Approach Light Systems

CEE 4674 – Airport Planning and Design

Dr. Antonio A. Trani
Professor of Civil Engineering
Virginia Polytechnic Institute and State University

Blacksburg, Virginia
2015

Purpose

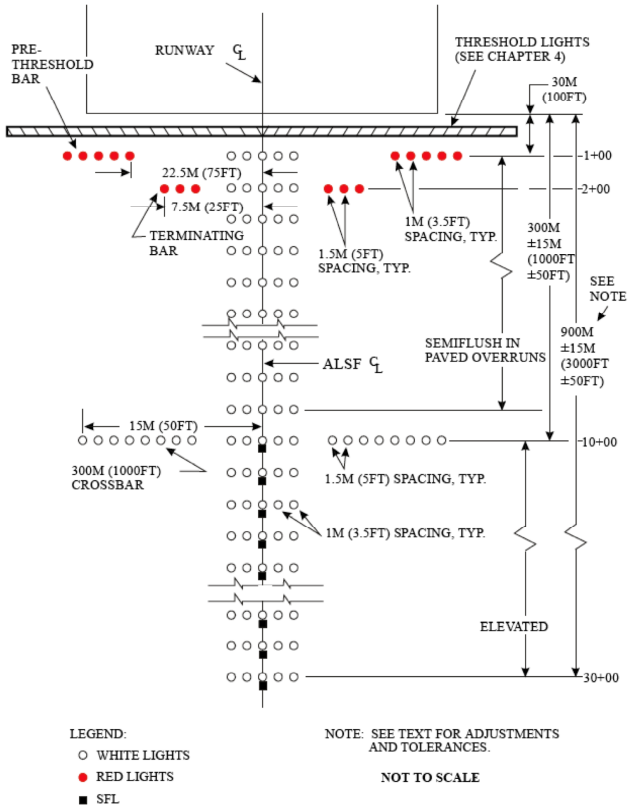
- Provide guidance in the transition from instrument to visual conditions
- Very important to many airports to provide reliable service to them
- Various types of system shave been developed over the past 60 years

Types of Systems and Deployment

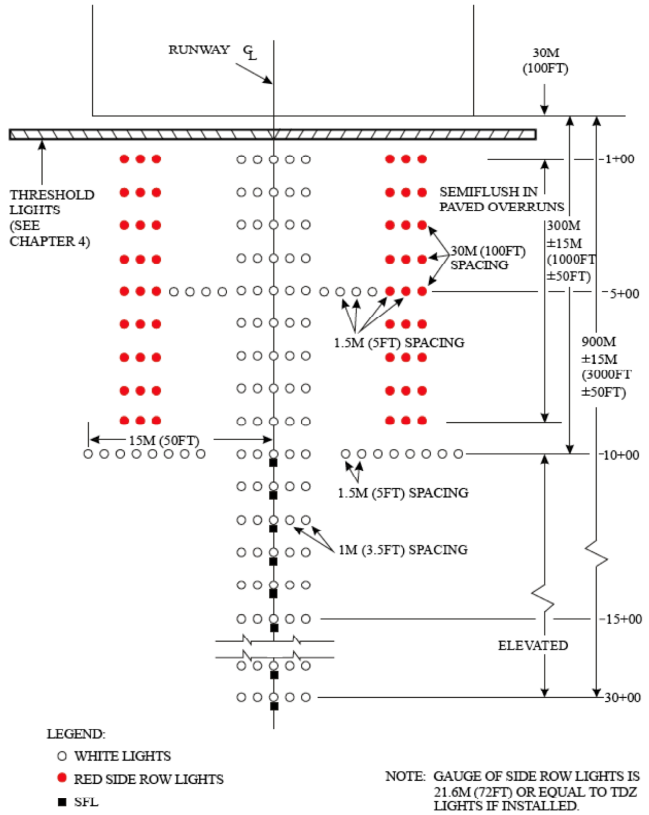
Table 1.2. Approach Light Systems and Installations in the United States. Source: FAA Airport and Runway Facilities Directory (February 2008).

Approach Light System (ALS)	Name of the Approach Light System	Number of Systems Installed at U.S. Airports	Number of Airports with ALS System
ALSF-1	High Intensity Approach Light Systems with Sequenced Flashing Lights (Configuration 1)	129	84
ALSF-2	High Intensity Approach Light Systems with Sequenced Flashing Lights (Configuration 2)	154	99
LDIN	Lead-in Lighting System	21	19
MALS	Medium Intensity Light System	66	61
MALSF	Medium Intensity Light System with Flashers	66	64
MALSR	Medium Intensity Light System with Runway Alignment Indicator Lights	823	633
ODALS	Omni-directional Approach Lights	98	94
SALS	Short Approach Light System	22	18
SSALS	Simplified Short Approach Light System	4	4
SSALR	Simplified Short Approach Light System with Runway Alignment Indicator Lights	11	9
SSALSF	Simplified Short Approach Light System with Sequenced Flashers	4	3
Total Systems		**1,398**	

ALSF-1 and ALSF-2 Systems



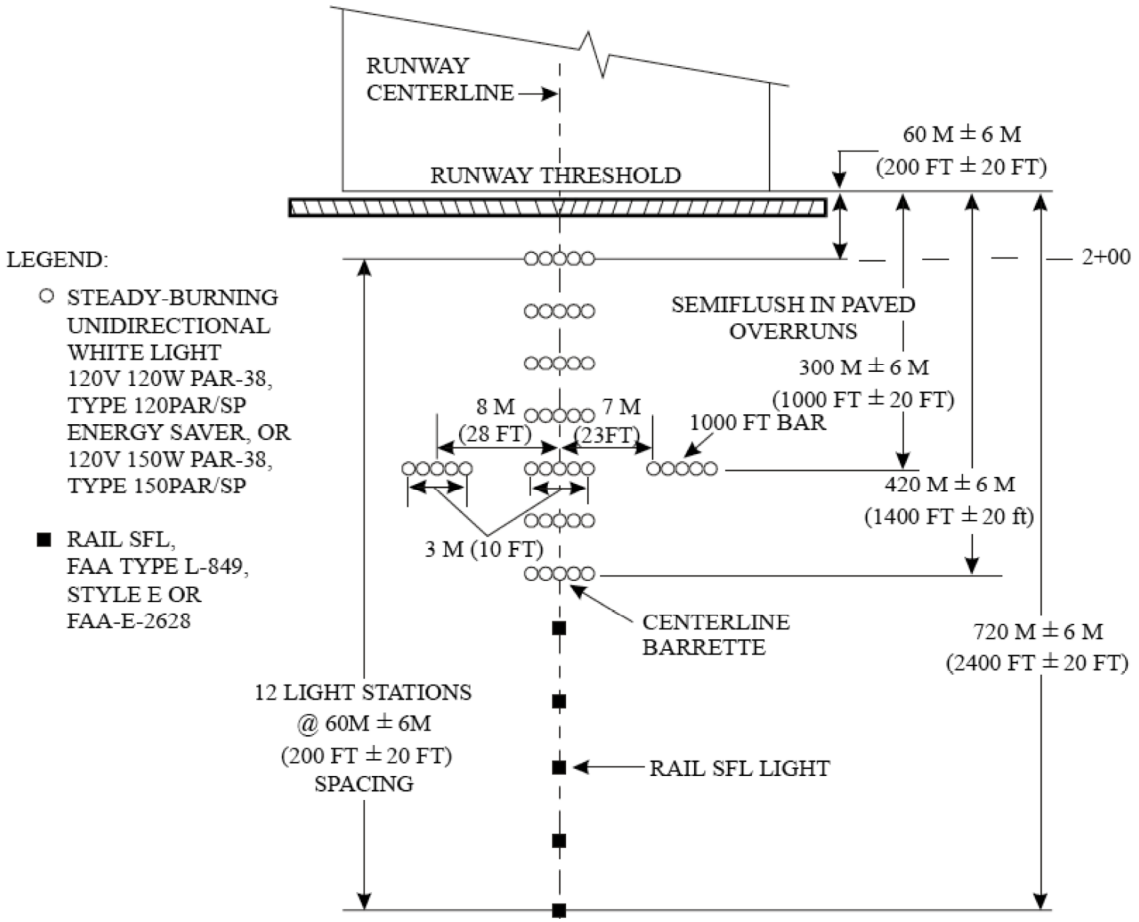
ALSF-1



ALSF-2

SOURCE: DEPARTMENT OF DEFENSE, UNIFIED FACILITIES CRITERIA: VISUAL AIR NAVIGATION FACILITIES DOCUMENT UFC-3-535-01

MALSR System



SOURCE: DEPARTMENT OF DEFENSE, UNIFIED FACILITIES CRITERIA: VISUAL AIR NAVIGATION FACILITIES DOCUMENT UFC-3-535-01

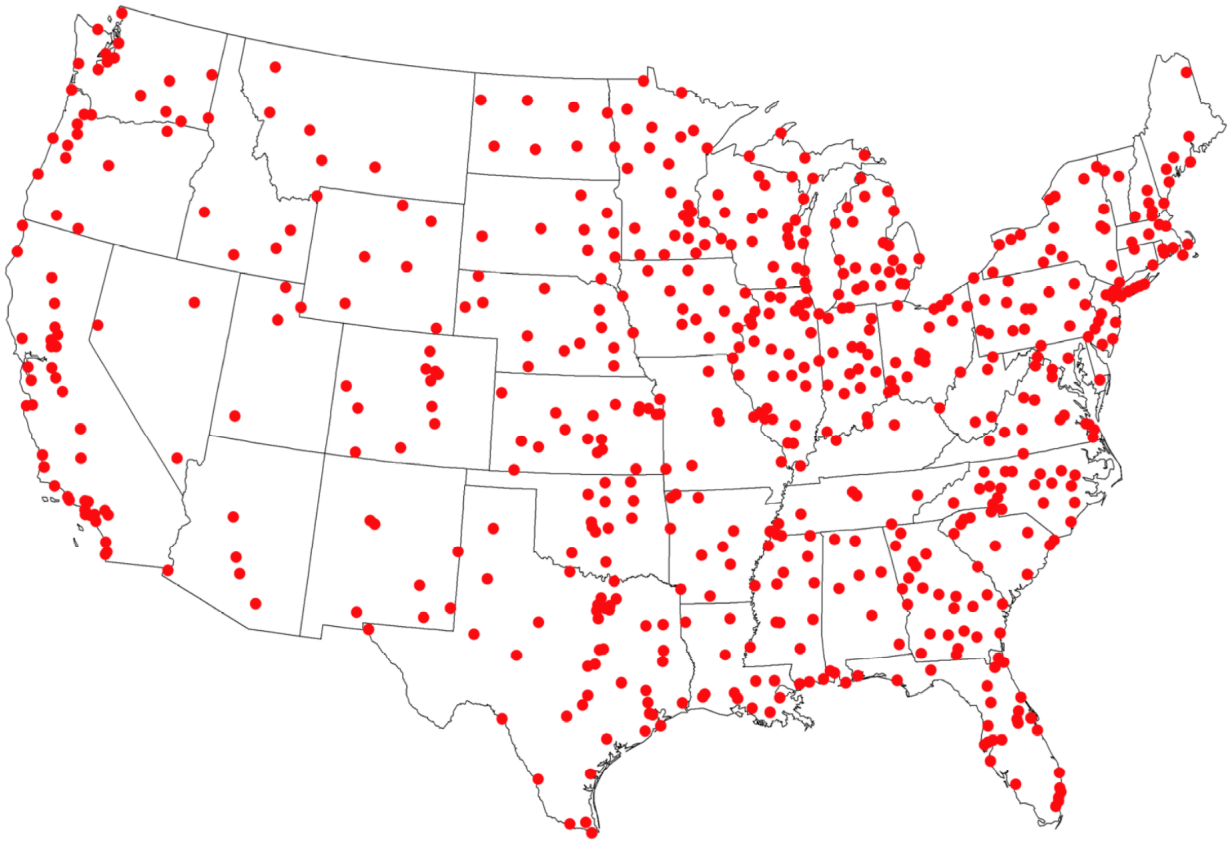
FAA Guidance (AC 5300-13 App. 16)

Table 1.1 Federal Aviation Administration Runway Design Criteria for Approach Light Systems.

Runway Design Criteria	Lights	< 3/4 Statute Mile	< 1 Statute Mile	1 Statute Mile	> 1 Statute Mile	Circling
Precision Instrument Approach	Runway Edge Lights	HIRL / MIRL	HIRL / MIRL	N/A	N/A	N/A
	Approach Lights	MALSR, SSALR, or ALSF	Recommended	N/A	N/A	N/A
Approach Procedure With Vertical Guidance (APV-RNP)	Runway Edge Lights	HIRL / MIRL	HIRL / MIRL	MIRL/LIRL	MIRL/LIRL	N/A
	Approach Lights	ODALS, MALS, SSALS	ODALS, MALS, SSALS	Recommended	Recommended	N/A
Non-precision Approach	Runway Edge Lights	HIRL / MIRL	HIRL / MIRL	MIRL / LIRL	MIRL / LIRL	MIRL / LIRL (Required only for night minima)
	Approach Lights	MALSR, SSALR, or ALSF Required	ODALS, MALS, SSALS, SALS	Recommended (ODALS, MALS, SSALS, SALS)	Recommended (ODALS, MALS, SSALS, SALS)	Not Required

HIRL = High Intensity Runway Lights, MIRL = Medium Intensity Runway Lights, Others explained in Table 1.2.

Deployment of MALSR Systems



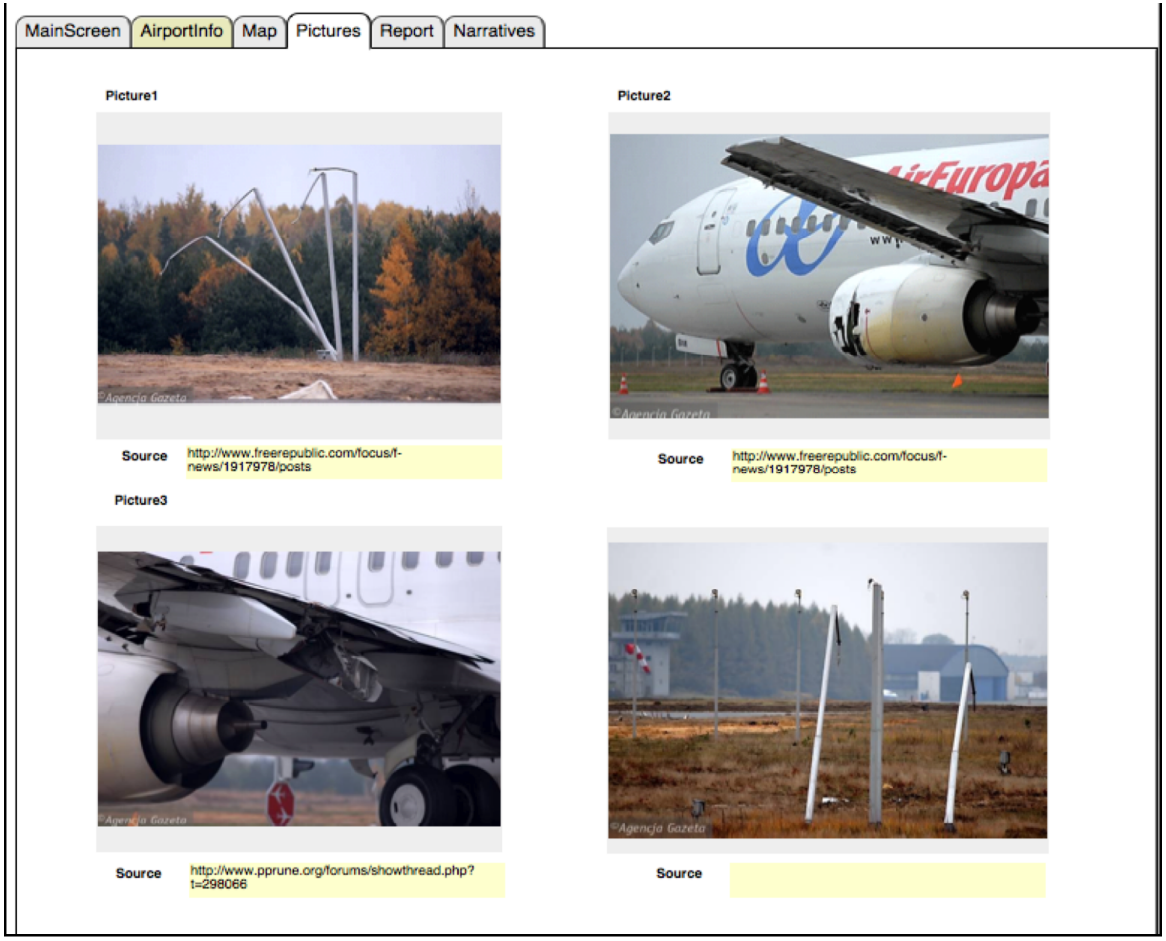
633 airports (823 systems)

Frangibility Issues

- Ideally, ALS system mounts should be frangible
- Several types of mounts:
  - Aluminum
  - Fiberglass (tubes)
  - Hybrid mounts (Frangible + Non-frangible)

Why Do We Need Frangibility?

- Accidents occur (420 overruns and undershots in 30 years)
- 110 accidents hit ALS lights
- Air Europa aircraft accident



Approach Lights Mounted on Fiberglass Tubular Poles

Approach Lights Mounted on Aluminum Lattice Support Structures

Approach Lights Mounted on Hybrid Supports (Frangible and Non-Frangible)

Approach Lights Mounted on Hybrid Supports (Frangible Fiberglass Tubular Poles and Non-Frangible Wooden Pier Structure)