)Construction. Construction should be with rigid pavement, surface to be sloped to prevent water from ponding.

(2)Physical Protection. In order to reduce the quantity/distances the hardstand should be directly surrounded on three sides by protective revetments, the revetment for the fourth side might be located on the opposite side of the road/loading area. Construction of these revetments to be in accordance with AASTP-1.

(3)Access. Each storage hardstand should be connected to the road network of the airfield. An appropriate manoeuvring space in front of the hardstand to allow for loading/unloading operation is required; size to be determined in accordance with the equipment used.

(4)Lightning Protection. Lightning protection is required for the storage hardstand; the design should be in accordance with the Host Nations regulations but should provide a resistance of maximum 10 Ohms.

(5) Electrical Installations. Not required.

4. **Item 14C - Multi-Bay Segregated Magazine**

a. **General**. This facility is to provide storage areas for explosives and ammunition of small total bulk, which require segregation.

b.Size. The calculation of the size of the individual bays should be based on the type and volume of ammunition stored. The determination of the number of bays required results from the compatibility of the various ammunition/ explosives to be stored. The minimum size per bay is 15m .

c. Construction

(1)Construction. Depending on the quantity/ distance considerations in accordance with AASTP-1, either a masonry construction with a light roof or a concrete structure with a light roof is required.

(2)Partition Walls. The partition walls between the individual bays will be cast in-situ reinforced concrete.

(3) Lighting

(a)Internal. Lighting inside the building at 150 LUX at floor level is required.

(b)External. Outside lighting, over the doors at 10 LUX at the base of the door, is required.

(4) Doors. The doors should be 5 mm steel plates.

(5)Ventilation. Ventilation openings should be provided in the lower part of the doors and the upper part of the rear walls; the ventilation openings should be protected with 5mm steel plates. If mobile dehumidification equipment is available for facilities of Item 14A, this equipment can also be used for the facilities of this item.

(6)Interior Paint. Interior painting of bays and special treatment of the concrete floors is not required.

(7)Lightning Protection. Lightning protection is required for the building; the design should be in accordance with the Host Nations regulations but should provide a resistance of maximum 10 Ohms.

5. **Item 14D - Storage Building**

a. **General**. The storage building is to store non-explosive items and ammunition handling equipment within an ammunition storage area.

b. Construction

(1)The building is of conventional construction with a light roof.

(2)The building should provide space for parking of 1 ea. forklift, including an electrical supply system for charging batteries if an electrical driven forklift is used.

(3) Internal Height. The internal height of the building should not exceed 4 m. Additional height has to be justified.

(4)Lighting

(a)Internal. Lighting inside the building at 150 LUX at floor level, is required.

(b)External. Outside lighting, over the doors at 10 LUX at the base of the door, is required.

(5)Ventilation. Ventilation of the building is achieved naturally with ventilation openings in the walls of the building.

(6)Lightning Protection. Lightning protection is required for the building; the design should be in accordance with the Host Nations regulations but should provide a resistance of maximum 10 Ohms.

(7)Interior Paint. Simple interior painting of walls and ceiling is sufficient. Special treatment of the concrete floors is not required.

6. **Item 14E - Ammunition Maintenance Shop**

a. **General**. This facility is to provide space for inspection, maintenance, assembly and disassembly of ammunition, rockets and explosives.

b. Construction

(1)Conventional construction with a protective roof where required or concrete construction might be applied.

(2)Physical Protection. If required for quantity/distance reasons a revetment has to be provided.

(3)Interior Finishes. The interior of the building should be plastered, if applicable, and painted. The floor in the workshop area should receive treatment for dust reduction.

(4)Internal Clearances and Door Dimensions. The minimum interior height of the building is 5 m. The minimum clear door dimension is 3 m high and 5 m wide.

(5) Security. The building shall have windows protected with steel bars.

(6)Doors. The exterior doors of the building should be of metal to delay access to the building, the interior doors could be of normal timber.

(7) Lighting

(a)Internal. Lighting inside the building, as per Technical Preamble for Maintenance Workshop, is required.

(b)External. Outside lighting, over the doors at 10 LUX at the base of the door, is required.

(8)Lightning Protection. Lightning protection is required for the building; the design should be in accordance with the Host Nations regulations but should provide a resistance of maximum 10 Ohms.

(9)Compressed Air. Low-pressure line not to exceed 1,380 kPa and high pressure line at least 5,170 kPa , not greater than 24,130 kPa, are required.

(10) Electrical Power. The requirements are:

400 V AC 50 Hz 3 phase (min 16 Amp per phase)
240 V AC 50 Hz 2 phase (min 16 Amp per phase)
110 V AC 60 Hz 1 phase (min 16 Amp)
115 V AC 400 Hz 3 phase (min 10 Amp per phase)

(11) **Concrete Pad**. A concrete pad of 6 12 (m) is required in front of the door to the workshop.

(12) **Lifting Equipment**. A lifting device with a maximum lifting capacity of 2,500 kg is required.

7. **Item 14G - Missile Checkout and Assembly Facility**

a. **General**. This facility is for assembly and checkout of missiles.

b. **Construction**. The construction principles as detailed for Item 14E apply also for this facility with the exception that the building should be of concrete construction.

ITEM 15 - Control Tower (Military Criteria)

1. **Function**. To provide a fixed facility from which control can be exercised over aircraft, mobile ground equipment, airfield lighting and arrestor gear. This is an occupied facility.

2. Characteristics

a.Dimensions. A total usable floor area of 72 m . Normally it will consist of two floors each of 36 m with the top floor enclosed with tinted glass and sloping windows. If additional lower floors are required to provide additional height for visual reasons they shall be used, wherever practicable, to house other NATO criteria or associated items such as meteorological facilities (Item 16), transmitters, receivers, transformers, or standby electrical power (Item 9).

b.Location/height. The tower shall be sited to give an elevated unobstructed view of the runway, approach and take-off areas and, as far as practicable and economically feasible, arm/disarm pads and aircraft ground movement area. The aim is to provide proper depth perception of all controlled surfaces. The height and location will be determined by the NMAs.

c.Utilities. Electricity, domestic water, sanitary connections, HVAC and communications are required.

d. Stand-by Power. Stand-by power is required.

e. Fire protection and safety egress are required.

3. **Requirements**

a. **MOBs/AEW DOBs**. At all MOBs and at AEW DOBs, one control tower is required.

b.DOBs. At DOBs and Reception airfields, requirement can be met by a hardstand plus power supply and telephone connections for a nationally provided control van. This facility should be integral with Item 29A - Facility for Ground-Controlled Approach (GCA) Equipment, wherever feasible.

c. FEBs. Not required.

ITEM 15 - Control Tower (Technical Standards)

1. Characteristics

a. General

(1)Other related criteria items may be collocated with the control tower on unoccupied floors, where possible.

(2) Lightning protection is required.

(3) Obstruction lights are required.

b. Observation deck

(1)Window glass supports to minimise visual obstruction and permit maximum view of all areas of interest on airfield.

(2)Window glass and supports must resist site wind loads and minimise vibrations.

(3) Heating and air conditioning are required.

c. Access

(1)A hoist support is required to allow lifting or lowering of large pieces of tower equipment.

(2)Openings to the mechanical room and observation deck should be of sufficient size to allow the largest piece of equipment to pass.

(3)Access to the observation deck should be by staircase with necessary enclosure. Mechanical means of access on a case by case basis.

d. Utilities

(1)A surge arrestor is required as an equipment item.

(2)Stand-by Power. One generator is required, of sufficient capacity to operate equipment for the ground/air communications, etc. The critical functions served by Communication and Information Systems (CIS) will be supplied by an UPS of appropriate capacity.

e. Special requirements

(1)Noise Reduction. Structure to incorporate noise attenuation treatment where necessary to ensure that observation deck exposure of 70 dB(A) is not to be exceeded from typical internal and external sources.

(2)Humidity Control. Additional humidity control may be considered for equipment located in areas other than the observation deck.

f. **Hardstand**. Where a hardstand only is required, this may be provided in either rigid or flexible pavement of sufficient strength to accommodate the type of van to be used.

ITEM 16 - Operations Facilities (Military Criteria)

1. **General**. This item covers the criteria for the following facilities:

   a. Item 16A - Wing Operations Facility,

   b. Item 16B - Meteorological Facility,

   c. Item 16C - Squadron Operations Facility,

   d. Item 16D - Air Reconnaissance Facility.

2. **Characteristics**

   a. **Construction**. These facilities shall be provided in conventional office type buildings. Additional protection, if required, will be identified by the NMAs.

   b. **Standby Power**. Standby power is required.

   c. **Siting**. As far as practicable and economically feasible these facilities might be collocated in one conventional building.

   d. These are occupied facilities.

ITEM 16A - Wing Operations Facility

1.Function. To provide space for essential combat command elements, such as combat operations, reinforcement mobility operations, wing intelligence and their administration. This facility shall only contain essential combat command elements and is not to be confused with the Base Headquarters Facility, which provides space for the day-to-day administrative activities of an airfield. This is an occupied facility.

2. Requirements

a.One dedicated Wing Operations facility is required at MOBs and DOBs with a minimum of 2 squadrons. Where there is only one squadron the requirement is included under Item 16C.

b. Usable areas will be as follow:

Aircraft Category	Usable Area (m)
MOB	170
AEW MOB ≤ 10 A/C	300
AEW MOB > 10 A/C	800
AGS	800
DOB	130

c. An increment of 30 m is required at tactical MOBs and DOBs for each squadron over two, which is operationally controlled.

d. FEBs. Not required.

e. Any adequate available facilities should be taken into account.

ITEM 16B - Meteorological Facility

1. **Function**. To provide space for meteorological activities supporting aircraft operations. This is an occupied facility.

2. **Location**. In or near the control tower (Item 15) or with the Wing Operations Facility (Item 16A).

3. **Requirements**. An area of 95 m to be provided at MOBs and MPA DOBs only.

ITEM 16C - Squadron Operations Facility

1. **Function**

a. To provide space for the operation and supporting functions of a squadron. This is an occupied facility. For MPA, AEW and Strategic Transport Airfields, occupancy includes ready crew area (shower, locker room and cooking facility).

b. The following functions are to be considered:

c. Operational functions such as squadron command activities, aircrew briefing, and mission planning.

d. Supporting functions such as aircrew clothing, equipment ready use storage, and recreation room including canteen.

2. **Requirements**

a. Basic area is as per following table:

Type of Sqn		**Basic area (m)**	
		MOBs	**DOBs**
TFA (fixed and rotary wing)	Single seat	100 + (6 No. A/C)	6 No. A/C
	Two seat	100 + (7 No. A/C)	7 No. A/C
TTA (fixed and rotary wing), AAR, MPA		100 + 4 x (No. aircrew x No. A/C)	100 + (10 No. A/C)
AEW		1,050 + 500(Ready crew area)	180
AGS		1,600	(TBD)
STA, SBA		100 + 4 (No. aircrew x No. A/C)	N/A

b. Within the overall space a briefing area of 3.5 m / Crew member is required.

c. Where one squadron constitutes an operational wing, this facility shall include the requirements of Item 16A by the addition of 100 m .

d. **FEBs**. Not required.

ITEM 16D - Air Reconnaissance Facility

1. **Function**. To provide, at an airfield whose primary role includes tactical air reconnaissance, space (occupied facility) for:

a. Receiving transmitting and analysing aerial photographs and/or electronic data acquired during flights by reconnaissance aircraft.

b. Processing and interpreting data.

c. Storing selected photographic and electronic material of current and continuing interest relevant to the role.

d. Management and control of reconnaissance interpretation process as defined by the preceding items.

2. **Requirements**

a. Facilities shall be determined on a case by case basis, minimum 60 m .

b. **FEBs**. Not required

ITEM 16 - Operations Facilities (Technical Standards)

1. **General**. This item covers the technical standards for the following facilities:

   a. Item 16A - Wing Operations Facility,

   b. Item 16B - Meteorological Facility,

   c. Item 16C - Squadron Operations Facility,

   d. Item 16D - Air Reconnaissance Facility.

ITEM 16A - Wing Operations Facility

1. **Characteristics**

   a. **Construction**. Conventional office type facility.

   b. **Stand-by Power**. One generator is required, of sufficient capacity to operate all installed command and control equipment, the airfield lighting control panel, etc. Its minimum capacity should be no less than 30 KVA. A UPS of appropriate capacity will supply the critical functions served by CIS.

ITEM 16B - Meteorological Facility

1. **Characteristics**

   a. **Construction**. Conventional office type facility, unless combined with Item 15 - Control Tower or Item 16A – Wing Operations Facility.

ITEM 16C - Squadron Operations Facility

1. Characteristics

a.Stand-by power. One generator is required, of sufficient capacity to operate all installed command and control equipment. The critical functions served by CIS will be supplied by an UPS of appropriate capacity.

ITEM 16D - Air Reconnaissance Facility

1. **Characteristics**

   a. **Construction**. Depending on the type of equipment used, there are two different types of Air Reconnaissance Facility:

(1)A facility accommodating user-provided specially equipped vehicles or containers to perform the RECCE function. In this case the facility will be a pad for all those self-sustained vehicles/containers, providing only the necessary utilities connections.

(2)A facility housing user-provided installed equipment to perform the RECCE function. It shall have two personnel/equipment doors.

b. **Stand-by power**. One generator is required, of sufficient capacity to operate all installed equipment. The critical functions served by CIS will be supplied by an UPS of appropriate capacity.

ITEM 18 - Base Headquarters Building (Military Criteria)

1. **Function**. To provide administrative space for command, control and administration of overall base activities excluding combat operations. This is an occupied facility.

2. **Characteristics**

a. **Construction**. Office type accommodation of conventional construction.

b. **Location**. Centrally located on base.

c. **Parking**. Vehicle parking is needed for military vehicles and cars for official use.

3. **Requirements**

a. **Size**. The base HQ facility is required to support Permanently Based Forces (PBF) at MOBs only. At a base where two or more NATO nations use the airfield as their MOB each nation's requirements should be considered separately, but combined where possible:

No. of PBF A/C	No. of MPA PBF A/C	HQ Area (m)	Parking (m)
32 or less	12	240	100
33 – 48	13 or more	300	120
more than 48		340	140

b. **NAEW**

(1)MOB. 1,900 m is required. The Base HQ carries out more functions and is manned by more people than normally found at a base with a supporting Host Nation.

(2) FOBs/FOL. 100 m is required.

c. **AGS**

MOB 1900 m is required. The Base HQ carries out more functions and is manned by more people than normally found at a base with a supporting Host Nation.

ITEM 19A - Aircraft Maintenance Hangar (Military Criteria)

1. **Function**. To provide space for first and second line maintenance of aircraft. The Hangar has a secondary function of providing parking. This is an occupied facility.

2. **Characteristics**

a. **Facility Parameters**

(1)Aircraft hangar doors required on one side of the hangar only.

(2)Aircraft hangar door minimum clearances (for interoperability) should be: Width – 30 m, Height – 7 m. The minimum width clearance to be at least 6 m greater than the wing span or rotor diameter for the design aircraft to use the hangar.

(3)Hangar minimum height clearance to be at least 1.0 m greater than the overall height, including jacking height, of the highest design aircraft to use the hangar. Minimum clear height inside (for interoperability): 7.5 m.

(4)Special Installations. Grounding points, standby power generators, equipment and installations for the production and distribution of:

(a) Compressed air,

(b) Special electrical voltages and frequencies.

(5)Special installations to include power converter, frequency converter to match aircraft requirement.

(6)Hangar floor should be of sufficient strength for the most demanding aircraft planned to use the hangar. Heavy duty, non-slip, industrial, floor coating is required.

(7)Heating is required. Minimum temperature requirements as described in Technical Preamble.

(8)A small office may be required but its area will be included into the overall area required.

b. **Siting**. Aircraft maintenance hangars should be sited in the same general area as aircraft maintenance workshops and warehouse buildings.

c. **Usable Floor Area**. The space should allow independent movement of the A/C. The usable floor area per aircraft shall be calculated as follows:

(1) For Tactical Fighter Aircraft

(Wingspan + 6 m) (Length + 10 m)

(2) All other Aircraft with wingspan • 30 m

(Wingspan + 6 m) (Length + 6 m)

(3) Aircraft with wingspan > 30 m

(Wingspan + 9 m) (Length + 9 m)

(4) Rotary Wing Aircraft

(Overall length-rotor spread + 6 m) (rotor diameter + 6 m)

(5) **Each 2nd dock**

(Overall length-rotor spread + 6 m) (width of fuselage + 6 m)[14]

d.Flexibility. Size of hangar to be based on designated aircraft. Consideration should be given to configure the hangar characteristics to take into account the likelihood of different aircraft being deployed to the airfield in the future.

e.Fire Fighting. All maintenance spaces should be protected by a basic, manually operated fire suppression system.

3. **Requirements**

a.Usable area based on providing space for 15% of the number of aircraft assigned, rounded up at MOB and rounded down at DOB to the next whole number. E.g. 15% of 16 aircraft is 2.4; hence the hangar will be designed for 3 aircraft at a MOB and for 2 aircraft at a DOB. Where a fuel cell dock is required, one of the aircraft spaces (i.e. part of the 15% allowance) will also be used for that purpose.

b.RWA Maintenance Hangars require an installed crane capable to lift rotor or engine.

c. **MOBs**. Aircraft maintenance hangars are required for 1st and 2nd line maintenance.

d. **DOBs**. Aircraft maintenance hangars are required for 1st and 2nd line maintenance of tactical fighter/rotary wing aircraft only. For all other types of aircraft, maintenance hangars are required only when no other covered facilities are available, where climatic conditions would preclude essential 1st line maintenance from being performed outdoors, and where the maintenance function cannot be performed at a nearby MOB. If and when justified, the requirement would be for one aircraft only.

[14] This applies if rotors can be folded or the aircraft has a two-blade rotor.

ITEM 19A - Aircraft Maintenance Hangar (Technical Standards)

1. Characteristics

a.General. The Aircraft Maintenance Hangar shall be designed to accommodate the maximum feasible number of aircraft. For flexibility, when a new hangar is designed, the likelihood of it being used by aircraft larger than the one(s) currently deployed at the airfield, should be taken into consideration.

b.Siting. The following design criteria should be observed when siting a new aircraft maintenance hangar:

(1)The hangar should be sited as near as possible to the existing taxiway system, to minimise the required length of the connecting taxiway.

(2)The hangar should be located within the Base Maintenance Area, close to warehouses and to other aircraft maintenance workshops.

c.Type. Conventional, aviation type, hangar construction to provide adequate weather protection for aircraft and ground support equipment, as well as acceptable working conditions for the aircraft maintenance personnel. Durability, ease/simplicity of maintenance and reasonable construction cost should be the key factors governing the aircraft hangar design.

d.Annexes. Annexes (Lean-to) around the three sides of the hangar may accommodate various aircraft maintenance workshops. This concept of collocating as many of the aircraft maintenance related activities as possible should be exploited to its maximum potential.

e.Floor. Concrete floor of sufficient strength for the most demanding aircraft planned to use the hangar to include provision for jacking the A/C. Reflective paint should be considered to compensate for the large shadowed areas underneath the wings. Floor slope(s) will facilitate gravity drainage; the effluent will be conducted into the same fuel/water separation system as that of the aircraft maintenance apron (Item 6A) in front of the hangar, for further treatment.

f.Hangar Door. Electro-mechanical door opening mechanism (with possibility for manual operation in case of power failure) is required.

g.Lighting. Permanent lights, providing an illumination of 300 LUX minimum inside the main hangar hall. Illumination levels at workshops (Annexes) will vary in accordance with the function of each shop.

h.Heating/Ventilation/Air Conditioning (HVAC). Heating of the main hangar hall and the lean-to annexes is required. Ventilation will be considered for specific workshops, e.g. paint shop, battery shop, etc.

ITEM 19B – Aircraft Shelter (Military Criteria)

1.Function. To provide covered aircraft parking space for weather protection. The Shelter has a secondary function of providing aircraft flight line maintenance and sortie generation. Physical and weapon protection characteristics and requirements are to be provided only when and as directed by the NMAs.

2. Characteristics

a. Facility Parameters

(1) Aircraft shelter dimensions

(a)Shelter minimum clearance to be at least 1.0 m greater than the overall height and 6.0 m greater than the overall width and length of the largest aircraft intended to use the shelter. Minimum clear height inside: 7.5 m.

(b) **For A/C with a wingspan >30m**

Shelter minimum clearance to be 9.0 m greater than the overall width and 6.0 m greater than the overall length of the largest aircraft intended to use the shelter.

(c) **For rotary wing aircraft**

Shelter minimum clearance to be at least 1.0 m greater than the overall height and 6.0 m greater than the rotor (unfolded) diameter and the overall length–rotor spread of the largest aircraft intended to use the shelter. Minimum clear height inside: 7.5 m.

(2) Shelter floor should be of sufficient strength for the most damaging aircraft planned to use the shelter. Heavy duty, non-slip, industrial, floor coating is required.

b. **Siting**. Aircraft shelters should be sited on existing platforms with adequate access to taxiways.

c. **Flexibility**. Size of shelter to be based on designated aircraft. Consideration should be given to configure the shelter characteristics to take into account the likelihood of different aircraft being deployed.

3. **Requirements**

a. Aircraft weather shelters are required for tactical fighter/rotary wing aircraft and MPA only when justified by extreme weather conditions.

b. Aircraft weather shelters are required for UAV in an ISR role.

c. Aircraft weather shelters are required for AGS at the MOB.

d. Additional enclosures, heating, dehumidification and ventilation are normally not required, but may be considered on case by case basis.

e. The adaptation of existing Protected Aircraft Shelters may be considered where feasible.

f. Deployable Assets may be used.

ITEM 19B – Aircraft Shelter (Technical Standards)

1. Characteristics

a. **Access**. Access taxiway as per Item 3 - Taxiway.

b. **Structure**. Clear span, light steel frame, light-weight panel cover.

c. **Apron and Floor**

(1)The floor should be an industrial type as described in the Technical Preamble. Those portions which will be occupied by an aircraft should meet the general requirements of Item 4 - Parking Platforms for Aircraft.

(2)Any external apron which allows the positioning or manoeuvring of the aircraft in a nose-in configuration should meet the general requirements for Item 4 - Parking Platforms for Aircraft.

d. **Utility Connections**. Utility connections only as agreed by the NMAs.

ITEM 19C - Aircraft Washing Facility (Military Criteria)

1.Function. To provide a facility where an aircraft can be washed and/or rinsed. Exceptional Considerations may apply to this Item as defined in the Military Preamble.

2. Characteristics

a. **Platform**. The facility can be provided through the use of a platform of the same size as a parking apron. This platform should have a light liquid separator.

b. **Covered Facility**. A covered facility should only be considered when the average minimum daily temperature for the coldest consecutive 30 day period annually is less than 5 ºC. The covered facility, if required, shall be in a light non-combustible construction.

3. **Requirements**

a. Washing is normally expected to be done on an aircraft maintenance apron (Item 6A). The facility is required on a case by case basis, dependent on the climatic conditions.

b. Power and water supply, drainage as well as heating for covered facility (min. 15 ºC) is required.

c. Minimum necessary access pavement is required.

d. This facility should serve at least 48 tactical aircraft or equivalent number of other A/Cs and including aircraft from adjacent airfields.

ITEM 19C - Aircraft Washing Facility (Technical Standards)

1. Characteristics

a. Access. Flexible pavement as per Item 3 - Taxiway.

b. Structure.

(1) Clear span, light steel frame, light-weight panel cover.

(2) Provide clear height as per Item 19A - Aircraft Maintenance Hangar.

c. **Floor**

(1)Provide rigid pavement with surface anti-skid treatment. ACN as per Aircraft Data Sheet.

(2) Floor gradients to compliment drainage pattern, maximum 1.5%.

(3) One grounding point installed as per Item 6A - Apron for Maintenance.

d. **Internal Space**

(1)Washing space should be based on aircraft parking requirements listed in Aircraft Data Sheets but provide minimum 3 m working clearance around any part of the aircraft and allow safe entry and exit from the facility.

(2)Additional space, not to exceed 20 m without specific justification may be provided for storage of equipment and personnel requirements.

e. **Utility Connections**

(1)Domestic water and electrical power connections are required.

(2)Storm water drainage may not be required if waste water is to be treated specially through separators or removed for treatment from holding tanks.

f. **Washing Apparatus**

(1)Washing apparatus to prepare the washing solution and to apply it to the aircraft is considered to be an equipment item.

(2)For washing purposes, cold water should be heated and pressurised, if necessary and provided at a sufficient flow rate.

(3)Detergent storage and mixing tanks, if required, may be part of the permanent installation. Detergent storage should not exceed 10 m and detergent mixing should not exceed 20 m without supporting calculations.

g. Drainage

(1)Drain waste should not be diverted to the sanitary drainage system.

(2)A holding tank or equivalent measure to contain waste water is required as well as oil/water or detergent/water separators.

(3)Trench drains may be incorporated into the floor to prevent ponding of water during or after washing.

h. **Personal Comfort and Safety**

(1)Heating should be provided to maintain the minimum interior temperature required as well as to prevent wash water freezing on the airframe.

(2)An emergency eyewash and internal industrial style sink should be provided.

(3)An emergency shower requires specific justification. Emergency showers available in an adjacent facility may be considered to meet the requirement.

(4) Lighting levels as per Workshops in Technical Preamble.

ITEM 19D - Aircraft Weapons Calibration Facility (Military Criteria)

1. **Function**. To provide space for:

a. Tactical Fighter/Rotary Wing Aircraft for harmonising and sighting the integrated fire control systems.

b. Reconnaissance Aircraft for harmonising and aligning integrated electronic and reconnaissance equipment.

2. **Characteristics**

a. **Construction**. A simple uncovered or nose facility for calibrating the installed gun or integrated electronics.

b. **Facility parameters**

(1)The construction has to be adapted to the specific aircraft and its equipment (see aircraft datasheet).

(2) Minimum essential access pavement and electric power is required.

3. **Requirements**. One Aircraft Weapons Calibration Facility is required at MOBs only, when specified on the aircraft data sheet.

ITEM 19D - Aircraft Weapons Calibration Facility (Technical Standards)

1. Characteristics

a. Access. Access taxiway as per Item 3 - Taxiway.

b. Structure. Simple conventional structure

c. Apron and Floor

(1)The floor should be an industrial type as described in the Technical Preamble. Those portions which will be occupied by an aircraft should meet the general requirements of Item 4 – Parking Platforms for Aircraft.

(2)Any external apron which allows the positioning or manoeuvring of the aircraft in a nose-in configuration should meet the general requirements for Item 4 – Parking Platforms for Aircraft.

d.Calibration Apparatus. While the necessary apparatus to calibrate aircraft weapons is considered to be an equipment item, some adaptation of infrastructure elements may be necessary to accommodate it.

e. Firing Butt

(1)The firing butt may be a simple earth berm of sufficient height and depth to ensure safety.

(2)Where space restrictions do not allow berm faces at the natural slope, retaining measures or slope stabilisation may be incorporated into the berm.

f. **Utility Connections**

(1) Electrical connection is required.

(2) Other utility connections only as agreed by the NMAs.

ITEM 20 – Warehouse/Storage Facilities (Military Criteria)

1.Function. To provide storage space for spare parts, equipment and materials required for the operation and maintenance of aircraft and their ancillary equipment. This is an occupied facility. Exceptional Considerations may apply to this Item as defined in the Military Preamble. This item applies also to provide space for the storage and preparation of sonobuoys (MPA)

2. Characteristics

a. Warehouse

(1)Standard simple facility with open bay layout & administrative space, with external lighting. Shelving is considered to be an equipment item.

(2) Usable storage height ≤ 5m.

(3)The storage of hazardous, flammable or sensitive items, or items that require special storage conditions will be considered (i.e. refrigeration or humidity control).

(4)Loading/Unloading Hardstand. Level rigid pavement, capable of handling loaded forklifts.

(5)Loading/Unloading Ramps or Docks may be considered on a case by case basis.

(6) Floor. Industrial floor, suitable for use of loaded forklifts.

b. Open Storage **Hardstand**. Level rigid pavement suitable for use as open storage and/or for siting of deployable assets.

c. **Access**. Access to the airfield road network.

d. **Location**. Should be sited adjacent to aircraft maintenance facilities. May be collocated with Item 19A - Aircraft Maintenance Hangars or Item 22F - General Maintenance Workshops. Storage of sonobuoys may be split between bulk and ready-use storage.

3. **Requirements**

a. **MOBs**. At MOBs a permanent building of simple, warehouse type, specifications is required.

b. **DOBs**. At DOBs, except AEW, only a paved platform, for open air storage, is required, with connections to the necessary drainage. Alternatively, moderate modifications to **existing** facilities are acceptable. For additional guidance see Annex C.

c. **Size**. The size of the facility/hardstand is shown below:

Aircraft Category	No. of A/C	Usable Area (m)	
		MOB	**DOB**
RWA, TFA	1-16 17-32 33-48 > 48	800 1,400 2,000 2,600	20 m per A/C
MPA	1-6 7-12 >12	800 1,400 2,600	20 m per A/C
TTA	1-16 17-32 > 32	800 1,400 2,000	40 m per A/C
STA , AAR, SBA	1-10 11-20 > 20	1,000 1,700 2,400	50 m per A/C (only AAR)
AEW	1-10 > 10	2,500 + 1,000 depot 6,000 + 2,500 depot	600
AGS		2,500	600

Note: The building areas include 20 m for administrative purposes.

(1)The loading/unloading apron is required only for a building and shall not exceed 10% of the usable area of the warehouse.

(2)Sonobuoys. At MOBs and DOBs, the requirement for specific storage quantities, will be based on planning factors in maritime stockpile planning guidance. The following figures are to be used as a guide for the evaluation of the required space when stacking pallets three high:

(a) Bulk Storage: 24 m per 1,000 sonobuoys

(b) Ready-use Storage: 45 m

d. **Fire Detection and Suppression System**. At NAEW MOB fire detection and suppression system is required.

ITEM 20 - Warehouse Storage Buildings (Technical Standards)

1. **Characteristics**

a. **General**. The Military criteria determine how this requirement can be met (Permanent building or open air storage facility).

b. Construction

(1)Where a permanent building is to be constructed, provision will be made for the following:

(a)Loading/Unloading Ramps or Docks.

(b)Loading/Unloading Doors. Loading/unloading doors dimensions (clearances) should be sufficient to allow operation of cargo handling equipment (forklifts) capable of handling loaded, 20', ISO containers.

(c)Floor. Concrete floor with industrial finish to allow unobstructed movement of heavy cargo handling equipment. Floor strength should be based on the wheel load of the heaviest equipment intended to use the warehouse, or on a minimum of 2.50 tons wheel load.

(d)Lighting. Exterior (Area) lighting is also required to allow for loading/unloading operations during the hours of darkness or poor visibility.

(e)Fire Detection and Suppression System. Where critical items are stored a simple sprinkler system should be provided.

(2)Where only an open-air storage facility is required, a simple rigid pavement pad will be constructed. This pad will be designed for the heaviest vehicle intended to use it, or a minimum of 2.50 tons single wheel load. The surface of the pad will be sloped to prevent water from ponding. Depending on the size and other conditions, trench drains may also be required.

ITEM 21 - Reception Airfield Facilities (Military Criteria)

1. **Function**. To provide the required combined facilities for personnel and cargo handling at Reception Airfields for:

a. Management of aircraft and ground movement, parking, loading/unloading and servicing. (Reception Operation Centre)

b. Cargo handling.

c. Holding Area for In-and out transit personnel.

d. Storage of essential ground support and handling equipment and aircraft spares.

e. Interim storage of cargo, including weapons and ammunition.

With the exception of aircraft parking these facilities may be suitable for provision at short notice. Prefabricated or temporary structures may satisfy requirements as may existing Host Nation facilities. Therefore the NMAs may direct that these facilities will not be provided until the execution of AOM.

2. Characteristics

a.Authority. The category of the Reception Facilities will be determined by the NMAs.

b.Reception Facilities. There are three types of Reception Facilities (APODs/APOEs) as identified below (see Glossary of Terms/Receptions Facilities):

(1) Primary Reception Facility (PRF).

Capacity. The facility should have parking platforms for a minimum of eight (8) Strategic Transport Aircraft. It must be able to accommodate, in a 24 hour period, in excess of 5,000 personnel, and/or over 2,000 tonnes of cargo. The Facility should allow for an average turn around time of 4 hours.

(2) Secondary Reception Facility (SRF).

Capacity. The facility should have parking platforms for a minimum of one (1) Strategic Transport Aircraft plus six (6) Tactical Transport Aircraft. It must be able to accommodate, in a 24 hour period, between 2,000 and 5,000 personnel, and/or between 1,000 and 2,000 tonnes of cargo. Facilities should allow for a maximum turn around time of 4 hours.

(3) Tertiary Reception Facility (TRF).

Capacity. The facility should have parking platforms for a minimum of one (1) Strategic Transport Aircraft plus two (2) Tactical Transport Aircraft. The facility should be able to accommodate, in a 24 hour period, up to 20 Tactical Transport Aircraft, up to 2,000 personnel, and/or up to 1,000 tonnes of cargo. Facilities should allow for a maximum turn around time of 4 hours.

c. Infrastructure.

(1)Infrastructure facilities requirements are based on the type of the reception facility. It is not intended to provide for the movement of personnel on peacetime rotation, or for the peacetime logistic support of in-place forces.

(2)Taking into account the interim nature of the usage involved, the functional requirements of this item **should be met to the maximum feasible extent through use of existing facilities**. This includes operations centres, hangars and civil or military passenger freight terminals. Additional space for facilities provided by NATO/User-/Host Nation is required only where existing facilities are unsuitable or not available.

Notes:

(a)Communications equipment is considered "Equipment Item".

(b)Host Nation responsibilities, such as custom clearance, are excluded.

d. **Siting**. The space for facilities should be adjacent to aircraft parking aprons. Parking Platforms are described under Item 4.

3.Requirements. The Tables below show the space needed for NATO/User/Host Nation provided deployable assets, based on the capacities given for each type of Reception Facility in Para 2. They are given for planning purposes. Adjustments can be made, as appropriate, for increases in the number of aircraft in the operational movement plan and subsequent increases in the processing of personnel and cargo. The areas required to fulfil the functions identified in Para 1.a. through 1.f., should be located on the airfield and, in the three reception airfield types are as follows:

a.Reception Operations Centre (Management of Aircraft and ground movement, loading/unloading and servicing). This is an occupied facility.

Sub-function	**Area (m)**		
	PRF	**SRF**	**TRF**
Airlift operations	50	50	50
Flight planning	50	50	50
Aircrew briefing	50	30	20
Movement control (troops, equipment and supplies)	50	40	20
Maintenance operations	50	40	20
Total	**250**	**210**	**160**

b. **Cargo Handling**

Sub-function	Area (m)		
	PRF	SRF	TRF
Pallet/container build up/tear down and inspections including admin space	300	200	100

c. **Holding Area for In-and out transit Personnel**

Sub-function	Area (m)		
	PRF	SRF	TRF
Holding area	6,000	4,500	1,500

(1)The values for In-and out transit personnel space above are maximum areas required if the following functions are not provided in other areas:

(a)Passenger processing areas including a dedicated space for a Flight Line Medical staging facility for the reception of critical casualty personnel.

(b)Baggage make up/breakdown/weighing and claim areas, personnel scanning and luggage scanning points, special areas for dogs

(c) Personnel waiting areas including toilet facilities.

(d)Food preparation and serving areas for En-Route personnel. This could be a hardstand with appropriate utilities to receive portable kitchens.

(2) This may be an occupied facility. To be determined by the NMAs.

d. **Storage of Essential Ground Support Equipment**

Sub-function	Area (m)		
	PRF	SRF	TRF
Open parking (average number of vehicles (PRF:47/SRF:36/TRF:12))	1,600	1,200	400
General maintenance workshop including spare parts storage	300	250	130

Note. General maintenance requirements should be combined with Item 23 - Vehicle Maintenance Workshops.

e. **Temporary Storage**

Sub-function	**Area (m)**		
	PRF	**SRF**	**TRF**
Break bulk (open storage)	10,000	5,000	2,500
Covered/Enclosed storage	1,000	500	250
Vehicles	3,000	2,000	1,000
In-and out transit personal weapons[15]	30	30	15
In-and out transit Ammunitions[15] / Hazardous Cargo Holding Area	200	100	50

f. **Localised Water storage**. Where it is not practical to provide water from existing supply and storage deployable or leased assets may be considered.

[15] Circumstances and especially in an AOM may justify the requirement for a secure room for the storage of weapons and ammunition. This has to be decided by the NMAs on a case by case basis.

ITEM 21 - Reception Airfield Facilities (Technical Standards)

1. Characteristics

a.Vehicle Access and Parking.

(1) Access road in accordance with Item 7 - Roads and Parking Areas.

(2) Parking as per Technical Preamble.

b.Open Storage. Open storage in general accordance with Item 7 - Roads and Parking Areas suitable for support of vehicles used in loading/unloading operations.

c. **Covered Storage**. In accordance with the requirements of Open Storage, above with addition of a light non-combustible shelter.

d. **Enclosed Cargo Storage**. In accordance with Item 20 - Warehouse/Storage Facility.

e. **Personnel Holding Areas/Cargo Handling Areas**

(1)Occupied Facility. In accordance with Technical Preamble. Interior finishes, to austere standards, and layout should be simple and durable, given the temporary nature of occupancy.

(2)Unoccupied Facility. Light conventional construction finished to austere standards.

(3)Sanitary Facilities. Toilets and personal washing requirements can be met by:

(a) conventional construction,

(b) provision or rental of portable toilets,

(c) use of facilities in adjacent buildings.

f. **Reception Operation Centre**. Office type accommodation of conventional construction.

g. **Storage of Essential Ground Support Equipment**. See Item 22B.

h. **Temporary Storage**

(4)In-and out transit personal weapons. To be determined.

(5) In-and out Transit Ammunition/ Hazardous Cargo Holding Area

(6)Fenced hardstand with area lighting, grounding points for ammunition loading systems and lightning protection. Siting in accordance with AASTP-1.

ITEM 22A - Avionics Workshop (Military Criteria)

1. **Function**. To provide space for specialised avionics test equipment for maintenance of ECM equipment and for mission essential avionics spares. This is an occupied facility.

2. **Characteristics**

a. **Construction**. Workshop will be provided in conventional construction. Protective construction required only when identified by the NMAs.

b.Siting. This facility should preferably be sited as not to preclude access to aircraft. It should neither be sited in dispersed squadron areas nor in the general area of aircraft maintenance. The separation distance to fuel installations should be a minimum of 150 m from any fuel storage tank of 50 m (or larger), and the distance to ammunition storage facilities shall be in accordance with AASTP-1.

c.Climate Control. Air conditioning, humidity control and/or dust control may be required where such is identified by manufacturers' specifications, equipment maintenance requirements, etc.

d.Lifting equipment. A bridge crane with a capacity of 1,000 kg is required in the area devoted to ECM pod maintenance and in other specialised maintenance areas where justified.

e.Speciality Installations. Grounding points, standby power generators, equipment and installations for the production and distribution of:

(1) Compressed air,

(2) Special electrical voltages; and

(3) Special frequencies are required.

f.Internal layout. Door openings and configuration of building must facilitate movement of ECM pods and test equipment throughout the building.

g. Standby Power. Standby power is required.

3. **Requirements**

a. **MOBs**

(1)For aircraft requiring avionics maintenance support, the following is required:

(a) Tactical fighter/rotary wing aircraft

No. of A/C	Area (m)
48 and less	1,000
more than 48	1,600

(b) **MPA, AEW and AGS**

No. of A/C	Area (m)
6	1,500
12	2,400
13 or more	50 (additional per A/C)

(2) For aircraft not requiring avionics maintenance support, additional space is provided for in Item 22F - General Maintenance Workshop.

b. **DOBs**. Only required at AEW DOBs, 100 m .

ITEM 22A, B, C, D, E and F - Aircraft Maintenance Workshops (Technical Standards)

1. Characteristics

a.General. This item contains the technical standards for all aircraft maintenance workshops, i.e. 22A – Avionics Workshop, 22B - Aircraft Ground Equipment Workshop, 22C - Aircraft Engine Workshop, 22D - Parachute and Survival Equipment Facility, 22E Liquid Oxygen Storage & Production (LOX) and 22F - General Maintenance Workshop. Associated administration space is also required at each individual workshop.

b.Siting. Aircraft maintenance workshops should be sited within the general area of aircraft maintenance. Where feasible, they should be constructed as annexes (lean-to) or adjacent to aircraft maintenance hangars. They can be combined or provided in separate buildings.

c. Construction

(1)General. Conventional workshop construction. Compressed air systems and special electric current frequencies should be installed where technically required.

(2) For Item 22E - LOX

(a)LOX Containers. Standard, commercially available containers, refillable and transportable.

(b)Shelter for LOX production plant. If the nationally provided production plant is to be sited on-base, then a light, non-combustible, shelter is required.

(c)Storage shelter for LOX containers. Light, non-combustible construction.

d. **Clearances**

(1)Ceiling. The clear height inside any workshop should be adequate for its function. In all workshops, a minimum height of 3 m should be observed.

(2)Doors. Door clearances and workshop configuration should be appropriate for the unimpeded passage of equipment to be maintained (e.g. aircraft engines).

e.Floor finish. Heavy-duty, non-slippery, industrial floor type coating is required. For Avionics workshops Normal, dust-free, floor coating used at precision work workshops is considered adequate. Anti-static floor finish should only be used in those areas where such an environment is required

f.HVAC. 18 ºC for the general workshop areas. 22 ºC for the administrative rooms and workshop areas where precision work is performed. General area ventilation is required. Additional local ventilation might also be considered, where technically justified

(e.g. paint shop, battery shop). In addition to the requirements identified in the Technical Preamble, air cooling, humidity and/or dust control are required where technically justified.

g.Lighting. See Technical Preamble/Administration space, General Purpose and Precision Work Workshops (All avionics workshop areas are considered as precision work areas.

h.Personnel Safety. Personnel safety measures (e.g. eye-showers) are a national responsibility.

i.Lifting Devices. For Item 22A only, a bridge crane with a lifting capacity of 1,000 kg is required in the area devoted to ECM pod maintenance. Monorails may also be required in other specialised areas.

j.Stand-by power. For Item 22A only, one generator is required, of a capacity determined on a case by case basis. Some critical testing equipment may be supplied by a UPS of appropriate capacity.

ITEM 22B - Aircraft Ground Equipment Workshop (Military Criteria)

1. **Function**. To provide space for maintenance of mobile powered ground equipment. This is an occupied facility.

2. **Characteristics**

a. **Siting**. Where feasible, site as annexes or adjacent to maintenance hangars and general workshops.

b.Construction. Workshop shall be provided in conventional construction. The functions may be combined with other maintenance activities or in separate buildings.

c. Compressed Air. A compressed air system is required.

d. Crane. A bridge crane of 2.5 tons is required.

3. **Requirements**

a. **MOBs**. The following scope for tactical and transport aircraft is required based on the number of permanently based aircraft:

TFA, RWA, TTA		**MPA**		**STA, AAR, AEW, AGS, SBA**	
No. of A/C	**Area (m)**	**No. of A/C**	**Area (m)**	**No. of A/C**	**Area (m)**
≤ 32	700	≤ 6	500	≤ 10	800
33 - 48	1,000	7 - 12	700	> 10	1,500
49 - 80	1,300	13 - 18	1,000	---	
≥ 81	case by case	≥ 19	1,300		

b. **DOBs**. Space for tactical fighter, rotary wing, tactical transport aircraft, AGS and MPA 120 m is required. Space for Strategic transport, AAR, AEW aircraft and SBA, 240 m is required.

ITEM 22C - Aircraft Engine Workshop (Military Criteria)

1. **Function**. To provide space for the first and second line maintenance of aircraft engines. This is an occupied facility.

2. **Characteristics**

a. **Siting**. Where feasible, site as annexes or adjacent to maintenance hangars and general workshops.

b.Construction. Workshop shall be provided in conventional construction. The functions may be combined with other maintenance activities or in separate buildings.

c.Lifting Device. A bridge crane with a capacity to lift one aircraft engine or a minimum of 2,500 kg is required.

d. **Clear Height**. A minimum clear height of 4 m to the hook of the installed crane is required.

3. **Requirements**

a. **MOBs**. The following areas for permanently based aircraft is required based on the number of installed engines:

TFA, RWA, TTA, MPA, AGS		**STA, AEW, AAR, SBA**	
No. of Installed engines	**Area (m)**	**No. of Installed engines**	**Area (m)**
≤ 24	700	≤ 40	1,000
25 - 36	900	> 40	1,700
37 - 48	1,100		
49 - 72	1,400		
73 - 96	1,700		
97 - 144	2,200		

b. **DOBs**. For AEW 100 m .

ITEM 22D – Parachute and Survival Equipment Facility (Military Criteria)

1.Function. To provide space for the maintenance, and storage of parachutes, aircrew survival equipment and drag parachutes. This is an occupied facility.

2. Characteristics

a. Siting. Where feasible, site adjacent to other maintenance facilities.

b. Construction. Workshop shall be provided in conventional construction.

c.Drying Facility. A tower should be provided for drying parachutes with a 10 m hanging height. For chutes greater than 10 m, additional measures may be considered.

d. Climate Control. Humidity control required for the drying tower.

3. **Requirements**

a. **MOBs**

(1) **Drag Parachute**. The following scope is required based on the number of permanently based aircraft requiring drag parachute:

No. of A/C	Area (m)
≤ 16	200
17 - 32	250
33 - 48	300
≥ 49	350

(2) **Personnel Parachutes and/or Aircrew Survival Equipment**

TFA	MPA, TTA		STA, AAR, AEW, SBA	
Area (m)	No. of A/C	Area (m)	No. of A/C	Area (m)
200	≤ 12	300	≤ 10	550
	> 12	400	>10	1,000

b. **DOBs**. The following scope is required based on the number of deployed aircraft requiring drag parachute:

No. of A/C	Area (m)
≤ 16	200
17 - 32	250
33 - 48	300
≥ 49	350

c. At AEW DOBs 50 m storage and maintenance space for life support equipment is required.

ITEM 22E - Liquid Oxygen Production and Gas Storage (Military Criteria)

1.Function. To provide space for production of liquid oxygen (LOX) and the testing, maintenance and storage of LOX equipment and gases supporting flying operations. The workshop is considered an occupied facility. At AEW airfields, a storage facility is required for Nitrogen and Sulfor-hexa Fluoride 6 (SF6).

2. Characteristics

a.Usage. Facility includes maintenance workshop, fixed LOX containers, shelter for LOX containers and shelter for the production plant. Plant for production is considered an equipment item.

b.Construction. Workshop shall be provided in conventional construction. Adequate ventilation must be provided. Shelters shall be designed to accommodate the required number of containers with a minimum of 0.75 m between walls and containers and between adjacent containers to permit the refilling of containers in place or the replacement of containers.

c.LOX Production. LOX production may be either off-base as part of the national logistics system or on-base.

3. **Requirements**

a.LOX Storage Calculation. Required for all aircraft to meet the requirements of the first seven days of operations. A minimum of two containers will be provided for each facility. The gross capacity is calculated as follows:

$T_s \quad A_s \quad C \quad I_c \quad L_f$

Where,

T_s = Total number of sorties during the first seven days of operation.

A_s = Average sortie length in hours (from NMA approved stockpile planning guidance).

C = Number of crew members.

I_c = 1 litre/hour (the estimated average consumption per hour).

L_f = 8 (factor to allow for the loss of LOX from all causes and for the fact that containers cannot be completely filled).

Note: For MPA only, consider an extra factor of 20 % for the estimated maximum wartime usage.

b. MOB

(1)Tactical Fighter Aircraft, Tactical Transport & MPA. As per formula in sub-para 3.a. above.

(2)STA/ AAR /AEW. The minimum requirements based upon the type of aircraft required. For AEW at MOB LOX storage required of 7500 l, for ELINT and Tanker aircraft, 3,000 l; for Strategic Reception, 7,500 l.

(3)Platform. A minimum of 60 m is required in rigid pavement, covered by an open sided shed for the protection of storage containers to cover the platform.

(4)Workshop. A workshop of 55 m is required for LOX testing and for general maintenance and repair of LOX system components.

c.DOBs.Where commercial supply is available, only a rigid paved platform of 60 m and shelter are required. Otherwise, provide for as a MOB. For AEW a storage container for 2,000 l is required.

d. Security Fencing is required.

ITEM 22F - General Maintenance Workshop (Military Criteria)

1.Function. To provide space for first and second line maintenance of aircraft components (electrical, battery, tire, non-destructive testing, pneumatic, hydraulic, welding, machine, structural, painting, weapons release, environmental and associated administration). The workshops are occupied facilities. Exceptional considerations may apply to this Item as defined in the Military Preamble.

2. Characteristics

a.Siting. Where feasible, site as annexes or adjacent to maintenance hangars.

b.Construction. Workshop shall be provided in conventional construction. The functions may be combined with other maintenance activities or in separate buildings.

c. **Lifting Device**. A monorail crane with a minimum lifting capacity of 1,000 kg with 3m hook height is required.

d. **Ceiling Clearances**. Sufficient ceiling height to provide for safe operation of lifting equipment.

e. **Standby Power**. Standby power is required.

3. **Requirements**

a. **MOBs**.

(1)General maintenance workshops are required for 1st and 2nd line maintenance.

(2) The following scope is required based on the number of aircraft:

TFA, RWA, TTA, AGS		AEW		STA, AAR, MPA, SBA	
No. of A/C	**Area (m)**	**No. of A/C**	**Area (m)**	**No. of A/C**	**Area (m)**
≤ 16	1,900	≤ 10	4,000	≤ 6	1,200
17 - 48	2,600	>10	7,000	7 - 12	1,600
49 - 80	3,300			13 - 18	2,400
				19 - 24	3,000

(3) The following additional scope for avionics maintenance is required for aircraft not requiring dedicated avionics workshop.

No. of A/C	Area (m)
≤ 48	500
> 48	800

b. **DOBs**. Required on a case by case basis, for 1st line maintenance only. The requirement for TFA, TTA, RWA, MPA and AGS is 300 m per squadron and for STA, AAR, AEW and SBA is 500 m .

ITEM 23 - Vehicle Maintenance Workshop (Military Criteria)

1. **Function**. To provide space for the maintenance of military vehicles and the prime movers of mobile ground support equipment. This is an occupied facility. Exceptional Considerations may apply to this Item as defined in the Military Preamble.

2. **Characteristics**

a. **Siting**. To minimise vehicle congestion the facility should, where feasible, be sited on the periphery of aircraft maintenance areas rather than within these areas.

b. **Washing Facility**. For maintenance purpose only, where a vehicle washing facility is required, weather permitting it should be provided outside by appropriate drainage (i.e. fuel/water separator). Where the weather does not permit such an arrangement, the facility should be provided inside but the space allocated for it, will be part of the overall area.

3. **Requirements**. Vehicle maintenance and shops are required as follows:

a. MOBs

(1) TFA and TTA

No. of A/C	Area (m)	No. of Inspection Bays
≤ 16	400	2
17 - 32	700	3
33 - 48	1,000	4
≥ 49	1,300	5

(2) **AAR, MPAs and RWA**

No. of A/C	Area (m)	No. of Inspection Bays
≤ 18	400	2
19 - 36	700	3
≥ 37	1,000	4

(3) **AEW, STA and SBA**

No. of A/C	Area (m)	No. of Inspection Bays
≤ 10	700	3
>10	1,900	4

(4) **AGS**

No. of A/C	Area (m)	No. of Inspection Bays
10 or less	700	3
AGS Ground Station Vehicle	300	1
AGS Ground Station System Maintenance	500	

b. **DOBs**. Not required. For AEW only, an area of 100 m with one pit. For additional guidance see Annex C.

ITEM 23 - Vehicle Maintenance Workshop (Technical Standards)

1. **Characteristics**

a. **Construction**. Simple steel frame or reinforced concrete/masonry construction is considered adequate inspection bays will be equipped with inspection pits or commercially available lifting devices. Inspection pits should be constructed integrally with the concrete floor of the main maintenance area, with stairways built in for safe access.

b. **Floor finish**. Heavy-duty, non-slip, fuel-resistant, industrial floor coating is required for both, main vehicle maintenance and specialised workshop areas.

c. **Heating**. 18 ºC is considered adequate for all maintenance and workshop areas. Office area 22 ºC.

d. **Ventilation**. General ventilation required in both main and specialised workshop areas. Also additional, local, ventilation may be required in some workshops (e.g. batteries) as well as in the refuelling vehicles maintenance bay. Finally, each vehicle maintenance bay should provide a connection for the exhaust pipe of the vehicle, so that the exhaust fumes produced by the idle running of the engine during maintenance are directed outside the building.

ITEM 24 - Crash and Fire Station (Military Criteria)

1.Function. To provide space for aircraft crash and fire vehicles, and the direction of aircraft crash and fire fighting operations except at MOBs for AEW and AGS only, structural fire- fighting remains a national responsibility, and may be collocated. This is an occupied facility. Exceptional Considerations may be applied as defined in the Military Preamble.

2. Characteristics

a.Construction. Simple steel frame or masonry construction. This includes storage areas.

b.Siting. The crash and fire station should be sited to provide rapid 2-lane access to the runway area. A secondary consideration is access to the remainder of the airfield for normal fire fighting purposes.

c. Standby Power. Standby power is required.

3. **Requirements**

a.MOBs. A building with usable area of 400 m plus suitable manoeuvring hardstand is required at MOBs only for fire-fighting operations. Personnel administration and accommodation facilities are a national responsibility.

b.DOBs. At DOBs and APODs/APOEs, where there are no existing facilities, a building with a usable area of 200 m plus suitable manoeuvring hardstand is required.

c.AEW/AGS. Including structural fire-fighting the total requirements for AEW/AGS MOB is:

(1)10 or less = 500 m , (2)

11 or more = 1,350 m ,

(3) AEW DOBs = 125 m .

ITEM 24 - Crash and Fire Station (Technical Standards)

1. Characteristics

a. General

(1)This standard describes elements required for crash and fire operations related to aircraft. Structural fire components, if included are described in the relevant national standards.

(2)The specific layout of elements should be based on the fire vehicles and equipment intended for the facility within the overall space allowance. Additional internal accommodation of other smaller vehicles to be accomplished by deepening individual parking bays.

b. **Access**. Access road, according to Technical Standards in Item 7 - Roads and Parking Areas.

c. **Hardstand**

(1)Hardstand at entrance to be same strength as floor.

(2)The size of the hardstand should allow the necessary manoeuvring to permit a vehicle to back into its internal parking bay.

d. **Building**

(1)Provide sufficient clear space in the parking bay area.

(2)Vehicle entrance door(s) should provide sufficient clear height and width for ease of entry and exit. Vehicle entrance door(s) to meet relevant national codes for type acceptable for use in a fire station.

(3) Separate personnel entry door is required.

(4)Internal ceiling height to allow hose and other handling operations to take place inside the facility for cleaning, disassembly, etc.

e. **Internal Layout**. Where no particular fire vehicle has been identified, internal bay space should be 7 14 (m) minimum with additional depth if smaller vehicles are to be accommodated.

f. Floor

(1)Strength should be based on wheel load of the heaviest intended fire vehicle. If unknown, a wheel load based on the general guidance provided in the Technical Preamble should be used for an industrial type floor.

(2)Trench drains may be incorporated into the floor to prevent ponding of water during hose cleaning or other operations likely to cause the discharge of water.

g. **Ventilation**

Adequate ventilation system either natural or mechanical must be considered in order to allow exhaust of fumes from crash and fire vehicles to the outside in an expedient way.

ITEM 25 - Vehicle Pool Hardstand (Military Criteria)

1. **Function**. To provide for the outdoor parking of military vehicles including POL trucks, aircraft ground equipment, vehicles, and vehicles awaiting maintenance. Exceptional Considerations may apply to this Item as defined in the Military Preamble.

2. Characteristics

a.Location. The main portion of this Item is normally sited adjacent to Item 23 - Vehicle Maintenance Shop. The remainder may be located consistent with reasonable modes of operation. For safety reasons, hardstand for POL trucks should be located separately from other vehicles.

b.Construction. Hardstand may be provided through the use of an existing rigid or flexible pavement. Pavement strength should be consistent with the intended use. New hardstand should be of rigid pavement. The NMAs may direct other methods of construction for this item.

3. **Requirements**. Vehicle pool hardstands are required at MOBs and DOBs based on the following table. Exceptions need to addressed on a case by case basis.

a. **MOBs**

Aircraft Category	**No. of A/C**	**Area (m)**	
		Covered	**Uncovered**
TFA, TTA, MPA, STA, RWA	≤ 16		4,000
	17 - 32		6,000
	33 - 48		7,000
	> 48		8,000
AEW, SBA	≤10	1,500	4,500
	>10	2,800	9,500
AGS	≤10	1,500 + 1,000 (Mobile Ground Station)	4,500

Note. For Strategic aircraft, where special loading/unloading equipment is used, a covered area complete with electrical plug-ins, is required.

b. **DOBs**. Covered and uncovered space. To be defined by the NMAs.

For NAEW FOBs/FOL the required area amounts to 800 m covered and 1,800 m uncovered

c. **MPA**. No requirement for DOBs and FEBs.

ITEM 25 - Vehicle Pool Hardstand (Technical Standards)

1. Characteristics

a.General. This item provides for the centralised outdoor parking of military vehicles including refuelling trucks and aircraft ground support equipment, when they are not being used. It also provides parking for vehicles awaiting maintenance. Vehicle parking outside other buildings on base (i.e. when the vehicles are being used) is considered as a functional part of that particular facility and does **not** form part of this Item.

b.Construction. New hardstand should be constructed of rigid pavement. Existing flexible pavement should be considered for use on a case-by-case basis. The surface of the hardstand should be sloped to prevent water from ponding. Depending on the size and other conditions, trench drains may also be required. The pavement should be designed for the heaviest vehicle likely to use it. A single wheel load of 2.5 tons should be the minimum design load. Access to the parking area should be designed to facilitate continuous flow of traffic.

ITEM 27 - Communications and Information Systems Building (Military Criteria)

1.Function. This occupied facility is to provide dedicated space for the effective operation and maintenance of the Communication and Information Systems (CIS) provided under criteria Item 28 and for the following communications facilities:

a. Main base voice and data switches,

b. Terminal equipment,

c. Cryptographic machines,

d. Cryptographic records and duplicator,

e. Radio equipment,

f. Battery room and standby power,

g. Necessary office space.

2. Characteristics

a.Siting. The facility shall be provided on base and should be collocated with the Wing Operations Facilities or Squadron Operations Facilities where feasible. The provision of dispersed small sheds to house voice and data switches should be considered.

b.Construction. This facility shall be provided in conventional office type building as reported in Item 27 (Tech).

c. Standby Power. Standby power as per Item 9.

d.Electrical Power. Where required, filtered power and circuits commensurate with security requirements.

3. **Requirements**. Usable areas should be based on the table, however final sizing shall be based on equipment to be accommodated:

Aircraft Category	No. of A/C	Area (m)	
		MOBs	DOBs
TFA, TTA, RWA	≤ 16	120	120
	17 - 32	135	135
	≥33	155	155
MPA		200	200
AEW , AGS	≤10	200	100
	>10	750	100
STA, SBA		200	N/A

Notes. For MPA, additional requirement considered on case by case.

ITEM 27 - Communications and Information Systems Building (Technical Standards)

1. Characteristics

a.Construction. This building should normally be a conventional, office type, facility. Depending on the risk/threat level, at tactical airfields this building may be required to be a protected structure.

Floor. Raised flooring to allow under-floor cabling may be installed, if necessary, to provide effective installation and operation of the communication equipment.

b.HVAC: Heating shall be in accordance with the Technical Preamble/Office Type Building. If the building is a protective (hardened) structure, then air conditioning shall be installed. In other cases mechanical ventilation may be provided. Localised air cooling shall only be installed if necessary to meet the cooling requirements of the CIS equipment. Where required, any air duct installation shall include sound attenuation measures to meet security requirements.

c.Lighting. Lighting shall be in accordance with the Technical Preamble/Administration Buildings.

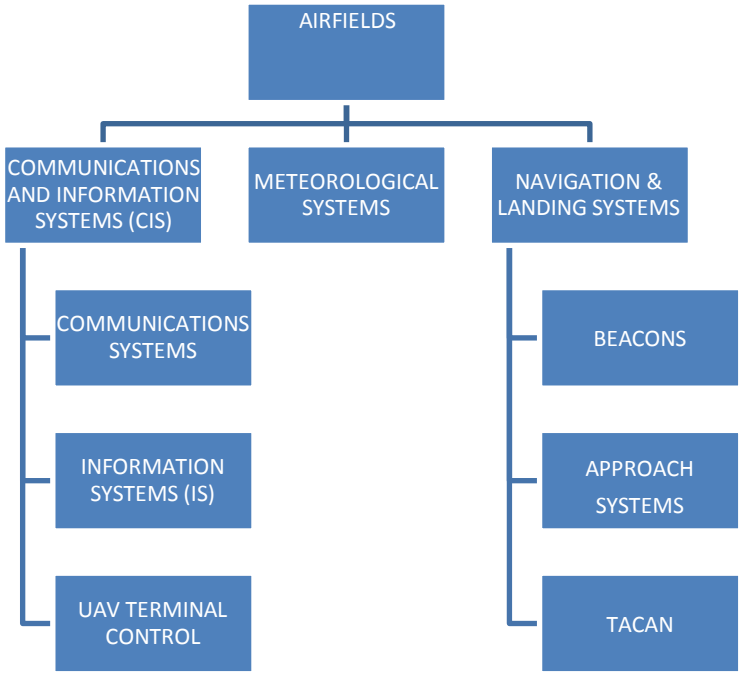
d. Standby Power. As per Item 9.

ITEM 28 - CIS, Meteorological, and Navigation Systems (Military Criteria)

1.Function. To provide effective communication, information processing, meteorological, and navigation services on airfields. The electronic systems, which provide these services, can be distinguished in 3 groups: Communications and Information Systems (CIS); Meteorological Systems; and, Radio Navigation and Landing Systems.

2. Characteristics

These groups are subdivided as shown below.



Examining each of these groups in turn:

a.CIS. The CIS required at airfields falls within the user domain of the NATO CIS Architecture. The facilities and services required are listed in the following paragraphs. The CIS group includes the Communications Systems and the various Information Systems.

(1)Communication Systems. Forces depending on their role require the following Communications Systems:

(a)Trunk accesses to the NATO General Purpose Segment Communication System (NGCS).

(b)Non-secure telephone, including NATO and commercial access, and airfield local distribution through the airfield Public Address Base Exchange System (PABX).

(c) NATO secure telephone.

(d) Non-secure facsimile.

(e) NATO secure facsimile.

(f) Public address

(g) Telebriefing system.

(h) Air traffic control UHF and VHF ground-to-air radios.

(i) HF ground-to-air radios for Beyond Line Of Sight (BLOS) AEW voice and Link 11 data, and transport aircraft voice.

(j) Ground Support & Management mobile radios net.

(k) Link 16 radios for tactical voice and data exchange between ground and AEW or TFA.

(l) UAV Terminal control requiring a line of sight microwave tower(s) throughout the UAV movement areas.

(2)Information Systems (IS). IS supporting the following functions are required by forces based at airfields:

(a)Bi-SC AIS Core services

(b) Intelligence.

(c)Air Control and Planning (ACP), includes Flight Planning, ATO and RAP provision.

(d) Air Traffic Control.

(e) GBAD

(f) CBRN Warning and Reporting System.

(g) Message Handling.

b. **Meteorological Systems**. This group requires special meteorological systems such as meteorological radar and other specialist equipment.

c. **Navigation and Landing Systems**. Navigation and landing aids are required to support operational use of the airfield. The required aids are as follows:

(1)TACAN. TACAN systems are required at NATO airfields in accordance with the SHAPE TACAN Plan.

(2)Radio Beacons. Radio beacons are widely used navigational systems and those NATO airfields, which are not provided with a TACAN, are required to have a radio beacon.

(3) Approach Systems. A GCA system normally consisting of Area

Surveillance Radar (ASR), Precision Approach Radar (PAR) and Secondary Surveillance Radar (SSR) is required at operational airfields. SSR and ASR functions may be replaced with a Radar Approach Control (RAPCON) system. The PAR function may be replaced with an ILS provided all aircraft operating from the airfield are ILS capable.

d. **Survivability**. Multiple routing and equipment redundancy to be considered in system Memorandum of Requirements (MORs).

e. **Availability**. System availability is to be included in system MORs.

f. **Security**

(1)Information processing security is required to conform to NATO promulgated policy and policy guidance expressed in C-M(2002)49 and C-M(2002)50.

(2)Data networks, which serve multiple user groups, are to provide need-to-know separation as well as protection from outside attack.

g. **Build-up Capability**.

(1)Peacetime infrastructure provided might be less than that required for crisis and war provided that the mechanisms for build-up to the required level are well defined and the ability to implement within the necessary time frames is assured.

(2)The needed build-up mechanisms may include leased services, redeployment of assets, borrowed assets, equipment pools, and emergency acquisitions.

h. **Interoperability and Standardisation**

(1)Interoperability between national systems is necessary to ensure the flexibility to deploy forces to various host airfields and to achieve operational effectiveness when deployed.

(2)Interoperability should be achieved in accordance with the NATO Interoperability Management Plan (NIMP), by implementation of the operational standards being developed by the appropriate operational authorities, the procedural standards being developed by SC/2, and technical standards developed by the NC3 Board.

(3)Information systems are to comply with the NATO C3 System (NC3S) Architecture Framework, which is part of the NIMP, Vol. II. Existing Standards should be used to maximum extend possible.

i. **Standby Power**. As per Item 9.

3. **Requirements.** The electronic systems required to operate a base are detailed in the table below. The DOB requirements are per squadron deployed. In addition to the requirements, the table lists the principles of provision of the systems.

REQUIREMENT	**MOB**	**DOB**[16]
COMMUNICATIONS SYSTEMS		
PABX	A	B
Trunk Access Lines	A[17]	B(2)
Airfield Telephones	A[18]	C(30)
Commercial Access telephones	A	C(10)
Commercial Access Facsimile	A	C
NATO Secure Telephones	A(4)	D(1)
NATO Secure Facsimile	A	D(1)
Public Address	A	A
Telebriefing System	A	A
UHF Ground to Air Radios	A	B
VHF Ground to Air Radios	A	B
HF Ground to Air Radios for AEW voice and Link 11 data or transport aircraft voice	A	B
Ground Support/Management Mobile Radios	A	B
INFORMATION SYSTEMS		
Air Control & Planning	A	D
Intelligence	A	D
Message Handling	A	D
GBAD	A	D
CBRN Warning and Reporting System	A	D
METEOROLOGICAL SYSTEMS		
Meteorological Radar & Equipment	A	B
NAVIGATION & LANDING SYSTEMS		
GCA (ASR, SSR, PAR) or ILS[19]	A	B
TACAN or Beacons	A	B

Notes: Numbers in brackets () are the required number of systems.

A. Provided by Host Nation (HN).

B. Should be provided by HN. Any expansion needed for deployed squadrons might be NATO funded on a case-by-case consideration.

C. Should be provided by HN. Could be provided by the Sending Nation (SN)

D. Provided by a SN or from the Bi-SC AIS.

[16] Per deployed squadron.

[17] This includes connection to civilian and/or military networks.

[18] Capacity of in-use PABX.

[19] ILS is also required for NAEW at MOB. For a DOB an ILS is acceptable in lieu of PAR if all aircraft operating from that DOB are ILS compatible. The SSR and ASR functions may be replaced with a RAPCON system.

ITEM 28 - CIS, Meteorological and Navigation System (Technical Standards)

1. Characteristics

a.The systems shall be provided in accordance with the policy, requirements and standards documents listed in the table below.

REQUIREMENT	POLICY DOCUMENT	STANAG/STANDARD
COMMUNICATIONS SYSTEMS		4250, 4260
PABX		NGTS-53
Trunk Access Lines		NGTS-53, 4459
Airfield Telephones		
Commercial Access Telephones		
Commercial Access Facsimile		
NATO Secure Telephones		
NATO Secure Facsimile		
Public Address		
Telebriefing System	MCM-52-80	4339, 5059
UHF Ground to Air Radios		4246
VHF Ground to Air Radios		4204
HF Ground to Air Radios		4203,4245,4285,4444
Data	MC 306	5511,5516
INFORMATION SYSTEMS	3810/SHPRC/93	
Mission Preparation & Co-ord	ASC01010 & 01009	
NATO Message Handling		4406, 5045
Intelligence		
METEOROLOGICAL SYSTEMS		
Meteorological Services	MC115/24, AWP-2	
NAVIGATION AND LANDING SYSTEMS		
GCA	AC/224(AG)/-5ALS/WD D/1	3242
TACAN		5034,5022,5506,5507
Beacons		

b. **Standby Power**. As per Item 9.

ITEM 29 - Facility for Ground-Controlled Approach (GCA) and UHF/DF Building (Military Criteria)

2. **Function**. To provide space for controllers and control equipment and either a shelter for fixed GCA equipment or a hardstand for mobile equipment. It is also to provide a shelter for UHF/DF equipment which does not include an integral shelter. Only the controllers' area is an occupied facility.

3. **Characteristics**

a. **Construction**

(1) **Controllers' Area**. Office standard construction with climate control.

(2) **Shelter**. To be in light conventional construction.

(3) **Hardstand**. Flexible or rigid pavement.

b. **Siting**. Siting of these facilities will be governed by the siting requirements of the equipment and runway clearances. This is an essential navigational aid. Siting waiver may be required.

c. **Utilities**. Electrical power should be available at the hardstand and/or the shelter. Remote control cable (GCA) is considered part of the equipment.

d. **Access**. Minimum vehicular access is required (single lane).

e. **Standby Power**. As per Item 9.

4. **Requirements**

a. **Controllers' Area**. Working space for controllers and related equipment. Area to be determined case by case.

b. **Hardstand**. A total of 200 m is required at MOBs and DOBs. This can be in two separate facilities (if necessary to meet the equipment requirements only).

c. **Shelter (GCA)**. A total of 20 m is required at MOBs and DOBs, only if the GCA includes fixed Precision Approach Radar (PAR) and/or Approach Surveillance Radar (ASR).

d. **Shelter (UHF/DF)**. A total of 20 m is required at MOBs and DOBs, where confirmation is given that UHF/DF equipment will be provided and installed by the user. For AEW MOBs 45 m is required. Minimum vehicular access is required (single lane).

ITEM 29 - Facility for Ground-Controlled Approach (GCA) and UHF/DF Building (Technical Standards)

1. **Characteristics**

a. **General**. This item contains the technical standards for all the facilities for GCA equipment, fixed or mobile, and a UHD/DF building (Item 29 Mil.).

b. Construction

(1)Hardstand. New hardstand should be constructed of rigid pavement. The strength of the pavement will be governed by the anticipated loading; however for most situations, a 0.15 m thickness should be sufficient. Existing flexible pavement should be considered on a case-by-case basis. The surface of the hardstand should be sloped to prevent water from ponding. Depending of the size and other conditions, trench drains may be required.

(2)Shelter. Light non-combustible construction, designed to accommodate the necessary fixed equipment, up to 20 m in area. Were required this shelter shall have the necessary foundation to support the weight of the fixed equipment.

c. **Utilities**. Electricity and storm water drainage.

d. **Access**. Access roads should be single lane as per Item 7.

ITEM 30 – Utilities (Military Criteria)

1.Function. To provide utilities as potable water (including for fire fighting purposes), electrical power, drainage and sewage and essential heating, ventilation and air conditioning of facilities.

If applicable, it also covers the necessary storage facility, treatment plant and distribution system. Exceptional considerations may apply to this Item as defined in the Military Preamble. This item includes utilities under the following headings:

a. Item 30A – Water supply, Storage & distribution system

b. Item 30B – Electrical Power supply and distribution system

c. Item 30C – Drainage/Sewage

d. Item 30D – Heating, Ventilation and Air Conditioning

(The quantities listed here represent only the critical capacity necessary to ensure continued airfield operation and may be counted in the national fire fighting quantity.)

2. Characteristics

a.Utilities general. **Splinter Protection is not required**.

b.Item 30A - Water Pressurisation. A means of providing pressure to the water distribution system for normal domestic use after it leaves the storage is required.

(1)Fire fighting pressurisation requirements take precedence over those for the provision of domestic water. Pressurisation for fire fighting should not be affected adversely by typical demands for domestic consumption in any segment of the water distribution system.

(2) Fire booster pumps are required as a separate element.

c.Item 30B - Electrical power supply and distribution systems. This item includes the complete on base power distribution system from the HN handover station(s) to NATO facilities including required transformer stations and their installed equipment.

(1)The Electrical Power Supply and Distribution System and its major Sub-systems must be able to supply electrical power for the maximum anticipated load of all existing facilities, for currently planned facilities (see Technical Standards for representative loads) as well as for an additional 20% of the total of those loads to account for unidentified future requirements.

(2)The Principal Distribution Net, intended to provide broad coverage on the airfield, should be a loop/ring network so that all take-off points on it can receive electrical power from an alternate source, should any part suffer a failure. Redundancy is not required on Secondary or Radial supply lines.

(3) Although there are no particular military criteria applicable for distribution

voltages, these should be appropriate for the facilities served and the intended loads. In addition, where justified, provision should be made to convert the power to a special frequency and/or voltage from that normally provided.

d. **Item 30C – Drainage/sewage**

(1)No features of the drainage system, such as open ditches should constitute a hazard to flying operations.

(2)Collecting ponds which may attract birds shall not be permitted anywhere low-level flight is anticipated, particularly in approach and departure clear zones.

e. **Item 30D - Heating, Ventilation and Air Conditioning**

(1) Maximum and minimum temperatures must be maintainable within facilities or part of facilities.

(2) **Heating and Ventilation**. The maintenance of these temperature ranges using only heating or ventilation is acceptable.

(3)Air conditioning is required in extreme conditions if normal ventilation and building construction measures cannot ensure that limits are not exceeded.

(4) Humidity control is required where identified in individual Criteria Items.

(5) Dust Control

(a)The general requirement for dust control depends on site conditions and should be considered to be the exception.

(b)Dust control as a military requirement at an airfield or associated site, will be determined on a case by case basis.

(6) System Redundancy

(a)Redundancy in Heating Ventilation and Air Conditioning as well as Humidity and Dust Control Systems or related equipment and components is not a general requirement.

(b)Partial redundancy for Heating Ventilation and Air Conditioning for facilities requiring stand-by power may be agreed on a case by case basis.

(7)Controls. Controls should be simple to permit interoperability and use by personnel without specialised training.

(8)Ease of Maintenance. In general, heating, ventilation and air conditioning installations should be selected to provide ease of maintenance and reliability in preference to technical complexity alone.

3. **Requirements**. This Item is required for all NATO airfields.

ITEM 30 – Utilities (Technical Standards)

1.Function. To provide utilities as potable water (including for fire fighting purposes), electrical power, drainage and sewage and essential heating, ventilation and air conditioning of facilities. If applicable, it also covers the necessary storage facility, treatment plant and distribution system. Exceptional considerations may apply to this Item as defined in the Technical Preamble. This item includes utilities under the following headings:

a. Item 30A – Water supply, Storage & distribution system,

b. Item 30B – Electrical Power supply and distribution system,

c. Item 30C – Drainage/Sewage,

d. Item 30D – Heating, Ventilation and Air Conditioning.

(The quantities listed here represent only the critical capacity necessary to ensure continued airfield operation and may be counted in the national fire fighting quantity.)

2. Characteristics

a.Local Utilities. The following requirements are provided by the Host Nation under prior agreement, however, alternate Host Nation arrangements may apply where multinational forces operate:

b. Item 30A - Water supply, Storage & distribution system

(1)Supply of potable water at a source on the airfield or ammunition site or to the airfield or ammunition site boundary when the source is off the site.

(2)Treatment of water for hardness, iron, etc. as required to prevent damage to equipment and facilities.

(3)Distribution mains for dedicated fire fighting systems and additional pressurisation for this purpose above that needed for domestic distribution.

c. **Item 30B - Electrical power supply and distribution systems**

(1)Provision of electrical power by means of an off-base power supply line from an outside high voltage source up to the airfield boundary or by means of an on-base power generation plant.

(2)Provision of the Main On-base Electrical Sub-station including switch-gear and transformers, as necessary to convert the high voltage off-base supply to the on-base distribution.

(3)Where it is accepted by NATO that serious interruption to the normal power supply to the airfield is a feature of the site, any requirements for an overall Standby Electrical Supply System is not part of these prior agreements under Host Nation responsibility.

d. Item 30C – Drainage/sewage

(1)The handling of foul water (domestic sewage and industrial waste) beyond the airfield boundary.

(2)The treatment of foul water, typically by an off-base facility but may be by on-base septic tanks and industrial waste separators when they are cost effective and acceptable.

(3)The handling and disposal beyond the airfield boundary of storm water generated on-base.

3. **Requirements**

a. **Item 30A - Water supply, Storage & distribution system**

(1) **General**

(a)Earth cover should be provided to ensure all piping and any portion of the underground tank is below the frost line but with not less than 1.0 m cover.

(b) Vents should have adequate filters and be located downstream.

(c) All associated metal components should be of stainless steel.

(d)Installation shall comply with national standards for domestic water storage.

(2) Sizing of Distribution Mains

(a)Mains must be sized to meet the most critical requirement of either fire fighting or domestic water consumption.

(b)In determining the critical sizing for fire fighting requirements, 20% of the average domestic water consumption rate may be added to the demand flow for this purpose.

(c)Principal Distribution Net. The water supply shall be by a loop system to provide an alternate path of delivery to any take-off point to a Secondary portion of the system, should any part of the Principal Net suffer a failure.

(d) Underground Water Reservoir

1/ Walls should be of reinforced concrete and include a waterproof membrane.

2/ Reservoir tank should house valves and controls separate from storage.

(e) **Pressure Pumps**

1/ Pumps may be located in a separate pump-house with a floor drain and drainage.

2/ The pressurisation pump should provide a flow rate for purposes of the delivery of domestic water to meet national responsibilities (typically to provide 30 litres/second)

3/ Additional booster pump capacity for fire protection may need to be incorporated in the system to meet national responsibilities (typically to provide a flow rate of 125 litres/second).

4/ Mains to be provided to withstand flows and pressure levels required.

(f) **Irrigation**. While it is expected that water from the system may be used for irrigation purposes for some sites, no additional requirement is recognised for NATO purposes.

b. **Item 30B - Electrical power supply and distribution systems**

(1) **Principal Distribution**

(a)The Principal Distribution Voltages should be at such a level as to minimise line losses and allow for cost-effective sizing of distribution cables.

(b)Provided by a Single Ring distribution system. A Multiple Ring scheme would be considered as an exception only. A Radial system should not be considered unless warranted by site limitations.

(2) Secondary Distribution

(a)Radial distribution is the norm for secondary distribution off the principal Distribution loop/ring.

(b)Secondary distribution should be from Electrical Sub-stations with switch-gear and transformers as necessary to feed individual groups of facilities at low voltage.

(3) Cable Characteristics

(a)Distribution cable should be suitable direct burial type. The cable should be encased in a protective duct under pavement crossings or where likely to be exposed to disturbance or vehicle loads. Ducting is not a requirement elsewhere.

(b)Individual cable runs should maintain a uniform size without splices between the Main On-base Electrical Station, Sub-stations and Facilities.

(4) Trenching. The maximum common use of trenching should be made. High

and low distribution cables will need additional separation from other cables and from other buried services.

(5) **Load Calculations**. For estimating the required load for future planned but not-yet-designed facilities, use the following maximum capacities (in some cases, these capacities are based on the requirements for facilities meant to operate under physical protection mode and these can be reduced when conventional construction is intended):

(a)	Item 16A – Wing Operations:	80 kVA
(b)	Item 16C – Squadron Operations:	80 kVA
(c)	Item 16D – Air Reconnaissance:	800 kVA
(d)	Item 16F – Maritime Air Operations Centre:	50 kVA
(e)	Item 19B – Aircraft Shelter:	33 kVA
(f)	Item 22A – Avionics Workshop:	1,000 kVA
(g)	Item 22F – Maintenance Workshops:	1 kVA / 15 m
(h)	Other Facilities: case by case	

c. **Item 30C – Drainage/sewage**

(1) **Foul Water Drainage**

(a)Drainage system to be dedicated for this purpose consists of buried drainage pipe with sufficient gradient to ensure flow and self-cleaning.

(b)Pipe materials must be capable of handling sewage and the types of industrial waste products which are characteristic to an airfield.

(2) Storm Water Drainage

(a)Drainage system to be dedicated for this purpose consists of catchment devices such as drainage inlets and manholes and open channels and buried piping.

(b)Buried piping is required in the vicinity of operational airfield pavements.

(c)Simple open ditches including the necessary lining may be used wherever feasible and economical.

(d)Manholes, drainage inlets and their covers as well as any underground drainage crossings must be able to withstand either direct or indirect loading due to aircraft or associated ground vehicle operations.

(e) Water flow in pipes must be sufficient to handle expected runoff and be self-cleaning. Minimum gradient is 0.5%.

(3) Storm Water Load Calculations

(a)Pipe sizing must accommodate the maximum ten-year precipitation run-off in consideration of local topographic features and outfall conditions.

(b)Include the estimated load which may result from future planned but not-yet-designed facilities to the extent possible.

(4) Fuel/Water Separators

(a)Separators should be used only in the numbers required and should be located to maximise their effectiveness, typically downstream from any probable area of spill.

(b)Separation should be achieved by simple gravity methods using baffles and chambers.

(c)The separator should provide a means of access to the chamber for later pump out of components for disposal.

(d) Automatic sensors are not required.

d. **Item 30D - Heating, Ventilation and Air Conditioning**

(1) **Sizing of Equipment**

(a)Where a commercially available unit is within 5% of the calculated size required, this unit would be considered acceptable. If not, then the next nearest available commercial size should be provided

(b)Technical justification is required wherever it is intended to provide the necessary total capacity by the use of multiple units rather than by a single unit sized to cover the full required capacity.

(c)Heating and Ventilation. The requirement for heating and ventilation should be assessed along with related building features such as insulation in new construction to achieve the best overall combination of features at lowest cost.

(d)Air Conditioning. Air conditioning should be introduced only when other low cost measures such as building orientation, natural shading, choice of materials and finishes and layout have been exploited to minimise the requirement.

(e) Humidity and Dust Control.

1/ The measures taken for dust and humidity control require a case by case determination.

2/ To the extent possible, these measures should be confined to the critical areas of the facility where dust or humidity poses a problem.

ITEM 34 - Fencing and Gates (Military Criteria)

1. **Function**. To delineate airfield and associated site boundaries and to secure designated installations.

2. **Characteristics**

a.Perimeter Fencing. Wire mesh strung on supporting vertical posts of durable construction to a height of 1.5 m is required to mark the boundary. A non-obscured free zone of 3m along both sides of the fence is required.

b. Security Fencing

(1)This Item should only be provided where identified in individual Criteria Items under "**Security Fencing**".

(2)Uprights to be of durable construction and anchored at the bottom to prevent lifting of the fence.

(3)In soft soil conditions, additional soil stabilisation is required along fence length to inhibit excavation or to avoid soil erosion which might undermine function. Continuous concrete or asphalt curbing is not a requirement.

(4)Chain link, 50 50 mm mesh size with a core diameter of 3.0 mm (nominal) to a height of 2.15 m plus three strand barbed wire overhanging outwards. (ACO Security Directive AD 70-1, Chapter 1, Annex A).

(5)Additional features to deter intrusion such as a continuous concrete base are not required.

(6) Intrusion detection systems may be justified, case by case.

(7)Security fencing should be designed based on the threat assessment for the subject airfield, as determined by the NMAs.

c. **Gates**

(1)Gates to be constructed to same criteria as the associated fencing.

(2)Size of gates should be the minimum required for passage of vehicles and or aircraft assigned to the installation.

(3)Size of gate opening for Aircraft should be for Aircraft assigned to the base and in accordance with:

Aircraft category	Gate opening
AEW, AGS, TTA, MPA, STA, AAR, SBA	Wingspan + 15 m
TFA	Wingspan + 9 m
RWA	Rotordiameter 2

(4)One dedicated personnel gate may be provided at the main point(s) of entry on the perimeter fence.

(5)The gate area should be designed based on the threat assessment for the subject airfield, as determined by the NMAs.

(6) Crash rescue gates may be considered.

d. **Additional Measures for Snow Accumulation**. Where it can be demonstrated that snow will accumulate along the fence line to a depth of at least 1.0 m, an additional 1.0m of fence height may be provided along these sections of the fence.

3. **Requirements**. Required at all NATO Airfields.

ITEM 34 - Fencing and Gates (Technical Standards)

1. Characteristics

a. Perimeter Fencing

(1)Wire mesh and supporting vertical metallic posts should be galvanised or plastic coated to inhibit corrosion.

(2) Posts constructed of concrete or preservative treated wood are acceptable.

(3)Fencing should follow the natural terrain and no additional measures are necessary at drainage ditches or other sudden and localised changes of ground profile.

(4) Fence posts within clear zones shall be frangible.

b. Security Fencing

(1) Chain link mesh should be galvanised or plastic coated to inhibit corrosion.

(2)Uprights should be galvanised metal posts with additional tension wires installed along the top, centre and bottom of the fence fabric.

(3)Barbed wire should be galvanised with corrosion resistant fasteners to hold it to the overhang outriggers.

(4)Outriggers should be of similar construction to the main fence structure and securely fastened to the upright posts of which they are an extension.

(5)At the aircraft approach zones non metal type of fencing materials, which do not influence NAVAIDS should be considered.

(6)Security fencing should follow the general terrain but will require extra measures where there is a sudden and localised change of ground profile to maintain the integrity of security.

(7) Fence posts within clear zones shall be frangible.

c. Gates

Gates to be constructed to same standards as the associated fencing.

ITEM 39A - NAEW IT - Support Facilities (Military Criteria)

1.Function. To provide space for the provision of cryptographic and software / data related mission support for NAEW operations, for the design, development, implementation and maintenance of ground communications and information systems for NAEW both on and off the aircraft and the related services as well as for organic maintenance of radar and ESM software. This is an occupied facility.

2. Characteristics

a.Siting.The IT–Support Facilities should be located close to Item 39B - NAEW Training Facilities.

b.Construction. The IT Support Facilities shall be provided in conventional office type buildings meeting the physical and communication security requirements according to ACO Security Directive AD 70-1. Scope includes building structure and installed equipment less computers, computer terminals and other computer and test equipment and software.

c.Fire Detection and Fire Fighting. Fire detection is required in all facilities. Fire fighting systems are required in computer rooms, server rooms, terminal rooms and mission essential software development areas.

d.Air–Conditioning. Air cooling, humidity and dust control equipment in computer rooms, server rooms, terminal rooms and software development areas are required.

e.Standby Power. Connection to Base Standby Power System is required. The critical functions served by CIS will be supplied by an UPS of appropriate capacity.

3. **Requirements**. This facility is required at NAEW MOBs only as follows:

No. of A/C	Area (m)
≤10	1,200
>10	3,000

ITEM 39B - NAEW Training Support Facilities (Military Criteria)

1. **Function**. To provide space for:

a.The Flight Simulator for the NE-3A aircraft

b.Training of the mission crews to operate and to maintain the NAEW mission system and radar as well as for the verification of the Mission Simulators' software

c. To accommodate training classrooms and static mock-ups and displays of aircraft operating positions and audio visual type self-training devices

d. To accommodate classrooms for academic training in aircraft repair / maintenance such as structural repair, engine works, electronic systems etc.

e. To accommodate classrooms for academic training of the International Military Police, the Civil Guard Forces as well as NAEW deployable personnel in Individual Common Core Skills (ICCS) and Individual Deployment Training (IDT) including weapon training and live firing.

These are occupied facilities.

2. **Characteristics**

a.Siting. The Simulator facilities and flight crew training facilities should be co-located.

Aircraft maintenance / repair training facilities to be co-located with aircraft maintenance / repair facilities.

b.Construction. This facility shall be provided in a conventional office type/classroom type building. Scope includes building structure and installed equipment less Flight Simulator, Mission Simulators, Radar Simulator and related equipment. For the Indoor Firing Range mandatory installations are considered to be infrastructure items.

c.Fire Fighting. Fire fighting systems are required for the Flight Simulator, the Mission Simulators, the Radar Simulator and for the Indoor Firing Range.

d.Air-Conditioning. Air cooling, humidity and dust control equipment in the simulator rooms and their related computer rooms are required as well as a ventilation system for the Indoor Shooting Range.

e. **Standby Electrical Power**. Connection to the centralized base emergency power systems required for the Mission Simulators, the Flight Simulator and the Radar Simulator. For the computer room Flight Simulator 15 kVA UPS is required.

3. **Requirements**. These facilities are required at NAEW MOBs as follows:

a. **Flight Simulator Facility**. This facility is required at NAEW MOBs with a usable area of **1,000 m**

b. **Mission / RADAR Simulator Facility**. This facility is required at NAEW MOBs:

No. of A/C	Area (m)
≤10	400
>10	1,000

c. **Static Flight Crew Training Facility**. This facility is required at NAEW MOBs:

No. of A/C	Area (m)
≤10	800
>10	2,700

d. **Aircraft Maintenance / Repair Training Facility**. This Facility is required at NAEW MOBs:

No. of A/C	Area (m)
≤10	800
>10	1,300

e. **Security Squadron Training Facilities**. These facilities are required at NAEW MOBs with more than 10 aircraft.

Facilities	Area (m)
Training/classrooms	500
Hardened outdoor area	1,000
Indoor shooting Range	400

ITEM 39C – NAEW Base Support Facilities (Military Criteria)

1.Function. To provide facilities and installations for those tasks that are normally performed by the Host Nation. At E-3A Component MOB these tasks are performed by NATO PE personnel or NATO contracted and reimbursed HN personnel whom, according to the "Civil Administration / Civil Engineering Memorandum of Agreement (CE/CA MOA)" the facilities to perform the assigned tasks have to be provided by NATO. These are occupied facilities.

2. Characteristics

a.Siting. These facilities shall be located on-base and co-located.

b.Construction. These facilities shall be provided in conventional office / workshop type buildings. Special requirements for workshops and medical installations according to HN standards.

c.Utilities. Ventilation and air-conditioning according to HN standards. Compressed air supply where technically required for specific workshops.

d.Standby Electrical Power. To be provided for medical installations where required

3. **Requirements**. These facilities are required at NAEW MOB only, as the "territorial Host Nation" does not act as Host Nation in this context.

a. Base Support Wing Offices

(8) Office of the Commander, Base Support Wing:

(9) Language Services,

(10) Publications and Forms,

(11) Printing, Reproduction,

(12) Internal Mail Distribution Services,

(13) Infrastructure Office.

Requirements for E-3A Component MOB: 800 m

b. **Graphics Section / Photo Services** 370 m

c. **HN Construction Office**: 400 m

d. **Special Vehicle Section** (Snow removal, Runway sweepers, De-icing Equipment)

(1) Ready Area / Offices: 270 m

(2) Workshops: 800 m

(3) Covered Hardstand: 800 m

(4) Uncovered Hardstand: 2,800 m

e. In – House Workforces

(1) Offices: 270 m

(2) Storage: 1,200 m

(3) Workshops: 1,200 m

f. **Medical Facility**:

(1) Treatment Rooms,

(2) Examination Rooms,

(3) Ready Rooms for Crash Response Team,

(4) Dental Treatment Area,

(5) X-Ray Area,

(6) Pharmacy,

(7) Offices,

(8) Archive for Records of Flying Personnel,

(9) Garages for Vehicles Crash Response Team and Ambulances.

Requirements for NAEW MOB: 1,200 m

g. **Food Services**. Flight Kitchen: 200 m

h. **Security Squadron**:

(1) Pass control,

(2) Security Force Operations Centre,

(3) Guard facilities,

(4) Guard Dog facilities to include:

(a) Kennels,

(b) Dog Feeding Facility,

(c) Dog Training Area.

Requirements for NAEW MOB 1,200 m

ITEM 39A, B, C - NAEW Support Facilities (Technical Standards)

1. Characteristics

According to Technical Preamble.

ITEM 40A - AGS IT - Support Facilities (Military Criteria)

1.Function. To provide space for the provision of cryptographic and software / data related mission support for AGS operations, for the design, development, implementation and maintenance of ground communications and information systems for AGS both on and off the aircraft and the related services as well as for organic maintenance of radar and Electronic Support Measures (ESM) software. This is an occupied facility.

2. Characteristics

a.Siting. The IT - Support Facilities should be located close to Item 40B, AGS Training Facilities.

b.Construction. The IT - Support Facilities shall be provided in conventional office type buildings meeting the physical and communication security requirements according to ACO Security Directive AD 70-1. Scope includes building structure and installed equipment less computers, computer terminals and other computer and test equipment and software.

c.Fire Detection and Fire Fighting. Fire detection and fire fighting systems are required.

d. **Air–Conditioning**. Cooling, humidity and dust control in computer rooms, server rooms, terminal rooms and software development areas is required.

e. **Standby Power**. Connection to Base Standby Power System is required. The critical functions served by ADP may be supplied by an UPS of appropriate capacity.

3. **Requirements**. This facility is required with 3,000 m at AGS MOBs only.

ITEM 40B - AGS Training Support Facilities (Military Criteria)

1. **Function**. To provide space for:

a. The Flight Simulator for the AGS aircraft

b. Training of the mission crews to operate and to maintain the AGS

c. Control system and radar as well as for the verification of the Mission Simulators' software.

d. To accommodate training classrooms and static Mock-ups and displays of aircraft operating positions and audio visual type self-training devices.

e. To accommodate classrooms for academic training in aircraft repair / maintenance such as structural repair, engine works, electronic systems etc.

f. To accommodate classrooms for academic training of the International Military Police, the Civil Guard Forces as well as AGS deployable personnel in Individual Common Core Skills (ICCS) and Individual Deployment Training (IDT) including weapon training an life firing

These are occupied facilities.

2. **Characteristics**

a. **Siting**. Items a., b. and c. should be co-located. Aircraft repair / maintenance training facilities to be co-located with aircraft maintenance / repair facilities.

b.Construction. This facility shall be provided in conventional office type/classroom type building. Scope includes building structure and installed equipment less Flight Simulator, Mission Simulators, RADAR Simulator and related equipment. For the Indoor Firing Range mandatory installations are considered part of the building.

c.Fire Fighting. Fire detection and for fighting systems are required for the Flight Simulator, the Mission Simulators, the Radar Simulator and for the Indoor Firing Range.

d.Air-Conditioning. Cooling, humidity and dust control in the simulator rooms and their related computer rooms is required as well as a ventilation system for the Indoor Shooting Range.

e. **Standby Electrical Power**. Connection to the centralized base emergency power systems required for the Mission Simulators, the Flight Simulator and the Radar Simulator. For the computer room Flight Simulator 15 KVA UPS is required.

3. **Requirements**. These facilities are required at AGS MOBs as follows:

a.	Flight Simulator Facility.	(TBD)
b.	Mission / Radar Simulator Facility.	1,000 m

c.	Static Flight Crew Training Facility.		2,700 m
d.	Aircraft Maintenance / Repair Training Facility:		1,300 m
e.	Security Squadron Training Facilities:		
	(1)	Training/classrooms	500 m
	(2)	Hardened outdoor area	1,000 m
	(3)	Indoor shooting Range	400 m

ITEM 40C – AGS Base Support Facilities (Military Criteria)

1.Function. To provide facilities and installations for those tasks normally performed by the Host Nation. At AGS MOB these tasks might be performed by NATO PE personnel or NATO contracted and reimbursed HN personnel. In that case, according to MOU/MOA, these facilities have to be provided by NATO. These are occupied facilities.

2. Characteristics

a.Siting. These facilities shall be located on-base and co-located.

b.Construction. These facilities shall be provided in conventional office / workshop type buildings. Special requirements for workshops and medical installations according to HN standards.

c. Installed Equipment. Minimum essential equipment is required

d.Utilities. Connections to water, electrical power, drainage, heating and communication network is required. Ventilation and air-conditioning according to HN standards for equivalent facilities. Compressed air supply where technically required for specific workshops.

e. Standby Electrical Power. To be provided for medical installations case by case.

3. **Requirements**. These facilities are required at AGS MOBs only, as the 'territorial Host Nation 'does not act as Host Nation in this context.

a. **Base Support Wing Offices**: 800 m

(1) Office of the Commander, Base Support Wing,

(2) Language Services,

(3) Publications and Forms,

(4) Printing, Reproduction,

(5) Internal Mail Distribution Services,

(6) Infrastructure Office.

b. **Graphs Section / Photo Services** 370 m

c. **HN Construction Office** 400 m

d. **Special Vehicle Section** (Snow removal, Runway sweepers, De-icing Equipment):

(1) Ready Area / Offices 270 m

(2) Workshops 800 m

	(3)	Covered Hardstand	800 m
	(4)	Uncovered Hardstand	2,800 m
e.	**In – House Workforces**:		
	(1)	Offices	270 m
	(2)	Storage	600 m
	(3)	Workshops	1,200 m
f.	**Medical Facility**:		1,200 m
	(1)	Treatment Rooms,	
	(2)	Examination Rooms,	
	(3)	Ready Rooms for Crash Response Team,	
	(4)	Dental Treatment Area,	
	(5)	X – Ray Area,	
	(6)	Pharmacy,	
	(7)	Offices,	
	(8)	Archive for Records of Flying Personnel.	
g.	**Garages for Vehicles Crash Response Team and Ambulances**		
	Total Requirements		1,200 m

ITEM 40D – AGS – Mission Operation Centre (Military Criteria)

1.Function. To provide facilities and installations for a real time operations centre and data archive and dissemination. Including the facilities for the Aircraft Operators. The facility supports:

a. “in depth” analysis of SAR, ESM, GEO,

b. Track Management theatre / strategic level,

c. data transfer to standing NCS,

d. operational support strategic/political level,

e. manage mission planning and execution,

f. maintain AGS integrity and oversight,

g. data transfer to nations (national purposes),

h. data exchange with Intelligence Fusion Centre (IFC),

i. integrity and oversight (OPS, CIS, LOG),

j. UAV employment.

At AGS MOB these tasks are performed by NATO PE personnel or NATO contracted and reimbursed HN personnel. These are occupied facilities.

2. Characteristics

a. **Siting**. These facilities shall be located on-base and co-located with the Operation & Training Wing Buildings.

b. **Construction**. These facilities shall be provided in conventional office / command type buildings. The whole facility will be a class 2 security area. Special requirements according to HN standards.

c.Installed Equipment. Minimum essential equipment is required

d.Utilities. Connections to water, electrical power, drainage, heating and communication network is required. Ventilation and air-conditioning according to HN standards for equivalent facilities.

e. Standby Electrical Power. Is required, to include UPS.

3. **Requirements**. These facilities are required only at AGS MOB for the UAV System Operators.

a. System Software Integration Lab: 200 m

b.	Component OPS Lab:		470 m
	(1)	Component Operations Centre (COC)	320 m
	(2)	Mission Planning Enclave (MPE) 1&2	75 m
	(3)	Brief/Debrief OPS 1&2	75 m
c.	Data Archive & Dissemination Centre		250 m
d.	Mission OPS 1		325 m
e.	Training/Backup Mission Control		600 m
f.	Mission OPS 2		325 m
Total Requirements			2,170 m

ITEM 40A, B, C, D - AGS Support Facilities (Technical Standards)

1. **Characteristics**

According to Technical Preamble.

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ANNEX A TO
Bi-SC Dir 85-5
DATED OCTOBER 10

Glossary of Terms, Abbreviations and Acronyms

The purpose of this Annex is to provide a glossary of terms and acronyms frequently used in this document and to provide a listing of the most important source documents which have been used to produce this Directive.

APPENDICES:

1. **Glossary of Terms**
2. **Abbreviations and Acronyms**
3. **Reference Documents**

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APPENDIX 1 TO
ANNEX A TO
Bi-SC Dir 85-5
DATED OCTOBER 10

Glossary of Terms

The following definitions are to be used in applying this document:

1. Aircraft Categories

Air-to-Air Refuelling Aircraft (AAR). Aircraft equipped for in-flight supply of fuel to other aircraft.

Airborne Early Warning & Control Aircraft (AEW). Larger aircraft assigned to airborne surveillance, command and control.

Alliance Ground Surveillance Aircraft (AGS). Unmanned aircraft assigned to airborne ground surveillance and/or control.

Maritime Patrol Aircraft (MPA). Land based aircraft engaged in Maritime Operations, including surveillance, Reconnaissance and Target Assessment, Anti-Surface Unit Warfare and Anti-Submarine Warfare missions.

Rotary Wing Aircraft (RWA). All forms of helicopters.

Tactical Fighter Aircraft (TFA). Fixed wing, manned aircraft in the following roles:

(1) Air Offence/Defence Fighter;

(2) Fighter Bomber;

(3) Electronic Combat;

(4) Tactical Reconnaissance;

(5) Anti-surface force air operations.

These roles may also be provided by the use of Unmanned Aerial Vehicles (UAVs).

Tactical Transport Aircraft (TTA). Fixed wing aircraft with relatively short take-off and landing characteristics, primarily employed for the transport of personnel (including paratroopers) and cargo over short/medium distances.

Strategic Bomber Aircraft (SBA). Long range aircraft for delivery of bombs and missiles.

Strategic Transport Aircraft (STA). Long range wide bodied aircraft for the transport of personnel and cargo.

2. Aircraft Classification Number[1]

The standard method of reporting airfield pavement strengths (LCN system) has been superseded by a single standardized system known as the Aircraft Classification Number – Pavement Classification Number method (ACN – PCN). The ACN of an aircraft expresses its relative loading severity on a pavement supported by a specified subgrade. It is calculated taking into account the weight of the aircraft, the pavement type and the sub-grade category. The letter designations (A, B, C, and D) represent four standard levels of pavement sub-grade strength.

3. Aircraft Parking

Apron[2]. Paved surface used for aircraft parking, either mass or dispersed, and where an aircraft may also be serviced, maintained, calibrated, etc.

Pad. Small, isolated aircraft parking surface used for a specific task, e.g. Arm/Disarm Pad.

Platform[3]. Paved surface used for aircraft parking, either mass or dispersed.

4. Advanced Logistics Support Site (ALSS).

A central receiving, storage and distribution point for personnel, mail and cargo, from all supply sources to forces afloat or deployed. It should be near or co-located with a sea-port and should have ready access to an airfield capable or receiving strategic transport aircraft.

5. Airport of Debarkation (APOD).

An airfield in, or close to, the area of crisis where troops and equipment/materiel will disembark. See Reception Airfield Facilities.

6. Airport of Embarkation (APOE).

An airfield from where strategic transport aircraft pick-up troops and equipment/materiel for transport to an APOD in, or close to, the area of crisis. See Reception Facilities.

7. Compatibility (Ammunition).

Ammunition and explosives are considered to be compatible if they may be stored or carried together without significantly increasing either the probability of an accident or, for a given quantity, the magnitude of the effects of such an accident.

8. Critical Item.

That Criteria Item which, by its nature, is solely used in military airfields (e.g. Arrestor Gear), and for which it is very difficult or impossible to find spare parts readily available in the market. For

[1] Aircraft Classification Number - ACN [(ref. AEP-46(B)).

[2] The two terms (apron and platform) are describing an aircraft parking surface and historically have been used alternatively, but the difference which exists, lies in their separate descriptions and functions.

[3] Refer to Footnote # 2

such an item it is required to always keep a certain stock of essential spares, to cover emergencies.

9. Deployment Operating Base (DOB).

See NATO Airfield Categories.

10. Flexible Employment Base (FEB).

See NATO Airfield Categories.

11. Forward Operating Base (FOB).

See NATO Airfield Categories.

12. Forward Operating Location (FOL).

See NATO Airfield Categories.

13. Gross Interior Area.

The total interior floor area of a building, within the exterior walls including the area of any openings in floors.

14. Hardstand.

Paved surface not used for aircraft parking e.g. GCA equipment Hardstand, Open-revetted Hardstand for Ammunition Storage, etc. The term Hardstand should not be confused with the terms "Apron, Pad and Platform" (see 3. Aircraft Parking)

15. Host Nation.

The member nation or NATO entity legally responsible for the contracting and implementation of a NSIP project. The NATO member nation, upon whose territory permanent infrastructure is placed, that has title to but not necessarily beneficial use of the implemented works.

16. In-Place Forces (IPF).

Predominantly required for collective defence within or near the territory of the nation providing them. Therefore, those HQs/forces need not be fully deployable but are also held at appropriate readiness levels. Their HRF portion provides the initial response to emerging threats to Alliance territory. Based on their tactical mobility they may also contribute to non-Article 5 CRO in their vicinity. They are primarily sourced by individual nations.

17. Main Operating Base (MOB).

See NATO Airfield Categories.

18. Maintenance.

The recurring, scheduled and unscheduled, works required:

a. to prevent excessive wear of the NATO facilities

b. to assure the continuous and effective use of the facilities at the operational capacity originally designed for, for the duration of their service life.

19. Maintenance - First Echelon (1st LINE).

Maintenance performed upon aircraft in dispersal areas, including servicing, repairs, adjustments, Line Replacement Units (LRU) exchange, line testing, etc.

20. Maintenance - Second Echelon (2nd LINE).

Maintenance which is performed for an aircraft within the operational airbase, including bay maintenance, re-conditioning, uninstalled engine testing and minor modification.

21. Maritime Patrol Aircraft (MPA).

See Aircraft Categories.

22. Minimum Military Requirement (MMR).

The most austere facility required to meet a NATO military need as determined by the NATO Military Authorities (NMAs).

23. Modification.

Major works to bring NATO infrastructure in line with new requirements. When the new requirements exceed those under which it was originally built, the term "Upgrading" can also be used, for a more accurate definition.

24. NATO Airfield Categories

a.Deployment Operating Base (DOB). An airfield identified for deployment of NATO forces in times of tension, crisis or war. This airfield may, or may not, have a permanent user. If it does, then it is simultaneously a MOB for the permanent user and a DOB for the deployed NATO forces.

b.En-Route Base (EB). An airfield identified at strategic locations where agreed Aircraft Cross-Servicing is available in support of the deployment and re-deployment aircraft.

c. **Flexible Employment Base (FEB)**. An airfield identified for use by NATO Forces, to which NATO aircraft may be deployed in wartime, for short term operations (MPA).

d. **Forward Operating Base (FOB)**. Permanently manned airfield for deployments of specific aircraft. (i.e. NAEW)

e. **Forward Operating Location (FOL)**. see FOB

f. **Main Operating Base (MOB)**. An airfield permanently occupied by air forces.

g. **Reception Airfield (APOD/APOE)**. An airfield having facilities for the embarkation/disembarkation of external reinforcements, including both turn-around facilities for transport aircraft and facilities to provide for the throughput of troops, equipment and supplies.

25. Reception Facilities.

Facilities on Reception Airfields to provide for the reception of personnel and/or logistics and their forward movement. As designated by the NMAs, there are three types of Reception Facilities as categorised below:

a.Primary Reception Facility (PRF). A facility with the primary role of receiving and supporting Strategic Transport Aircraft. Its basic operational concept is "Strategic Transport Aircraft In - Strategic Transport Aircraft Out".

b.Secondary Reception Facility (SRF). A facility with the primary role of supporting Tactical Transport Aircraft. Its basic operational concept is "Strategic Transport Aircraft In - Tactical Transport Aircraft Out".

c. **Tertiary Reception Facility (TRF)**. Any facility requiring supply and resupply by air, normally at the forward end of the logistics trail. Its basic operational concept is "Tactical Transport Aircraft In - Tactical Transport Aircraft Out".

26. Occupied Facility

A permanently manned building.

27. Pavement Classification Number (PCN):

A number that expresses the relative load-carrying capability of a pavement in terms of a standard single-wheel load Pavement Classification number (PCN ref. AEP-46(B))

28. Restoration/Rehabilitation.

Major works to bring existing NATO infrastructure back to the operational standards to which it was originally built or actual standards, and where normal maintenance work can no longer be reasonably expected to keep the installation in an acceptable state of repair. If appropriate, restoration can be accomplished by total replacement of the existing facility with a new one (Restoration by replacement).

29. Splinter Protection.

When required, splinter protection (i.e. shrapnel from deliberate or accidental explosion) shall consist of walls of 0.20-0.25 m masonry or 0.18 m reinforced concrete to a height of 0.5 m above the items protected. The doors and other closures will be constructed of 10 mm mild steel or 5 mm mild steel plus 50 mm of hardwood.

30. STANAG.

NATO Standardisation Agreement. The record of an agreement among several or all the member nations to adopt like or similar military equipment, ammunition, supplies, and stores; and operational, logistic and administrative procedures.

31. Tiered Approach[4].

Defines different phases (tiers) during AOMs in order to describe parameters to be adopted when defining MMRs for NSIP funded infrastructure and CIS projects.

a.Tier 1: support needed for the initial personnel deploying on operations and operating under field conditions. Mostly limited to what personnel can carry on their person or in their support vehicles.

b. **Tier 2**: basic support in the initial phase of an operation and would span the period of 1 and 2 months to 2 years.

c. **Tier 3**: support provided for the sustainment phase of an operation for a period over 6 month to more than 10 years.

d. **Tier 4**: support standards equalling peacetime standards.

32. Usable Area.

Net internal usable area of a building, resulting from the gross interior area after the deduction of the areas of toilets/changing rooms, lift shafts/stairwells, corridors, utility rooms, service ducts and internal walls.

33. User Nation

The member nation or NATO entity using national or NATO facilities for a NATO AOM.

[4] Reference 6100.01/SHLEX/067/09.

APPENDIX 2 TO
ANNEX A TO
Bi-SC Dir 85-5
DATED OCTOBER 10

Abbreviations and Acronyms

A/C (a/c)	Aircraft
AAR	Air to Air Refuelling
ACN	Aircraft Classification Number
ACO	Allied Command for Operations
ACP	Air Control and Planning
ACT	Allied Command Transformation
ADP	Automated Data Processing
AEP	Aeronautical Publication
AEW	Airborne Early Warning
AGE	Aircraft Ground Equipment
AGS AIS	Alliance Ground Surveillance
ALSS	Automated Information System
AOM	Advanced Logistics Support Site
AOS	Alliance Operations and Missions
APOD	Aircraft Operating Surface
APOE	Airport Of Debarkation
ASR	Airport of Embarkation
ATO	Area Surveillance Radar
BFI	Air Task Order
Bi-SC	Bulk Fuel Installation
BLOS	Bi-Strategic Commands
CBRN	Beyond Line Of Sight
CIS	Chemical, Biological, Radiological and Nuclear
COC	Communication and Information Systems
CP	Component Operations Centre
CRO	Capability Package
CRR	Crisis Response Operation
CUR	Capability Requirement Review
DF	CRO Urgent Requirement
DOB	Defensive Fire
DOS	Deployed Operating Base
DRR	Days of Supply
EB	Defence Requirements Review
ECM	NATO En-Route Base
ELINT	Electronic Countermeasures
ES	Electronic Intelligence Exposed
ESM	Site
ESS	Electronic Warfare Support Measures
FEB	Engineer Service Support
FLR	Flexible Employment Base
FOB	Force of Lower Readiness
FOD	Forward Operating Base
	Foreign Object Damage

FOL	Forward Operating Location
GBAD	Ground Based Air Defence
GCA	Ground-Controlled Approach
GEO	(deprecated) GSO - Geostationary Satellite Orbit
GRF	Graduated Readiness Force
HF	High Frequency
HN	Host Nation
HRF	High Readiness Force
HVAC	Heating, Ventilation, Air Conditioning
IC	Infrastructure Committee
ICAO	International Civil Aviation Organization
ICCS	Individual Common Core Skills
IDT	Individual Deployment Training
IFC	Intelligence Fusion Centre
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IPF	In-Place Force
IS	Information Systems
ISO	International Organization for Standardization
ISR	Intelligence, Surveillance and Reconnaissance
IT	Information Technology
JFSI	Jet Fuel Storage Installation
LCN	Load Classification Number
LOG	Logistics
LOX	Liquid Oxygen/ Liquid Oxygen Storage & Production
LRU	Line Replacement Unit
MAOC	Maritime Air Operations Centre
MCR	Minimum Capability Requirements
MMR	Minimum Military Requirement
MOA	Memorandum of Agreement
MOB	Main Operating Base
MOU	Memorandum of Understanding
MPA	Maritime Patrol Aircraft
MPE	Mission Planning Enclave
NAEW	NATO Airborne Early Warning
NCS	NATO Committee for Standardization
NEQ	Net Explosive Quantities
NGCS	NATO General Purpose Segment Communication System
NIMP	NATO Interoperability Management Plan
NMA	NATO Military Authority
NOR	NATO Office of Resources
NRF	NATO Response Force
NSIP	NATO Security Investment Programme
OPS	Operations / Operational Performance Standard
PABX	Public Address Base Exchange System
PAPI	Precision Approach Path Indicator
PAR	Precision Approach Radar
PAX	Air Passenger
PBF	Permanently Based Forces

PCN	Pavement Classification Number
PE	Peacetime Establishment
PES	Potential Explosive Site
PFR	Primary Reception Facility
POL	Petrol, Oil, Lubricants
QRA	Quick Reaction Alert
RAPCON	Radar Approach Control
RECCE	Reconnaissance
RWA	Rotary Wing Aircraft
SAR SBA	Search and Rescue
SC	Strategic Bomber Aircraft
SN	Strategic Command
SRF	Sending Nation
SSR	Secondary Reception Facility
STA	Secondary Surveillance Radar
STANAG	Strategic Transport Aircraft
TA	NATO Standardisation Agreement
TACAN	Tactical Aircraft
TBD	Tactical Air Navigation
TCA TFA	To Be Determined
TRF	Trainer/Cargo Aircraft
TTA	Tactical Fighter Aircraft
UAS	Tertiary Reception Facility
UAV	Tactical Transport Aircraft
UHF	Unmanned Aircraft System
UPS	Unmanned Aerial Vehicle
VASI	Ultra High Frequency
VFR	Uninterrupted Power Supply
VHF	Visual Approach Slope Indicator
	Visual Flight Rules
	Very High Frequency

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APPENDIX 3 TO
ANNEX A TO
Bi-SC Dir 85-5
DATED OCTOBER 10

Reference Documents

A listing of the most important reference documents which have been used to produce this Directive is provided below:

A. Bi-SC Directive 85-1(interim), Capability Package Directive, dated Jun 07

B. C-M (56) 60, The Maintenance of NATO Common Infrastructure, dated Apr 1956

C. AEP-46(B), Criteria for the Aircraft Classification Number (ACN)/Pavement Classification Number (PCN), dated Jun 08

D. STANAG 3634, Runway Friction and Breaking Conditions, dated Mar 07

E. C-M(56)59, Local Utilities, dated Apr 1956

F. AC/4-R/1388, Record of Meeting, dated Sep 86

G. AASTP-1, Manual of NATO Safety Principles for the Storage of Military Ammunition and Explosives, dated May 06

H. STANAG 3158, Day Marking of Airfield Runways and Taxiways, dated Apr 07

I. STANAG 7114, Helipad Clearance Plane Requirements, dated Nov 00

J. STANAG 3619, Helipad Marking and Lighting, dated Nov 07

K. STANAG 3316, Airfield Lighting, dated May 04

L. STANAG 3346, Marking and Lighting of Airfield Obstructions, dated Oct 02

M. STANAG 3784, Technical Guidance for the Design and Construction of Aviation and Ground Fuel Installations on NATO Airfields, dated Nov 08

N. AC/4-M(96)001, NATO Approved Technical Criteria and Standards for POL Facilities, dated Jul 96

O. C-M (2002)49, Security Within NATO, dated Jun 02

P. C-M (2002)50, Protection Measures for NATO Civil and Military Bodies, deployed NATO Forces and Installations (Assets) against Terrorist Threats, dated Jun 02

Q. AD 70-1, ACO Security Directive, dated Jan 09

R. 6100.01/SHLEX/067/09, Guidance on NATO Security Investment Programme (NSIP) Funded Infrastructure and Communication and Information System (CIS) Projects on Crisis Response Operations (CRO) – Revision 1, dated Dec 09

S. ACO Forces Standards (AFS) Vol. III Standards for Air Force, dated Jan 09

T. AAP-6, NATO Glossary of Terms and Definitions (English and French), dated Apr 09

U. AAP-15, NATO Glossary of Abbreviations Used in NATO Documents and Publications, dated Mar 09

V. STANAG 7141 EP, Joint NATO Doctrine for Environmental Protection during NATO Led Military Activities, dated Feb 08

W. MC 55/4, NATO Logistic Readiness and Sustainability Policy, dated Dec 02

X. Bi-SC Hardening Policy for Air Bases in NATO Territory, dated Nov 02

Y. AD 80-25, ACO Force Protection, dated May 09

ANNEX B TO
Bi-SC Dir 85-5
DATED OCTOBER 10

Aircraft Data Sheets

The purpose of this Annex is to provide the Aircraft Data Sheets for aircraft used by NATO Forces. These aircraft and the associated appendix are contained in the table below.

APPENDICES:

1. **Tactical Fighter Aircraft**
2. **Tactical Transport Aircraft**
3. **Maritime Patrol Aircraft**
4. **NATO Early Warning Aircraft**
5. **Strategic Aircraft**
6. **Unmanned Aerial Vehicles**
7. **Rotary Wing Aircraft**

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APPENDIX 1 TO
ANNEX B TO
Bi-SC Dir 85-5
DATED OCTOBER 10

Tactical Fighter Aircraft

TABLE OF CONTENTS

Generic Tactical Fighter Aircraft

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	21,000kg
Minimum Landing Distance @ Maximum Landing Weight	
Minimum Take-off Distance @ Maximum Take-off Weight	700m
LCN @ Maximum Take-off Weight	50
Arrestor Gear – Type/Capacity	
Average Take-off Speed	
Wheel Track	
Overall Length	15.96m
Overall Height	5.28m
Wing Span	10.95m
Turning Radius of Wheels Locked	
Crew Size	1
Number of Engines	2
Maximum Fuel Capacity	5.7m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D

Alpha Jet

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	7,100kg
Minimum Landing Distance @ Maximum Landing Weight	460m
Minimum Take-off Distance @ Maximum Take-off Weight	350m
LCN @ Maximum Take-off Weight	9
Arrestor Gear – Type/Capacity	
Average Take-off Speed	132 knots
Wheel Track	2.71m
Overall Length	11.75m
Overall Height	4.20m
Wing Span	9.11m
Turning Radius of Wheels Locked	
Number of Engines	2
Maximum Fuel Capacity	2.00m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D

AMX

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	13,000kg
Minimum Landing Distance @ Maximum Landing Weight	464m
Minimum Take-off Distance @ Maximum Take-off Weight	982m
LCN @ Maximum Take-off Weight	20
Arrestor Gear – Type/Capacity	
Average Take-off Speed	135 knots
Wheel Track	2.15m
Overall Length	13.23m
Overall Height	4.55m
Wing Span	9.97m
Turning Radius of Wheels Locked	7.53m
Crew Size	1
Number of Engines	1
Maximum Fuel Capacity	3.6m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D

A-7

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	19,050kg
Minimum Landing Distance @ Maximum Landing Weight	2,438m
Minimum Take-off Distance @ Maximum Take-off Weight	1,945m
LCN @ Maximum Take-off Weight	35
Arrestor Gear – Type/Capacity	Hook / 19,050 kg @150 knots
Average Take-off Speed	150 knots
Wheel Track	2.9m
Overall Length	14.06m
Overall Height	4.9m
Wing Span	11.8m
Turning Radius of Wheels Locked	5.79m
Crew Size	1
Number of Engines	1
Maximum Fuel Capacity	9.95m

3. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
9,998kg	9.5	9.5	9.5	9.5		9.5	9.5	9.5	9.5
19,050kg	18.5	18.5	18.5	18.5		18.2	18.2	18.2	18.2

A-10

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	23,133kg
Minimum Landing Distance @ Maximum Landing Weight	1,524m
Minimum Take-off Distance @ Maximum Take-off Weight	3,000m
LCN @ Maximum Take-off Weight	35
Arrestor Gear – Type/Capacity	Hook / 22,730 kg @110 knots
Average Take-off Speed	110 knots
Wheel Track	5.25m
Overall Length	16.26m
Overall Height	4.47m
Wing Span	17.53m
Turning Radius of Wheels Locked	7.01m
Crew Size	1
Number of Engines	2
Maximum Fuel Capacity	13.12m

3. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
11,976kg	10.8	10.8	10.8	10.8		10.8	10.8	10.8	10.8
23,133kg	21	21	21	21		20.9	20.9	20.9	20.9

AV-8B (Harrier)

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	13,494kg
Minimum Landing Distance @ Maximum Landing Weight	
Minimum Take-off Distance @ Maximum Take-off Weight	305m
LCN @ Maximum Take-off Weight	16
Arrestor Gear – Type/Capacity	N/A
Average Take-off Speed	90 knots
Wheel Track	6.76m
Overall Length	14.55m
Overall Height	3.55m
Wing Span	9.24m
Turning Radius of Wheels Locked	
Crew Size	1
Number of Engines	1
Maximum Fuel Capacity	3.79m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A		C	D		A	B	C	D
5,783	3.4	3.7	4.0	4.2		2.6	3.0	3.3	3.9
13,494	9.4	10.1	10.8	11.2		7.4	8.4	9.7	11.1

(C)F-18

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	25,401kg
Minimum Landing Distance @ Maximum Landing Weight	
Minimum Take-off Distance @ Maximum Take-off Weight	426m
LCN @ Maximum Take-off Weight	35
Arrestor Gear – Type/Capacity	Hook / 25,401 kg @ 150 knots
Wheel Track	3.11m
Overall Length	17.07m
Overall Height	4.66m
Wing Span	12.32m
Turning Radius of Wheels Locked	7.01m
Crew Size	1
Number of Engines	2
Maximum Fuel Capacity	9.77m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D

Eurofighter

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	21,000kg
Minimum Landing Distance @ Maximum Landing Weight	
Minimum Take-off Distance @ Maximum Take-off Weight	700m
LCN @ Maximum Take-off Weight	50
Arrestor Gear – Type/Capacity	Hook / 21,000 kg
Average Take-off Speed	
Wheel Track	
Overall Length	15.96m
Overall Height	5.28m
Wing Span	10.95m
Turning Radius of Wheels Locked	
Crew Size	1
Number of Engines	2
Maximum Fuel Capacity	5.7m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D

F-1

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	14,800kg
Minimum Landing Distance @ Maximum Landing Weight	
Minimum Take-off Distance @ Maximum Take-off Weight	
LCN @ Maximum Take-off Weight	17
Arrestor Gear – Type/Capacity	Hook / 14,800 kg @150 knots
Average Take-off Speed	150 knots
Wheel Track	2.5m
Overall Length	15.25m
Overall Height	4.49m
Wing Span	8.44m
Turning Radius of Wheels Locked	9.36m
Crew Size	1
Number of Engines	1
Maximum Fuel Capacity	6.7m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Utra Low
	A	B	C	D		A	B	C	D

F-3 Tornado

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	28,000kg
Minimum Landing Distance @ Maximum Landing Weight	500m
Minimum Take-off Distance @ Maximum Take-off Weight	600m
LCN @ Maximum Take-off Weight	50
Arrestor Gear – Type/Capacity	Hook / 28,000 kg @ 160 knots
Average Take-off Speed	160 knots
Wheel Track	3.10m
Overall Length	16.7m
Overall Height	5.95m
Wing Span	13.9m
Turning Radius of Wheels Locked	
Crew Size	2
Number of Engines	2
Maximum Fuel Capacity	13.0m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D

F-4

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	26,300kg
Minimum Landing Distance @ Maximum Landing Weight	
Minimum Take-off Distance @ Maximum Take-off Weight	1,220m
LCN @ Maximum Take-off Weight	45
Arrestor Gear – Type/Capacity	Hook / 26,300 kg @ 160 knots
Average Take-off Speed	160 knots
Wheel Track	5.46m
Overall Length	19.30m
Overall Height	5.00m
Wing Span	11.70m
Turning Radius of Wheels Locked	7.56
Crew Size	2
Number of Engines	2
Maximum Fuel Capacity	12.64m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
14,514kg	11	12	12	12		13	13	13	13
26,300kg	26	26	25	25		27	26	26	25

F-5

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	11,818kg
Minimum Landing Distance @ Maximum Landing Weight	1,463m
Minimum Take-off Distance @ Maximum Take-off Weight	1,829m
LCN @ Maximum Take-off Weight	20
Arrestor Gear – Type/Capacity	Hook / 11,818 kg @ 160 knots
Average Take-off Speed	165 knots
Wheel Track	3.81m
Overall Length	15.76m
Overall Height	4.08m
Wing Span	8.14m
Turning Radius of Wheels Locked	9.72
Crew Size	1
Number of Engines	2
Maximum Fuel Capacity	4.27m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
4,989kg	3	3	3	3		3	3	4	4
11,818kg	11	11	11	11		11	10	10	10

F-15C/D

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	30,844kg
Minimum Landing Distance @ Maximum Landing Weight	1,584m
Minimum Take-off Distance @ Maximum Take-off Weight	914m
LCN @ Maximum Take-off Weight	35
Arrestor Gear – Type/Capacity	Hook / 23,586 kg @ 145 knots
Average Take-off Speed	145 knots
Wheel Track	2.74m
Overall Length	19.45m
Overall Height	5.73m
Wing Span	13.05m
Turning Radius of Wheels Locked	
Crew Size	1
Number of Engines	2
Maximum Fuel Capacity	13.56m

2 ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
12,700kg	11	11	11	11		11	11	11	11
23,586kg	28	28	27	27		26	25	24	23

F-15E

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	36,740kg
Minimum Landing Distance @ Maximum Landing Weight	1,676m
Minimum Take-off Distance @ Maximum Take-off Weight	1,036m
LCN @ Maximum Take-off Weight	60
Arrestor Gear – Type/Capacity	Hook / 36,740 kg @ 145 knots
Average Take-off Speed	145 knots
Wheel Track	2.74m
Overall Length	19.45m
Overall Height	5.73m
Wing Span	13.05m
Turning Radius of Wheels Locked	
Crew Size	2
Number of Engines	2
Maximum Fuel Capacity	13.56m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
14,515kg	11	11	11	11		11	11	12	12
36,740kg	37	37	37	36		35	33	33	32

F-16

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	16,057kg
Minimum Landing Distance @ Maximum Landing Weight	1,554m
Minimum Take-off Distance @ Maximum Take-off Weight	823m
LCN @ Maximum Take-off Weight	35
Arrestor Gear – Type/Capacity	Hook / 16,057 kg @ 150 knots
Average Take-off Speed	150 knots
Wheel Track	2.38m
Overall Length	15.09m
Overall Height	5.03m
Wing Span	9.99m
Turning Radius of Wheels Locked	7.62m
Crew Size	1
Number of Engines	1
Maximum Fuel Capacity	7.95m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
7,711kg	6	6	6	6		6	6	6	6
16,057kg	15	15	15	15		14	14	14	13

F-22

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	kg
Minimum Landing Distance @ Maximum Landing Weight	m
Minimum Take-off Distance @ Maximum Take-off Weight	m
LCN @ Maximum Take-off Weight	
Arrestor Gear – Type/Capacity	
Average Take-off Speed	knots
Wheel Track	m
Overall Length	m
Overall Height	m
Wing Span	m
Turning Radius of Wheels Locked	
Crew Size	1
Number of Engines	2
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D

F-35

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	kg
Minimum Landing Distance @ Maximum Landing Weight	m
Minimum Take-off Distance @ Maximum Take-off Weight	m
LCN @ Maximum Take-off Weight	
Arrestor Gear – Type/Capacity	Hook / kg @ knots
Average Take-off Speed	knots
Wheel Track	m
Overall Length	m
Overall Height	m
Wing Span	m
Turning Radius of Wheels Locked	
Crew Size	1
Number of Engines	2
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D

L-159

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	8,000 kg
Minimum Landing Distance @ Maximum Landing Weight	725 m
Minimum Take-off Distance @ Maximum Take-off Weight	440m
LCN @ Maximum Take-off Weight	8
Arrestor Gear – Type/Capacity	Net / 8,000 kg @ ?? knots
Average Take-off Speed	Knots
Wheel Track	m
Overall Length	12.72 m
Overall Height	4.87 m
Wing Span	9.54 m
Turning Radius of Wheels Locked	
Crew Size	1-2
Number of Engines	1
Maximum Fuel Capacity	3.62 m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
4,500 kg	5	5	5	5		5	5	5	5
8,200 kg	8	8	8	8		8	8	8	8

Mig-29

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	18,500kg
Minimum Landing Distance @ Maximum Landing Weight	1,100m
Minimum Take-off Distance @ Maximum Take-off Weight	400m
LCN @ Maximum Take-off Weight	32
Arrestor Gear – Type/Capacity	Net / 18,500 kg @ 145 knots
Average Take-off Speed	145 knots
Wheel Track	3.1m
Overall Length	17.32m
Overall Height	4.73m
Wing Span	11.36m
Turning Radius of Wheels Locked	7.60m
Crew Size	1
Number of Engines	2
Maximum Fuel Capacity	8.1m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D

Mirage 5

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	13,700kg
Minimum Landing Distance @ Maximum Landing Weight	700m
Minimum Take-off Distance @ Maximum Take-off Weight	1,600m
LCN @ Maximum Take-off Weight	20
Arrestor Gear – Type/Capacity	Hook / 13,700 kg @ 160 knots
Average Take-off Speed	160 knots
Wheel Track	3.15m
Overall Length	15.03m
Overall Height	4.5m
Wing Span	8.22m
Turning Radius of Wheels Locked	
Crew Size	1
Number of Engines	1
Maximum Fuel Capacity	8.5m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D

Mirage 2000

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	10,860kg
Minimum Landing Distance @ Maximum Landing Weight	700m
Minimum Take-off Distance @ Maximum Take-off Weight	1,600m
LCN @ Maximum Take-off Weight	23
Arrestor Gear – Type/Capacity	Hook / 18,860 kg @ 185 knots
Average Take-off Speed	185 knots
Wheel Track	3.40m
Overall Length	14.65m
Overall Height	5.20m
Wing Span	9.13m
Turning Radius of Wheels Locked	
Crew Size	1
Number of Engines	1
Maximum Fuel Capacity	3.98m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D

Su-22

1. Aircraft Data.

AOS Group	TFA
Maximum Normal Take-off Weight	19,430kg
Minimum Landing Distance @ Maximum Landing Weight	950m
Minimum Take-off Distance @ Maximum Take-off Weight	900m
LCN @ Maximum Take-off Weight	23
Arrestor Gear – Type/Capacity	Net / 10,860 kg @ 180 knots
Average Take-off Speed	180 knots
Wheel Track	3.83m
Overall Length	19.01m
Overall Height	4.97m
Wing Span	13.68m
Turning Radius of Wheels Locked	12.0m
Crew Size	1
Number of Engines	1
Maximum Fuel Capacity	5.0m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D

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APPENDIX 2 TO
ANNEX B TO
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Tactical Transport Aircraft

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Generic Tactical Transport

1. Aircraft Data.

AOS Group	TTA
Maximum Normal Take-off Weight	70,454kg
Minimum Landing Distance @ Maximum Landing Weight	1,011m
Minimum Take-off Distance @ Maximum Take-off Weight	1,250m
LCN @ Maximum Take-off Weight	48
Average Take-off Speed	
Wheel Track	4.35m
Overall Length	30.32m
Overall Height	11.70m
Wing Span	40.42m
Turning Radius of Wheels Locked	17.70m
Crew Size	5
Number of Engines	4
Maximum Fuel Capacity	36.60m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
70,454kg	24	27	29	31		21	23	27	32

An-24

1. Aircraft Data.

AOS Group	TTA
Maximum Normal Take-off Weight	21,000kg
Minimum Landing Distance @ Maximum Landing Weight	1,600m
Minimum Take-off Distance @ Maximum Take-off Weight	780m
LCN @ Maximum Take-off Weight	120
Average Take-off Speed	
Wheel Track	7.90m
Overall Length	23.53m
Overall Height	8.32m
Wing Span	29.20m
Turning Radius of Wheels Locked	10.00m
Crew Size	4
Number of Engines	2
Maximum Fuel Capacity	6.07m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
21,000kg	10	11	12	13		9	10	12	13

An-26

1. Aircraft Data.

AOS Group	TTA
Maximum Normal Take-off Weight	25,000kg
Minimum Landing Distance @ Maximum Landing Weight	1,600m
Minimum Take-off Distance @ Maximum Take-off Weight	780m
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	7.90m
Overall Length	23.80m
Overall Height	8.58m
Wing Span	29.20m
Turning Radius of Wheels Locked	10.00m
Crew Size	5
Number of Engines	2
Maximum Fuel Capacity	6.98m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
25,000kg	12	13	14	14		10	12	13	15

C-2

1. Aircraft Data.

AOS Group	TTA
Maximum Normal Take-off Weight	kg
Minimum Landing Distance @ Maximum Landing Weight	m
Minimum Take-off Distance @ Maximum Take-off Weight	m
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	m
Overall Length	m
Overall Height	m
Wing Span	m
Turning Radius of Wheels Locked	m
Crew Size	
Number of Engines	
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
kg									

C-9

1. Aircraft Data.

AOS Group	TTA
Maximum Normal Take-off Weight	kg
Minimum Landing Distance @ Maximum Landing Weight	m
Minimum Take-off Distance @ Maximum Take-off Weight	m
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	m
Overall Length	m
Overall Height	m
Wing Span	m
Turning Radius of Wheels Locked	m
Crew Size	
Number of Engines	
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
kg									

C-12

1. Aircraft Data.

AOS Gropu	TTA
Maximum Normal Take-off Weight	kg
Minimum Landing Distance @ Maximum Landing Weight	m
Minimum Take-off Distance @ Maximum Take-off Weight	m
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	m
Overall Length	m
Overall Height	m
Wing Span	m
Turning Radius of Wheels Locked	m
Crew Size	
Number of Engines	
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
kg									

C-26

1. Aircraft Data.

AOS Group	TTA
Maximum Normal Take-off Weight	kg
Minimum Landing Distance @ Maximum Landing Weight	m
Minimum Take-off Distance @ Maximum Take-off Weight	m
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	m
Overall Length	m
Overall Height	m
Wing Span	m
Turning Radius of Wheels Locked	m
Crew Size	
Number of Engines	
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
kg									

C-27J

1. Aircraft Data.

AOS Group	TTA
Maximum Normal Take-off Weight	31,800kg
Minimum Landing Distance @ Maximum Landing Weight	340m
Minimum Take-off Distance @ Maximum Take-off Weight	580m
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	3.70m
Overall Length	22.70m
Overall Height	9.80m
Wing Span	28.70m
Turning Radius of Wheels Locked	
Crew Size	3
Number of Engines	2
Maximum Fuel Capacity	12.30m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
17,000kg	5.4	5.8	6.3	6.8		4.1	5.2	6.4	7.1
31,800kg	10.1	11.3	12.5	13.5		8.0	10.2	12.8	14.6

C-130

1. Aircraft Data.

AOS Group	TTA
Maximum Normal Take-off Weight	70,454kg
Minimum Landing Distance @ Maximum Landing Weight	1,011m
Minimum Take-off Distance @ Maximum Take-off Weight	1,250m
LCN @ Maximum Take-off Weight	48
Average Take-off Speed	
Wheel Track	4.35m
Overall Length	30.32m
Overall Height	11.70m
Wing Span	40.42m
Turning Radius of Wheels Locked	17.70m
Crew Size	5
Number of Engines	4
Maximum Fuel Capacity	36.60m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
70,454kg	24	27	29	31		21	23	27	32

C-130E

1. Aircraft Data.

AOS Group	TTA
Maximum Normal Take-off Weight	70,494kg
Minimum Landing Distance @ Maximum Landing Weight	1,011m
Minimum Take-off Distance @ Maximum Take-off Weight	1,250m
LCN @ Maximum Take-off Weight	48
Average Take-off Speed	
Wheel Track	4.35m
Overall Length	30.32m
Overall Height	11.70m
Wing Span	40.42m
Turning Radius of Wheels Locked	17.70m
Turning Radius to Outboard Engine	m
Outboard Engine to Outboard Engine	m
Crew Size	5
Number of Engines	4
Maximum Fuel Capacity	36.60m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
32,659kg	12.9	13.9	14.9	15.7		11.5	13.1	13.9	15.5
70,494kg	30.0	32.9	35.7	37.9		27.0	30.6	33.0	38.5
79,379kg	34.1	37.5	40.7	43.2		30.8	34.8	37.6	44.0

C-130J

1. Aircraft Data.

AOS Group	TTA
Maximum Normal Take-off Weight	70,454kg
Minimum Landing Distance @ Maximum Landing Weight	1,011m
Minimum Take-off Distance @ Maximum Take-off Weight	1,250m
LCN @ Maximum Take-off Weight	48
Average Take-off Speed	
Wheel Track	4.35m
Overall Length	30.32m
Overall Height	11.70m
Wing Span	40.42m
Turning Radius of Wheels Locked	17.70m
Crew Size	5
Number of Engines	4
Maximum Fuel Capacity	36.60m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
70,454kg	24	27	29	31		21	23	27	32

C-160

1. Aircraft Data.

AOS Group	TTA
Maximum Normal Take-off Weight	49,150kg
Minimum Landing Distance @ Maximum Landing Weight	
Minimum Take-off Distance @ Maximum Take-off Weight	
LCN @ Maximum Take-off Weight	10
Average Take-off Speed	
Wheel Track	5.10m
Overall Length	32.50m
Overall Height	11.65m
Wing Span	40.00m
Turning Radius of Wheels Locked	11.78m
Crew Size	5
Number of Engines	2
Maximum Fuel Capacity	16.49m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
49,150kg									

Cessna 525

1. Aircraft Data.

AOS Group	TTA
Maximum Normal Take-off Weight	kg
Minimum Landing Distance @ Maximum Landing Weight	m
Minimum Take-off Distance @ Maximum Take-off Weight	m
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	m
Overall Length	m
Overall Height	m
Wing Span	m
Turning Radius of Wheels Locked	m
Crew Size	
Number of Engines	
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
kg									

G-222

1. Aircraft Data.

AOS Group	TTA
Maximum Normal Take-off Weight	kg
Minimum Landing Distance @ Maximum Landing Weight	m
Minimum Take-off Distance @ Maximum Take-off Weight	m
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	m
Overall Length	m
Overall Height	m
Wing Span	m
Turning Radius of Wheels Locked	m
Crew Size	
Number of Engines	
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
kg									

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Maritime Patrol Aircraft

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Atlantique

1. Aircraft Data.

AOS Group	MPA
Maximum Normal Take-off Weight	44,500kg
Minimum Landing Distance @ Maximum Landing Weight	
Minimum Take-off Distance @ Maximum Take-off Weight	
LCN @ Maximum Take-off Weight	40
Average Take-off Speed	115 knots
Wheel Track	9.00m
Overall Length	31.75m
Overall Height	11.33m
Wing Span	36.30m
Turning Radius of Wheels Locked	14.50m
Outboard Propeller Tip to Outboard Propeller Tip	13.88m
Crew Size	9 – 12
Number of Engines	2
Maximum Fuel Capacity	21.0m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D

Nimrod

1. Aircraft Data.

AOS Group	MPA
Maximum Normal Take-off Weight	87,000kg
Minimum Landing Distance @ Maximum Landing Weight	
Minimum Take-off Distance @ Maximum Take-off Weight	
LCN @ Maximum Take-off Weight	50
Average Take-off Speed	142 knots
Wheel Track	8.58m
Overall Length	38.62m
Overall Height	9.14m
Wing Span	34.99m
Turning Radius of Wheels Locked	
Crew Size	13
Number of Engines	4
Maximum Fuel Capacity	53.0m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D

P-3

1. Aircraft Data.

AOS Group MPA	
Maximum Normal Take-off Weight	63,525kg
Minimum Landing Distance @ Maximum Landing Weight	
Minimum Take-off Distance @ Maximum Take-off Weight	
LCN @ Maximum Take-off Weight	50
Average Take-off Speed	136 knots
Wheel Track	9.25m
Overall Length	35.61m
Overall Height	10.44m
Wing Span	30.37m
Turning Radius of Wheels Locked	
Crew Size	12
Number of Engines	4
Maximum Fuel Capacity	38.3m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D

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NATO Early Warning Aircraft

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E-3A

1. Aircraft Data.

AOS Group	NAEW
Maximum Normal Take-off Weight	147,417kg
Minimum Landing Distance @ Maximum Landing Weight	1,466m
Minimum Take-off Distance @ Maximum Take-off Weight	1,993m
LCN @ Maximum Take-off Weight	65
Average Take-off Speed	
Wheel Track	6.75m
Overall Length	46.61m
Overall Height	12.72m
Wing Span	45.79m
Turning Radius of Wheels Locked	21.5m
Turning Radius to Outboard Engine	28.04m
Outboard Engine to Outboard Engine	31.70m
Crew Size	4 + 13
Number of Engines	4
Maximum Fuel Capacity	90m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
77,564kg	15	18	21	24		15	18	22	27
147,417kg	38	46	55	62		38	45	54	61

E-8

1. Aircraft Data.

AOS Group	NAEW
Maximum Normal Take-off Weight	kg
Minimum Landing Distance @ Maximum Landing Weight	m
Minimum Take-off Distance @ Maximum Take-off Weight	m
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	m
Overall Length	m
Overall Height	m
Wing Span	m
Turning Radius of Wheels Locked	m
Turning Radius to Outboard Engine	m
Outboard Engine to Outboard Engine	m
Crew Size	
Number of Engines	
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D

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Strategic Aircraft

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A-400M

1. Aircraft Data.

AOS Group	STA
Maximum Normal Take-off Weight	kg
Minimum Landing Distance @ Maximum Landing Weight	m
Minimum Take-off Distance @ Maximum Take-off Weight	m
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	m
Overall Length	m
Overall Height	m
Wing Span	m
Turning Radius of Wheels Locked	m
Crew Size	
Number of Engines	
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
kg									

An-124

1. Aircraft Data.

AOS Group	STA
Maximum Normal Take-off Weight	397,990kg
Minimum Landing Distance @ Maximum Landing Weight	900m
Minimum Take-off Distance @ Maximum Take-off Weight	3,000m
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	
Overall Length	69.10m
Overall Height	20.78m
Wing Span	73.30m
Turning Radius of Wheels Locked	
Crew Size	
Number of Engines	4
Maximum Fuel Capacity	50.20m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
397,990kg	48	35	73	99		51	61	79	109

Airbus A-310

1. Aircraft Data.

AOS Group	STA
Maximum Normal Take-off Weight	150,000kg
Minimum Landing Distance @ Maximum Landing Weight	
Minimum Take-off Distance @ Maximum Take-off Weight	
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	
Overall Length	46.66m
Overall Height	15.80m
Wing Span	43.89m
Turning Radius of Wheels Locked	
Crew Size	2
Number of Engines	2
Maximum Fuel Capacity	61.07m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
150,000kg	45	54	63	71		47	53	64	81

B-1B

1. Aircraft Data.

AOS Group	SBA
Maximum Normal Take-off Weight	216,363kg
Minimum Landing Distance @ Maximum Landing Weight	1,509m
Minimum Take-off Distance @ Maximum Take-off Weight	3,100m
LCN @ Maximum Take-off Weight	120
Average Take-off Speed	
Wheel Track	4.24m
Overall Length	46.06m
Overall Height	10.24m
Wing Span	41.67m
Turning Radius of Wheels Locked	34.44m
Turning Radius to Outboard Engine	m
Outboard Engine to Outboard Engine	m
Crew Size	4
Number of Engines	4
Maximum Fuel Capacity	114m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
85,729kg	19.0	22.4	26.1	29.7		21.1	22.4	25.0	33.2
216,363kg	66.6	80.0	93.2	102.5		69.4	78.7	97.6	117.1

B-52G/H

1. Aircraft Data.

AOS Group	SBA
Maximum Normal Take-off Weight	221,353kg
Minimum Landing Distance @ Maximum Landing Weight	2,591m
Minimum Take-off Distance @ Maximum Take-off Weight	2,441m
LCN @ Maximum Take-off Weight	120
Average Take-off Speed	
Wheel Track	2.514m
Overall Length	49.042m
Overall Height	12.396m
Wing Span	56.38m
Turning Radius of Wheels Locked	34.747m
Crew Size	5
Number of Engines	8
Maximum Fuel Capacity	176.39m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
104,326kg	36.2	40.6	45.4	49.5		29.7	31.5	34.9	42.3
221,353kg	98.7	110.6	121.7	130.6		77.3	83.7	94.4	112.6

B-747

1. Aircraft Data.

AOS Group	STA
Maximum Normal Take-off Weight	340,000kg
Minimum Landing Distance @ Maximum Landing Weight	1,940m
Minimum Take-off Distance @ Maximum Take-off Weight	3,048m
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	
Overall Length	70.65m
Overall Height	19.60m
Wing Span	59.65m
Turning Radius of Wheels Locked	22.86m
Crew Size	
Number of Engines	4
Maximum Fuel Capacity	50.20m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
340,000kg	42	49	59	68		46	51	62	82

B-767

1. Aircraft Data.

AOS Group	STA
Maximum Normal Take-off Weight	142,881kg
Minimum Landing Distance @ Maximum Landing Weight	
Minimum Take-off Distance @ Maximum Take-off Weight	1,980m
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	
Overall Length	48.52m
Overall Height	16.12m
Wing Span	47.58m
Turning Radius of Wheels Locked	35.66m
Crew Size	
Number of Engines	4
Maximum Fuel Capacity	

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
142,881kg	33	38	46	54		37	40	47	65

C-5A/B

1. Aircraft Data.

AOS Group	STA
Maximum Normal Take-off Weight	381,017kg
Minimum Landing Distance @ Maximum Landing Weight	1,036m
Minimum Take-off Distance @ Maximum Take-off Weight	3,048m
LCN @ Maximum Take-off Weight	57
Average Take-off Speed	
Wheel Track	7.90m
Overall Length	83.545m
Overall Height	19.842m
Wing Span	67.939m
Turning Radius of Wheels Locked	22.098m
Crew Size	7
Number of Engines	4
Maximum Fuel Capacity	194.37m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
169,643kg	12.1	12.3	13.7	16.6		12.3	13.4	15.8	20.4
381,017kg	28.7	34.3	44.7	55.5		36.4	40.2	49.6	68.0

C-17

1. Aircraft Data.

AOS Group	STA
Maximum Normal Take-off Weight	265,351kg
Minimum Landing Distance @ Maximum Landing Weight	m
Minimum Take-off Distance @ Maximum Take-off Weight	m
LCN @ Maximum Take-off Weight	80
Average Take-off Speed	
Wheel Track	7.62m
Overall Length	53.04m
Overall Height	16.8m
Wing Span	51.82m
Turning Radius of Wheels Locked	
Crew Size	3
Number of Engines	4
Maximum Fuel Capacity	102.61m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
126,552kg	22	22	22	24		20	21	24	32
265,351kg	49	49	49	65		52	57	69	90

Il-76

1. Aircraft Data.

AOS Group	STA
Maximum Normal Take-off Weight	210,000kg
Minimum Landing Distance @ Maximum Landing Weight	1,400m
Minimum Take-off Distance @ Maximum Take-off Weight	1,700m
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	8.16m
Overall Length	45.59m
Overall Height	14.76m
Wing Span	50.50m
Turning Radius of Wheels Locked	
Crew Size	7
Number of Engines	4
Maximum Fuel Capacity	109.5m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
210,000kg	28	30	34	35		24	27	33	45

KC-10

1. Aircraft Data.

AOS Group	AAR
Maximum Normal Take-off Weight	267,619kg
Minimum Landing Distance @ Maximum Landing Weight	1,410m
Minimum Take-off Distance @ Maximum Take-off Weight	2,745m
LCN @ Maximum Take-off Weight	80
Average Take-off Speed	
Wheel Track	10.67m
Overall Length	55.25m
Overall Height	17.62m
Wing Span	50.38m
Turning Radius of Wheels Locked	25.97m
Crew Size	6
Number of Engines	4
Maximum Fuel Capacity	138.2m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
108,862kg	12	13	15	18		14	17	21	27
267,619kg	48	57	68	79		58	64	75	102

KC-135R

1. Aircraft Data.

AOS Group	AAR
Maximum Normal Take-off Weight	146,283kg
Minimum Landing Distance @ Maximum Landing Weight	3,048m
Minimum Take-off Distance @ Maximum Take-off Weight	2,652m
LCN @ Maximum Take-off Weight	65
Average Take-off Speed	
Wheel Track	6.74m
Overall Length	41.51m
Overall Height	12.71m
Wing Span	39.87m
Turning Radius of Wheels Locked	19.82m
Crew Size	4
Number of Engines	4
Maximum Fuel Capacity	95m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
53,070kg	7	8	9	11		7	8	11	15
146,283kg	37	45	54	61		37	45	54	61

Tu-154

1. Aircraft Data.

AOS Group	STA
Maximum Normal Take-off Weight	210,000kg
Minimum Landing Distance @ Maximum Landing Weight	2,500m
Minimum Take-off Distance @ Maximum Take-off Weight	2,100m
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	11.50m
Overall Length	47.92m
Overall Height	11.40m
Wing Span	37.55m
Turning Radius of Wheels Locked	22.00
Crew Size	4
Number of Engines	3
Maximum Fuel Capacity	50.20m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
100,000kg	20	24	30	38		20	24	30	38

APPENDIX 6 TO
ANNEX B TO
Bi-SC Dir 85-5
DATED OCTOBER 10

Unmanned Aerial Vehicles

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Global Hawk Block 20+

1. Aircraft Data.

AOS Group	UAV
Maximum Normal Take-off Weight	14,606kg
Minimum Landing Distance @ Maximum Landing Weight	
Minimum Take-off Distance @ Maximum Take-off Weight	1,862m
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	
Overall Length	14.5m
Overall Height	4.66m
Wing Span	39.89m
Turning Radius of Wheels Locked	
Crew Size	
Number of Engines	1
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
14,605kg	14.8	14.8	14.8	14.8		13.7	13.7	13.7	13.7

RQ-1 Predator

1. Aircraft Data.

AOS Group	UAV
Maximum Normal Take-off Weight	1,020kg
Minimum Landing Distance @ Maximum Landing Weight	
Minimum Take-off Distance @ Maximum Take-off Weight	
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	
Overall Length	8.22m
Overall Height	2.1m
Wing Span	14.8m
Turning Radius of Wheels Locked	
Number of Engines	1
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
1,020kg									

Warrior

1. Aircraft Data.

AOS Group	UAV
Maximum Normal Take-off Weight	1,360kg
Minimum Landing Distance @ Maximum Landing Weight	
Minimum Take-off Distance @ Maximum Take-off Weight	
LCN @ Maximum Take-off Weight	
Average Take-off Speed	
Wheel Track	
Overall Length	8.50m
Overall Height	2.1m
Wing Span	17.1m
Turning Radius of Wheels Locked	
Number of Engines	1
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
1,360kg									

APPENDIX 7 TO
ANNEX B TO
Bi-SC Dir 85-5
DATED OCTOBER 10

Rotary Wing Aircraft

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AH-1

1. Aircraft Data.

AOS Group	RWA
Maximum Normal Take-off Weight	4,500kg
Main Rotor Diameter	13.40m
Tail Rotor Diameter	
Length of Fuselage	16.18m
Length Rotors Turning	
Overall Height	4.10m
Crew Size	2
Normal Cargo Load	
Maximum Cargo Load	
Slung Load	
Number of Passengers / Patients on Stretchers	
Number of Engines	1
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
4,500kg									

AH-64A

1. Aircraft Data.

AOS Group	RWA
Maximum Normal Take-off Weight	6,838kg
Main Rotor Diameter	14.63m
Tail Rotor Diameter	
Length of Fuselage	15.06m
Length Rotors Turning	17.76m
Overall Height	4.66m
Crew Size	2
Normal Cargo Load	
Maximum Cargo Load	
Slung Load (maximum from dual hook)	
Number of Engines	2
Maximum Fuel Capacity	1.36 m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
6,838kg									

AH-64D (Longbow)

1. Aircraft Data.

AOS Group	RWA
Maximum Normal Take-off Weight	7,530kg
Main Rotor Diameter	14.63m
Tail Rotor Diameter	2.79m
Length of Fuselage	15.47m
Length Rotors Turning	17.76m
Overall Height	4.95m
Crew Size	2
Normal Cargo Load	
Maximum Cargo Load	
Slung Load (maximum from dual hook)	
Number of Engines	2
Maximum Fuel Capacity	1.36 m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
7,530kg									

AS-330 Puma

1. Aircraft Data.

AOS Group	RWA
Maximum Normal Take-off Weight	16,300kg
Main Rotor Diameter	15.0m
Tail Rotor Diameter	
Length of Fuselage	
Length Rotors Turning	18.15m
Overall Height	5.14m
Crew Size	3
Normal Cargo Load	
Maximum Cargo Load	
Slung Load	
Number of Passengers / Patients on Stretchers	16
Number of Engines	2
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
16,300kg									

AS-532 Cougar

1. Aircraft Data.

AOS Group	RWA
Maximum Normal Take-off Weight	9,000kg
Main Rotor Diameter	15.60m
Tail Rotor Diameter	
Length of Fuselage	15.53m
Length Rotors Turning	18.70m
Overall Height	
Crew Size	2-3
Normal Cargo Load	4,635kg
Maximum Cargo Load	
Slung Load	4,500kg
Number of Passengers / Patients on Stretchers	21 / 6
Number of Engines	2
Maximum Fuel Capacity	1.49m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
9,000kg									

CH-47D

1. Aircraft Data.

AOS Group	RWA
Maximum Normal Take-off Weight	24,494 kg
Main Rotor Diameter	18.30m
Tail Rotor Diameter	
Length of Fuselage	
Length Rotors Turning	30.14m
Overall Height	5.70m
Crew Size	3
Normal Cargo Load	
Maximum Cargo Load	12,700kg
Slung Load (maximum from dual hook)	
Number of Passengers / Patients on Stretchers	33-55 / 24
Number of Engines	2
Maximum Fuel Capacity	4.16m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
22,680kg	10	10	11	11		8	10	11	12

CH-53D

1. Aircraft Data.

AOS Group	RWA
Maximum Normal Take-off Weight	31,666kg
Main Rotor Diameter	22.01m
Tail Rotor Diameter	
Length of Fuselage	26.97m
Width Rotors Turning	8.64m
Overall Height	7.60m
Crew Size	3
Normal Cargo Load	
Maximum Cargo Load	
Slung Load (maximum from dual hook)	
Number of Passengers / Patients on Stretchers	37 / 24
Number of Engines	2
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
31,666kg	18	19	19	20		15	17	18	19

EH-101

1. Aircraft Data.

AOS Group	RWA
Maximum Normal Take-off Weight	15,600kg
Main Rotor Diameter	18.59m
Tail Rotor Diameter	
Length of Fuselage	
Length Rotors Turning	22.81m
Overall Height	6.65m
Crew Size	4
Normal Cargo Load	5,443kg
Maximum Cargo Load	
Slung Load	
Number of Passengers / Patients on Stretchers	24 / 16
Number of Engines	3
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
15,600kg									

HH-60

1. Aircraft Data.

AOS Group	RWA
Maximum Normal Take-off Weight	9,900kg
Main Rotor Diameter	14.1m
Tail Rotor Diameter	
Length of Fuselage	
Length Rotors Turning	17.1m
Overall Height	5.1m
Crew Size	4
Normal Cargo Load	
Maximum Cargo Load	
Slung Load	
Number of Passengers / Patients on Stretchers	8-12
Number of Engines	2
Maximum Fuel Capacity	1.36m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
9,900kg									

Lynx

1. Aircraft Data.

AOS Group	RWA
Maximum Normal Take-off Weight	5,330kg
Main Rotor Diameter	12.80m
Tail Rotor Diameter	
Length of Fuselage	
Length Rotors Turning	15.16m
Overall Height	3.66m
Crew Size	2-3
Normal Cargo Load	
Maximum Cargo Load	
Slung Load	
Number of Passengers / Patients on Stretchers	
Number of Engines	2
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
5,330kg									

MH-53

1. Aircraft Data.

AOS Group	RWA
Maximum Normal Take-off Weight	21,000kg
Main Rotor Diameter	21.90m
Tail Rotor Diameter	6.10m
Length of Fuselage	22.35m
Width Rotors Turning	28.00m
Overall Height	7.60m
Crew Size	6
Normal Cargo Load	
Maximum Cargo Load	
Slung Load (maximum from dual hook)	
Number of Passengers / Patients on Stretchers	
Number of Engines	2
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
21,000kg									

Mi-8

1. Aircraft Data.

AOS Group	
Maximum Normal Take-off Weight	12,000kg
Main Rotor Diameter	21.29m
Tail Rotor Diameter	3.91m
Length of Fuselage	18.22m
Length with Rotors Turning	24.24m
Overall Height	5.65m
Crew Size	3
Normal Cargo Load	3,000kg
Maximum Cargo Load	4,000kg
Slung Load	
Number of Passengers / Patients on Stretchers	24 / 12
Number of Engines	2
Maximum Fuel Capacity	3.70m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
12,000kg									

Mi-17

1. Aircraft Data.

AOS Group	RWA
Maximum Normal Take-off Weight	13,000kg
Main Rotor Diameter	21.29m
Tail Rotor Diameter	3.91m
Length of Fuselage	18.22m
Length Rotors Turning	25.35m
Overall Height	4.75m
Crew Size	3
Normal Cargo Load	2,355kg
Maximum Cargo Load	4,000kg
Slung Load	3,000kg
Number of Passengers / Patients on Stretchers	24 / 12
Number of Engines	2
Maximum Fuel Capacity	3.70m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
13,000kg									

Mi-24

1. Aircraft Data.

AOS Group	RWA
Maximum Normal Take-off Weight	12,500kg
Main Rotor Diameter	17.30m
Tail Rotor Diameter	3.91m
Length of Fuselage	17.51m
Length Rotors Turning	21.60m
Overall Height	6.50m
Crew Size	3
Normal Cargo Load	2,400kg
Maximum Cargo Load	2,500kg
Slung Load	
Number of Passengers / Patients on Stretchers	8 / 4
Number of Engines	2
Maximum Fuel Capacity	4.68m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
12,500kg									

NH-90

1. Aircraft Data.

AOS Group	RWA
Maximum Normal Take-off Weight	10,600kg
Main Rotor Diameter	16.30m
Tail Rotor Diameter	
Length of Fuselage	
Length Rotors Turning	
Overall Height	5.23m
Crew Size	2
Normal Cargo Load	
Maximum Cargo Load	
Slung Load	
Number of Passengers / Patients on Stretchers	20 / 12
Number of Engines	2
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
10,600kg									

OH-58

1. Aircraft Data.

AOS Group	RWA
Maximum Normal Take-off Weight	2,495kg
Main Rotor Diameter	10.67m
Tail Rotor Diameter	
Length of Fuselage	
Length Rotors Turning	12.39m
Overall Height	2.29m
Crew Size	2
Normal Cargo Load	
Maximum Cargo Load	
Slung Load (maximum from dual hook)	
Number of Engines	1
Maximum Fuel Capacity	0.42 m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
2,495kg									

UH-60

1. Aircraft Data.

AOS Group	RWA
Maximum Normal Take-off Weight	7,375kg
Main Rotor Diameter	16.36m
Tail Rotor Diameter	3.35m
Length of Fuselage	15.43m
Length Rotors Turning	18.54m
Overall Height	2.87m
Crew Size	2 minimum
Normal Cargo Load	1,200kg
Maximum Cargo Load	12,700kg
Slung Load	3,628kg
Number of Passengers / Patients on Stretchers	14 / 6
Number of Engines	2
Maximum Fuel Capacity	m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
7,375kg	5.5	5.5	5.5	5.5		5.7	5.7	5.7	5.7

V-22

1. Aircraft Data.

AOS Group	RWA
Maximum Normal Take-off Weight	27,442kg
Main Rotor Diameter	11.58m
Length of Fuselage	17.48m
Width Rotors Turning	25.55m
Overall Height (Nacelles fully vertical)	6,63m
Crew Size	2
Normal Cargo Load	3,700kg
Maximum Cargo Load	4,500kg
Slung Load (maximum from dual hook)	6,100kg
Number of Passengers / Patients on Stretchers	24 / 12
Number of Engines	2
Maximum Fuel Capacity	2.97m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
20,865kg	9.3	9.9	10.3	10.5		5.6	5.9	6.5	7.9
27,442kg	12.0	12.7	14.2	14.4		7.8	8.2	9.3	11.1

W-3A

1. Aircraft Data.

AOS Group	RWA
Maximum Normal Take-off Weight	6,400kg
Main Rotor Diameter	15,70m
Tail Rotor Diameter	3.03m
Length of Fuselage	14.21m
Length Rotors Turning	18.79m
Overall Height	4.20m
Crew Size	2
Normal Cargo Load	1,004kg
Maximum Cargo Load	2,100kg
Slung Load	2,100kg
Number of Passengers / Patients on Stretchers	12 / 4
Number of Engines	2
Maximum Fuel Capacity	1.72m

2. ACN.

	Rigid Pavement Subgrades					Flexible Pavement Subgrades			
Weight	High	Medium	Low	Ultra Low		High	Medium	Low	Ultra Low
	A	B	C	D		A	B	C	D
6,400kg									

ANNEX C TO
Bi-SC Dir 85-5
DATED OCTOBER 10

Phased List of Requirements

ITEM #	DESCRIPTION	TIER 1	TIER 2	TIER 3	TIER 4
1A	Runway	F	F	F	F
1B	Arrestor Gear	D	D	D/F	F
1C	Helipads and Landing Lanes	D	D/F	F	F
2	Parallel Taxiway	N/A	N/A	N/A	AR
3	Taxiway	F	F	F	F
4	Aircraft Parking Platforms	F	F	F	F
5	Arm/Disarm Pad	D/F	D/F	F	F
6A	Apron for Maintenance & Inspection of Aircraft	D/F	D/F	F	F
6B/C	Apron for Aircraft Engine Testing	N/A	N/A	N/A	F
6D	Apron for Aircraft Compass calibration	N/A	N/A	N/A	F
7	Roads & Parking Areas	D	D	F	F
8	Airfield Lighting	D	D/F	F	F
9	Standby Electrical Power	D	D	D/F	F
10	Aircraft Fuel Storage & Dispensing Facilities	D	D/F	D/F	F
11	Lubricating Oil and Chemical Fluids Storage	D	D	D	F
12	Motor Fuel Storage & Dispensing Facilities	D	D	D/F	F
14	Aircraft Ammunition Storage	D	D	D/F	F
15	Control Tower	D	D/F	F	F
16 A-F	Operations Facilities	D	D/F	F	F
18	Base HQ Building	D	D	D/F	F
19A	Aircraft Maintenance Hangar	N/A	D	D/F	F
19B	Aircraft Shelter	N/A	D	D/F	F
19C	Aircraft Washing Facilities	N/A	N/A	N/A	F
19D	Aircraft Weapons Calibration Facility	N/A	N/A	N/A	AR
20	Warehouse/Storage Facilities	D	D	D/F	F
21	Facilities for cargo and personnel handling	D	D	F	F
22	Aircraft Maintenance Work Shop	D	D	D/F	F
23	Vehicle Maintenance Workshop	D	D	D/F	F
24	Crash & Fire Station	D	D	D/F	F
25	Vehicle Pool Hardstand	D	D	D/F	F
28	Communications System	D	D	D/F	F
29A+B	Landing Aids (GCA)/ HF/DF buildings	D	D	D/F	F
30	Utilities General	D	D/F	D/F	F
34	Fencing and Gates	D/F	F	F	F
39A/B/C	NAEW Facilities (IT/Training/Base Support)	N/A	N/A	N/A	N/A
40A/B/C	AGS Facilities (IT/Training/Base Support)	N/A	N/A	N/A	N/A

Legend: (F=fixed / D=deployable/expedient[1] method / AR=as required / N/A=not applicable)

[1] Actions taken during the initial stages of any operation to mitigate the lack of infrastructure (for example the use of deployable assets or temporary facilities)