Expeditionary Runway Lighting System

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Synopsis:
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THIS IS NOT A SOLICITATION.This Request for Information (RFI) is for information and planning purposes only and does not constitute a Request for Proposal.It shall not be construed as a commitment by the Government to award a contract as a result of this request for information.The Naval Air Warfare Center Aircraft Division Lakehurst is seeking information on portable runway lighting systems in support of the USMC Expeditionary Airfield (EAF) mission.Recent advances in off-the-shelf battery, remote control and light emitting diode (LED) technologies have shown the potential to replace or augment existing systems in the EAF inventory.

An immediate solution to desired capabilities stated herein is not required at this time.The intent of this RFI is to gain awareness of the different technical approaches being pursued by industry to advance the market of airfield lighting.The capabilities and technical characteristics presented in this synopsis shall be considered as guidance only, do not represent a final system specification, and may be subject to change at a later date.

The EAF concept supports a myriad of airfield lighting configurations, ranging in size and complexity from single-aircraft vertical take-off and landing (VTOL) sites, to short runways for tactical aircraft, to extended runways for heavy cargo lift.Therefore, it would be impractical to define such complete, overarching capability in a single, inflexible performance specification.For the purpose of this RFI, the term modified medium intensity, visual flight rules will be used as a generic performance description for a system capable of supporting a single, 4000-ft long runway.The demonstrated or implied potential to improve upon the stated capabilities in order to increase the application and/or capability of the system, or its components, will also be considered.

The unique operating scenario of the EAF concept places many equipment configuration specifications outside the scope of US Navy (NAVAIR 51-50AAA-2), Unified Facilities Criteria (UFC), Federal Aviation Administration (FAA), International Civil Aviation Organization (ICAO) and North Atlantic Treaty Organization (NATO) requirements.Although verbatim adherence to such published specifications would therefore be impractical, individual technical characteristics previously established by these agencies have served as the basis for a number of the performance criterion stated in this synopsis.

Desired System Capability

1.System shall be capable of supporting both Night Vision Device (NVD) -aided and un-aided flight operations through the use of visual spectrum and infrared spectrum light sources.

2.The system shall be capable of providing adequate visual cues to allow acquisition of the airfield at a minimum straight-on approach distance of 3 nautical miles.This shall apply to both NVD-aided and un-aided flight operations.

3.All system components shall be stored aboard one, single-axle towed trailer.Trailer chassis shall be an approved variant of the Light Tactical Trailer, Heavy Chassis (LTT-HC); to include the Flatdeck (LTT-F), Flatdeck Extended (LTT-FE) and Marine Corps Chassis (LTT-MCC).Total system weight, including trailer, shall not exceed 4200 pounds.

4.The system shall, at a minimum, contain of the following airfield lighting components:

16 Runway Edge Lights

2 Runway End Identifier Lights

8 Runway Threshold Lights

1 Precision Approach Path Indicator (PAPI) system

5.All airfield lighting components shall utilize light emitting diodes (LED) or other solid state lighting devices for their light source.

6.All airfield lighting components shall be powered by rechargeable batteries, and include provisions for hard-wiring to a prime power source.Batteries shall be capable of maintaining the maximum power output of each fixture for a minimum of 16 hours, continuous, even when the battery capacity has been degraded to 75% of its as-manufactured capacity.All fixtures shall be capable of being fully recharged (within 95% of capacity) in less than 8 hours.The necessary battery charging equipment, sufficient to simultaneously recharge all the airfield lighting components provided with the system, shall be integral to the system and/or individual components.

7.On-board battery charging equipment shall be capable of operating from all commonly found voltages worldwide.

8.The system shall include one (1) DOD-approved 3kW diesel-fueled generator (model number MEP-831A) for the purpose of battery recharging, short-term hard-wired operation, and the operation of other ancillary equipment.

9.The method for providing hard-wired power distribution, other than the interface to each individual fixture, does not need to be defined in detail at this time.

10.Each airfield lighting component shall posses the means to be manually switched on/off and through all intensity and output settings.Additionally, each lighting fixture shall be capable of wireless control of all functions through a dedicated remote control unit operating within the appropriate ISM band.

11.All airfield lighting fixtures shall exhibit ingress protection to a level of IP67 or NEMA 6.Although the system is intended to be portable and capable of rapid installation, all runway lighting components shall be expected to survive an installed duration of no less than 12 months.

12.All airfield lighting fixtures shall possess the ability to recharge their battery when both attached or detached from the fixture.Removing the battery (or batteries) from a fixture shall not require any tools.

13.All airfield lighting fixtures shall be capable of being fitted to an individual mounting base.Mounting bases shall be capable of being secured to surfaces including, but not limited to: routine/hard soil, asphalt, rock, coral, concrete, and various types of airfield surfacing materials (matting).Attaching hardware for securing the fixture to such surfaces may be determined and sourced separately by NAVAIR Lakehurst.Mounting base shall possess a means to positively lock the light to the base while retaining frangibility of the fixture.Mounting bases shall be retrievable, require no scheduled maintenance and will be considered consumable items.

Desired Performance of Individual Components

Runway Edge Light

1.Fixtures shall be capable of serving as both a medium intensity runway edge light and a VTOL site edge light.

2.Visible color shall be within the coordinates of Aviation White, as defined in SAE AS25050.

3.Aviation White output in the vertical plane shall be in accordance with the following table:

2 10 degrees 10 15 degrees 45 90 degrees

Minimum Minimum Average

Intensity Minimum Minimum

75 cd 125 cd 40 cd 5 cd

4.Aviation White output in the horizontal plane shall be consistent throughout all radials along 360 degrees of omnidirectional coverage.

5.Aviation White output shall be selectable through the following three intensity levels:

Setting Relative Intensity

Visible High 100%

Visible Medium 30%

Visible Low 10%

6.Infrared output shall have a high degree of perceptibility by Generation 3+ NVDs with low naked eye visibility.The infrared output shall have a peak emission and/or centroid wavelength between 850 and 900 nanometers.The half-power bandwidth of the infrared output shall be as narrow as possible to minimize visibility to the naked eye, while still maintaining the desired acquisition distance stated in the next paragraph.

7.Infrared output shall have the appropriate intensity to allow visibility at the following distances, when set to the indicated setting:

Setting Visible Range

NVD High 6.0 nautical miles

NVD Medium 3.5 nautical miles

NVD Low 0.5 nautical miles

8.At a minimum, the infrared output shall be projected in the vertical plane between 2 and 10 degrees, and shall be consistent throughout all radials along 360 degrees of the horizontal plane.

9.Fixture shall be capable of being set to any combination of simultaneous visible (white) and infrared output.

Runway End Identifier Light

1.Installed in pairs, these fixtures will serve as a uni-directional visual aid in identifying the beginning threshold of a runway.

2.Color of the visible light emitted by these fixtures shall be within the coordinates of Aviation White, as defined in SAE AS25050, or equivalent to that produced by an unfiltered xenon gas discharge lamp (white, at approximately 4000-8000 degrees Kelvin).

3.White output shall be selectable through the following three intensity levels:

Setting Effective Intensity

Visible High 5000 cd

Visible Medium 1500 cd

Visible Low 300 cd

4.Output beam pattern (visible and infrared) shall be 10 degrees vertical by 30 degrees horizontal.

5.Infrared output shall have a high degree of perceptibility by Generation 3+ NVDs with low naked eye visibility.The infrared output shall have a peak emission and/or centroid wavelength between 850 and 900 nanometers.The half-power bandwidth of the infrared output shall be as narrow as possible to minimize visibility to the naked eye, while still maintaining the desired acquisition distance stated in the next paragraph.

6.Infrared output shall have the appropriate intensity to allow visibility at the following distances, when set to the indicated setting:

Setting Visible Range

NVD High 15.0 nautical miles

NVD Medium 9.0 nautical miles

NVD Low 1.5 nautical miles

7.Fixture shall be capable of being set to any combination of simultaneous visible and infrared output.

8.Visual and infrared output shall have a flash rate of 120 flashes per minute (plus or minus 10 percent).

9.When installed as a pair, both fixtures shall flash simultaneously, with no more than 20 milliseconds of difference between them.Simultaneous flashing shall not require a hard-wired connection between the two fixtures.Synchronization shall be achieved through wireless communication, and a pair of fixtures shall be capable of achieving full synchronization within 5 seconds of operation.

Runway Threshold Light

1.Fixtures shall serve as bi-directional, red/green indicators to define the threshold and end of the runway.Installation will be in four pairs, each located at a corner of the runway boundary.

2.Visible colors shall be within the boundaries of Aviation Red and Aviation Green, as defined in SAE AS25050.

3.Output in the vertical plane shall be in accordance with the following table:

0 9 degrees

Minimum Average

Intensity

Visible High Green 90 cd

Red 10 cd

Visible Medium Green 30 cd

Red 3.5 cd

Visible Low Green 10 cd

Red 1.0 cd

4.For red and green, output in the horizontal plane shall be consistent throughout all radials along 180 degrees of coverage.Infrared output may consist of two separate 180 degree sources, or a single 360 degree output.

5.Infrared output shall have a high degree of perceptibility by Generation 3+ NVDs with low naked eye visibility.The infrared output shall have a peak emission and/or centroid wavelength between 850 and 900 nanometers.The half-power bandwidth of the infrared output shall be as narrow as possible to minimize visibility to the naked eye, while still maintaining the desired acquisition distance stated in the next paragraph.

6.Infrared output shall have the appropriate intensity to allow visibility at the following distances, when set to the indicated setting:

Setting Visible Range

NVD High 6.0 nautical miles

NVD Medium 3.5 nautical miles

NVD Low 0.5 nautical miles

7.Fixture shall be capable of being set to any combination of simultaneous visible (red/green) and infrared output.

Precision Approach Path Indicator System

1.This system shall serve as a visual glideslope indicator for aircraft approaching the runway.The desired system will be similar in both concept and performance to existing PAPI systems employed worldwide.That is, each light unit shall produce a beam of light split horizontally, with white light in the top sector and red light in the bottom.

2.Desired system shall be capable of meeting or exceeding the photometric performance (intensity and distribution) for white and red light as stated in FAA Advisory Circular 150/5345-28F.

3.Light output shall be selectable through the following three intensity levels:

Setting Relative Intensity

Visible High 100%

Visible Medium 20%

Visible Low 5%

4.In addition to a visual white/red signal, each light unit shall be capable of providing an infrared output that is split horizontally, with a steady beam in the top sector and a flashing beam in the bottom.

5.Infrared output shall have a high degree of perceptibility by Generation 3+ NVDs with low naked eye visibility.The infrared output shall have a peak emission and/or centroid wavelength between 850 and 900 nanometers.The half-power bandwidth of the infrared output shall be as narrow as possible to minimize visibility to the naked eye, while still maintaining the desired acquisition distance stated in the next paragraph.

6.Infrared output shall have the appropriate intensity to allow visibility at the following distances, when set to the indicated setting:

Setting Visible Range

NVD High 15.0 nautical miles

NVD Medium 10.0 nautical miles

NVD Low 5.0 nautical miles

7.Each light unit shall possess integral provisions to allow an installer to secure the unit to its mounting base, level the unit (front-to-back and side-to-side) and set aiming angle without the use of any special tools.

8.To accommodate concerns for rapid installation and/or available real estate, each individual light unit shall have universal capabilities which would allow the PAPI system to be operated as either a 4-Box arrangement (L-880) or a 2-Box arrangement (L-881).All light units shall be interchangeable with one another, and a user-selectable means of readily identifying where in an arrangement of boxes a particular light unit is installed shall be provided.

9.Individual light units shall be capable of being adjusted for accommodating a glideslope angle of between 2 and 8 degrees, inclusive, in 0.5 degree increments.

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